Universitat
de les Illes Balears

DOCTORAL THESIS

2020

THREE ESSAYS ON BUSINESS GROUPS, CORPORATE GOVERNANCE AND INTERNATIONALIZATION

Paula María Infantes Sánchez

Universitat Autònoma de Barcelona

Universidad Pública de Navarra
Nafarroako Unibertsitate Publikoa

Universitat de les Illes Balears

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2020

Doctoral Programme of Economics, Management and Organization (DEMO)

THREE ESSAYS ON BUSINESS GROUPS, CORPORATE GOVERNANCE AND INTERNATIONALIZATION

Paula María Infantes Sánchez

Thesis Supervisor: Rafel Crespí Cladera
Thesis Supervisor: Bartolomé Pascual Fuster
Thesis tutor: Rafel Crespí Cladera

Doctor by the Universitat de les Illes Balears

To my family

In memory of my beloved parents

The creatures outside looked from pig to man, and from man to pig, and from pig to man again; but already it was impossible to say which was which

George Orwell

Animal Farm, 1945

ACKNOWLEDGEMENTS

I would like to dedicate my first words of acknowledgment to my supervisors, Dr. Rafel Crespí Cladera and Dr. Bartolomé Pascual Fuster (Tomeu), who have been always willing to help and support me during the long process of this thesis. Without their advice, dedication and patience I could never finish this work. I hope that we will continue producing science for many more years. They well know that I will always be *"una passadora de pena"*.

I also want to thank Prof. Ruth V. Aguilera for offering me the opportunity of working with her during my research stay at the Department of International Business and Strategy at Northeastern University (Boston, US). Since the very beginning, she embraces me, she has shared with me her professionalism, and I have received the most fruitful comments I could ever receive (I will never forget when you left *Ines Rosales* cake in my office, it made me more than happy). A few words of gratitude have to go to Prof. Marco A. Barrenechea Méndez (MA), for his really helpful comments at the final stage of my thesis and his warm words while I was struggling with the job market. I could dedicate this quote to you: *"Good guys go to heaven, bad guys go everywhere".*

I am indebted to Dr. Heiko Rachinger for being my constant support and for solving all my econometric (and other) problems. I cannot forget to thank Dr. Abel Lucena Pimentel, who introduced me to the world of programming with Stata (I really love every pair of trainers you wear). I also thank my colleagues at the Business Economics Department and the Applied Economics Department at the Universitat de les Illes Balears, and all the financial and technical support that I received to conduct my research. This doctoral thesis has mainly been funded through the Spanish Ministry of Economy and Competitiveness scholarship, FPI program (ref. EEBB-I-18-12761).

Of course, I owe part of this thesis to my *Pasillo Girls* (Miryam and Nana), as they have been crucial in the development of my academic career and I will always have them in my heart. I will never forget all our break moments and *ranking times*.

My *gang* in Mallorca also deserves my mention. Olga, Diego, Sara, María, Jaime, Claudio, Marina, Berna, Antonio and Carlos know how much I have been striving for this thesis (and how much I had to give up some plans to work on it). My everlasting friends, despite the hundreds of kilometers away, have been supporting me during each difficult moment that I faced in the last years. Carmen, Manuel and Andrés are as important as my family.

Without my parents, Gloria and Alberto, this thesis would not have sense. I cannot express with words how blessed I feel of having had them as my parents. They have inspired me during my whole life and I am sure they will continue doing that wherever or whenever they are. I also would like to express my gratitude to my aunt Rosi (the smartest person ever) and to my siblings, Alberto, Piti and Rosalia, for their support and love during all these years, despite the distance that separates us. I regret all the moments that I could not share with my beloved nephews, my voice will always resonate in their minds: “Go away, I have to write!”

Special thanks go to my companion life, Yerai, who will feel the same happiness as me after this new episode in our lives, which will be determinant to finally stay together somewhere. He perfectly knows what this thesis means to me and I am sure he is proud of my achievement. Despite all the problems that I have encountered along the pathway, he was always there to help me –over the telephone, in Skype or visiting me. You deserve this thesis as much as I do.

ABSTRACT

Business groups have emerged in recent decades as key economic players around the world, with a higher prevalence in developing countries, but with presence in developed economies. Business groups are defined as a group of legally independent companies, joined by formal ties –such as ownership- or informal ties –such as ethnic links - whose aim is the exchange of resources and the alignment of strategies, within the same country or beyond its borders.

Despite its relevance globally, academics have mainly focused on their role as substitutes for institutions in environments fueled by market failures and weak institutional development. Therefore, there is a lack of research on the strategies of these corporations and their governance structures.

The purpose of this thesis is to address three main features of business groups: to know the state of the art in terms of business groups and their internationalization strategies, to study their corporate governance structure and the agency and dependency relationships between the parent companies and the subsidiaries of these entities, and to analyze the composition of boards of directors regarding gender diversity.

First, this thesis begins with a review of the literature about business groups and their internationalization strategies. In this chapter, we observe that most of the research deals with the effect of business group's affiliation on internationalization, rather than on the analysis of the internationalization strategies of groups as a joint organization. In addition, a majority of academic work remains stagnant in the large business groups that dominate developing economies. A relevant contribution of this chapter is the identification of vertical and hierarchical business groups through the use of algorithms, based mainly on ownership relationships and links between boards of directors.

The third chapter of this thesis seeks to delve into the corporate governance structures of business groups, specifically into the role of interlocking directors - directors who sit on multiple boards of directors - in the hierarchical relationships that exist between the headquarters and the affiliates within the business groups. Although the headquarters have control over the subsidiaries, there may be problems associated with asymmetric information, also known as agency problems, caused by the legal independence of the companies that integrate the group. This chapter presents interlocking directors as a potential mechanism to solve agency problems between headquarters and affiliates, thanks to the use of their privileged information for holding positions in different boards. However, this information resource may encounter different barriers, such as the geographical, institutional and industrial distance between headquarters and affiliated firms. Based on agency theory and resource dependence theory, we find that these barriers hinder the use of interlocking directors as a possible solution to agency problems. In addition, executive directors are more likely to be elected as interlocking directors.

This thesis concludes with a final chapter dedicated to the role of women directors on boards of headquarters and affiliates. This chapter aims at analyzing the relationship between gender diversity in headquarters and gender diversity in affiliated firms, under two main arguments: (i) whether the determinants of women's access to headquarters' boards may spread to the affiliates, due to the control relationships between headquarters-affiliates and based on inter-organizational approach, or (ii) whether the women in headquarters may exert their power and are responsible for a greater presence of women directors in affiliates, drawing upon homophily theory. Additionally, we study whether the empowerment of women, as executives in headquarters, may lead to an increase in the number of women directors in affiliates. These two relationships may be affected by moderating effects of the characteristics of business groups: level of the affiliate within the group, affiliates' importance in terms of income, and percentage of ownership of headquarters over the affiliates. Finally, we find a positive association between gender diversity in headquarters and gender diversity in affiliates, which may suggest that the above-mentioned arguments may be occurring. However, the empowerment of women directors does not lead to higher representation of women directors on affiliates' boards. These findings, thus, open an outstanding debate about women directors in business groups.

RESUMEN

Los grupos empresariales se han erigido en las últimas décadas como los principales agentes económicos a lo largo de la geografía mundial, con una mayor prevalencia en países en vía de desarrollo, pero también presentes en economías desarrolladas. Los grupos empresariales se definen como un conjunto de empresas con independencia legal, unidos por lazos formales –como por ejemplo la propiedad- o lazos informales –como por ejemplo la pertenencia a una etnia común- cuyo objetivo es el intercambio de recursos y la alineación de estrategias, dentro de un mismo país o más allá de sus fronteras.

Pese a su relevancia a nivel global, los académicos principalmente se han centrado en su función como sustitutos de instituciones en entornos acuciados por fallos de mercado y débil desarrollo institucional. Por consiguiente, existe una carencia de trabajos de investigación acerca de las estrategias de dichas organizaciones y sus estructuras de gobierno corporativo.

La presente tesis tiene como finalidad abordar tres grandes rasgos de los grupos empresariales: permitir conocer el estado del arte en cuanto a los grupos empresariales y sus estrategias de internacionalización, estudiar su estructura de gobierno corporativo y las relaciones de agencia y dependencia entre las matrices y las filiales de dichas entidades, y analizar la composición de los consejos de administración en materia de diversidad de género.

En primer lugar, esta tesis se inicia con una revisión de la literatura acerca de los grupos empresariales y sus estrategias de internacionalización. En dicho capítulo, se observa que la mayor parte de la investigación se versa en el efecto de la afiliación a un grupo empresarial sobre la internacionalización, más que en el análisis de las estrategias de internacionalización de los grupos como una organización en conjunto. Además, una mayoría de trabajos académicos sigue estancada en los grandes grupos que dominan las economías en vía de desarrollo. Una contribución relevante de este capítulo es la identificación de grupos empresariales verticales y jerárquicos mediante la utilización de algoritmos, basados principalmente en relaciones de propiedad y entre los consejos de administración de las empresas.

El tercer capítulo de la presente tesis pretende ahondar en las estructuras de gobierno corporativo de los grupos empresariales, específicamente en el rol de los *interlocking directors* –directores que se sientan en múltiples consejos de administración- en las relaciones jerárquicas que existen entre la matriz y las empresas filiales dentro de los grupos. A pesar de que las matrices controlan las filiales, pueden existir problemas asociados a la información asimétrica, también conocidos como problemas de agencia, acuciados por la independencia legal de las empresas que conforman el grupo. Este capítulo presenta a los *interlocking directors* como un potencial mecanismo para resolver los problemas de agencia entre matriz y filial, gracias al uso de su información privilegiada por ocupar cargos en diferentes consejos. No obstante, dicho recurso de la información puede toparse con diferentes barreras, tales como la distancia geográfica, institucional e industrial entre matriz y filiales. Basándose en la teoría de la agencia y la teoría de la dependencia de los recursos, se encuentra que dichas barreras frenan la utilización del *interlocking director* como una

posible solución a los problemas de agencia. Además, los directores ejecutivos tienen más propensión a ser elegidos como *interlocking directors*.

Esta tesis concluye con un último capítulo dedicado al rol de las mujeres directivas en los consejos de administración de las matrices y filiales de los grupos empresariales. Dicho capítulo pretende analizar la relación entre la diversidad de género en las matrices y la diversidad de género de las filiales, bajo dos argumentos principales: (i) si los determinantes del acceso de la mujeres a los consejos de la matriz se expanden hasta las filiales, debido a las relaciones de control entre matriz-filial y basándose en el enfoque de las dinámicas inter-organizacionales, o (ii) si las mujeres de las matrices ejercen su poder y son las responsables de una mayor presencia de mujeres directoras en las filiales, principalmente basado en la teoría de la homofilia. Además se estudia si el empoderamiento de las mujeres directivas en las matrices, jugando el rol de ejecutivas, puede conducir a una mayor presencia de mujeres en los consejos de las filiales. Ambas relaciones se pueden ver afectadas por efectos moderadores de las características de los grupos: nivel de la filial dentro del grupo, importancia en términos de ingresos, y porcentaje de propiedad de la matriz sobre las filiales. Finalmente, se encuentra que existe una asociación positiva entre la diversidad de género en las matrices y la diversidad de género en las filiales, lo que sugiere que los argumentos anteriormente indicados pueden estar ocurriendo. Sin embargo, el empoderamiento de las mujeres directivas no se traduce en un incremento de mujeres en los consejos de las filiales. Dichos resultados, por consiguiente, abren un debate relevante acerca de las mujeres directivas en los grupos empresariales.

RESUM

Els grups empresarials s'han erigit en les últimes dècades com els principals agents econòmics al llarg de la geografia mundial, amb una major prevalença en països en via de desenvolupament, però també presents en economies desenvolupades. Els grups empresarials es defineixen com un conjunt d'empreses amb independència legal, units per llaços formals –com per exemple la propietat- o llaços informals –com per exemple la pertinença a una ètnia comuna- l'objectiu és l'intercanvi de recursos i l'alineació d'estratègies, dins d'un mateix país o més enllà de les seves fronteres.

Malgrat la seva rellevància a escala global, els acadèmics únicament s'han centrat en la seva funció com a substituts d'institucions en entorns apressats per fallades de mercat i feble desenvolupament institucional. Per tant, hi ha una manca de treballs de recerca sobre les estratègies d'aquestes organitzacions i les seves estructures de govern corporatiu.

La present tesi té com a finalitat abordar tres grans trets dels grups empresarials: permetre conèixer l'estat de l'art pel que fa als grups empresarials i les seves estratègies d'internacionalització, estudiar la seva estructura de govern corporatiu i les relacions d'agència i dependència entre les matrius i les filials d'aquestes entitats, i analitzar la composició dels consells d'administració en matèria de diversitat de gènere.

En primer lloc, aquesta tesi s'inicia amb una revisió de la literatura sobre els grups empresarials i les seves estratègies d'internacionalització. En aquest capítol, s'observa que la major part de la investigació es versa en l'efecte de l'afiliació a un grup empresarial sobre la internacionalització, més que en l'anàlisi de les estratègies d'internacionalització dels grups com una organització en conjunt. A més, una majoria de treballs acadèmics segueix estancada en els grans grups que dominen les economies en via de desenvolupament. Una contribució rellevant d'aquest capítol és la identificació de grups empresarials verticals i jeràrquics mitjançant la utilització d'algoritmes, basats principalment en relacions de propietat i entre els consells d'administració de les empreses.

El tercer capítol de la present tesi pretén aprofundir en les estructures de govern corporatiu dels grups empresarials, específicament en el paper dels *interlocking directors* –directors que se sentin en múltiples consells d'administració- en les relacions jeràrquiques que hi ha entre la matriu i les empreses filials dins dels grups. Tot i que les matrius controlen les filials, poden existir problemes associats a la informació asimètrica, també coneguts com a problemes d'agència, aclaparats per la independència legal de les empreses que conformen el grup. Aquest capítol presenta als *interlocking directors* com un potencial mecanisme per resoldre els problemes d'agència entre matriu i filial, gràcies a l'ús de la seva informació privilegiada per ocupar càrrecs en diferents consells. No obstant això, aquest recurs de la informació pot topar-se amb diferents barreres, com ara la distància geogràfica, institucional i industrial entre matriu i filials. Basant-se en la teoria de l'agència i la teoria de la dependència dels recursos, es troba que aquestes barreres frenen la utilització de

l'interlocking director com una possible solució als problemes d'agència. A més, els directors executius tenen més propensió a ser elegits com *interlocking directors*.

Aquesta tesi conclou amb un darrer capítol dedicat al paper de les dones directives en els consells d'administració de les matrius i filials dels grups empresarials. Aquest capítol pretén analitzar la relació entre la diversitat de gènere en les matrius i la diversitat de gènere de les filials, sota dos arguments principals: (i) si els determinants de l'accés de les dones als consells de la matriu s'expandeixen fins a les filials, a causa de les relacions de control entre matriu-filial i basant-se en l'enfocament de les dinàmiques inter-organitzacionals, o (ii) si les dones de les matrius exerceixen el seu poder i són les responsables d'una major presència de dones directores en les filials, principalment basat en la teoria de l'homofilia. A més s'estudia si l'apoderament de les dones directives en les matrius, jugant el rol d'executives, pot conduir a una major presència de dones en els consells de les filials. Totes dues relacions es poden veure afectades per efectes moderadors de les característiques dels grups: nivell de la filial dins el grup, importància en termes d'ingressos, i percentatge de propietat de la matriu sobre les filials. Finalment, es troba que hi ha una associació positiva entre la diversitat de gènere en les matrius i la diversitat de gènere en les filials, el que suggereix que els arguments anteriorment indicats poden estar passant. No obstant això, l'apoderament de les dones directives no es tradueix en un increment de dones en els consells de les filials. Aquests resultats, per consegüent, obren un debat rellevant sobre les dones directives en els grups empresarials.

THESIS SUPERVISION CERTIFICATE

Universitat de les Illes Balears

Dr. RAFEL CRESPÍ CLADERA and Dr. BARTOLOMÉ PASCUAL FUSTER, of the UNIVERSITAT DE LES ILLES BALEARS,

DECLARE:

that the thesis entitled THREE ESSAYS ON BUSINESS GROUPS, CORPORATE GOVERNANCE AND INTERNATIONALIZATION, presented by PAULA MARÍA INFANTES SÁNCHEZ to obtain a doctoral degree, has been completed under our supervision and meets the requirements to opt for an International Doctorate.

For all intents and purposes, we hereby sign this document.

Signatures

Dr. Rafel Crespí Cladera

Dr. Bartolomé Pascual Fuster

Palma, 02/06/2020

CO-AUTHORS' AGREEMENT

Universitat de les Illes Balears

Dra. RUTH V. AGUILERA, Dr. RAFEL CRESPÍ CLADERA and Dr. BARTOLOMÉ PASCUAL FUSTER, as co-authors of the following article:

Aguilera, R.V., Crespí-Cladera, R., Infantes, P.M., Pascual-Fuster, B. (2020). Business groups and internationalization: Effective identification and research agenda. *Journal of World Business* 55 (4) 101050

DECLARE:

that we accept that PAULA MARÍA INFANTES SÁNCHEZ presents the cited article as part of her doctoral thesis and that such article cannot, therefore, form part of any other doctoral thesis.

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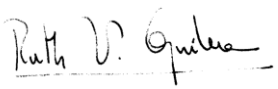

Dra. Ruth V.Aguilera | Dr. Rafel Crespí Cladera | Dr. Bartolomé Pascual Fuster

Palma, 02/06/2020

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1. INTRODUCTION

Business groups dominate most of the economies worldwide. For instance, affiliated firms to business groups signify 51% and 44% of listed companies in South Korea and Taiwan, respectively (Khanna & Yafeh, 2007). Defined as an amalgamation of legally independent firms joined by formal ties or informal ties, with the common aim of sharing resources and operations, at the national or international level, this organizational form is ubiquitous of emerging countries (Granovetter, 1994; Khanna and Rivkin, 2001). However, they are also present in developed countries, such as Spain or Germany, where Inditex or Volkswagen are among the most famous business groups. They receive different labels depending on their location –*keiretsu* in Japan (Aoki, 1990; Gerlach, 1992) or *chaebol* in South Korea (Chang, 2003; Almeida, Park, Subrahmanyam, & Wolfenzon, 2011; Guillen, 2000).

Beyond the former theoretical definition, commonly accepted among scholars, to establish the empirical boundaries of what is a business group challenges some of the current research on business groups. It is worthy to highlight that not all researchers have been struggling with the empirical definition, thanks to the access and availability of secondary data on business groups determination. *Prowess* database on business groups affiliation in India is a good example of the use of business groups' secondary databases. Nevertheless, one of the potential drawbacks of this kind of studies, only focusing on one or two economies, is that they do not allow making comparisons or cross-country analyses.

The purpose of this thesis started with the methodological aim of creating a massive dataset of business groups around the world. In order to do that, we first reviewed all the criteria that have been widely used when trying to come up with an empirical definition of a business group. For

instance, Bamiatzi, Cavusgil, Jabbour, and Sinkovics (2014) rely on the ownership links that tie firms together, and Alcantara and Mitsuhashi (2012) use interlocking directors as a potential tool to identify the confines of business groups. But these previous studies have been conducted in the context of one economy and have determined business groups manually. This thesis joins the recent empirical work done by Masulis, Pham, and Zein (2011) and Belenzon, Hashai, and Patacconi (2019), which can be considered as the first attempts to a massive identification of business groups by the implementation of algorithms on massive firms' databases. Thanks to the algorithmic identification, research on business groups can be generalizable and may allow scholars to compare business groups across countries. Furthermore, relevant questions can be better analyzed when we increase the scope of the samples, as for instance questions related to internationalization and corporate governance, which have received little attention within the academic audience. Nevertheless, our algorithmic identification is not exempt from drawbacks. Although this type of method may offer cross-country comparisons, in some scenarios it may be more precise to rely on given databases with exclusive sources of information. Moreover, the algorithm is not able to detect business groups joined by informal link, such as ethnic, religious, or cultural ties.

This thesis is intended to shed light on the previous questions about business groups and corporate strategies and governance. In Chapter 2, we conduct a systematic literature review in the link between business groups' research and international business articles. Chapters 3 and 4 aim at disentangling some of the corporate governance questions that have been disregarded by scholars, such as the role of interlocking directors and board gender diversity in the headquarters-affiliates relationship.

Internationalization emerges as one of the main corporate strategies that have thrilled academics across years. In a nutshell, when a firm internationalizes, it means that it goes abroad, usually by exporting, acquiring local firms in the host country, or establishing companies beyond the national borders. A business groups itself, through the inter-organizational networks of affiliated firms, may represent one plausible structure to internationalize. However, little has been said about the internationalization processes of business groups. In this sense, the opening chapter (Chapter 2) of this thesis focuses on the relevance of the association between business groups and internationalization research.

Although, a literature review in these two fields was first conducted by Holmes, Hoskisson, Kim, Wan, and Holcomb (2018), our study is the first systematic literature review on the confluence of business groups and internationalization. A content analysis is a technique that permits to systematically take stock of the extant literature in one particular field (Gaur & Kumar, 2018; Krippendorf, 2004; Neuendorf, 2016; Weber, 1990). Along Chapter 2 all the four stages in a content analysis are exhibited: (i) data collection, (ii) data coding, (iii) descriptive analysis of the results, and (iv) interpretation of the coded content. (i) Data collection is the step where the boundaries of the search are defined, such as the keywords, the journals and the period of years. In the (ii) data coding stage, all the categories to classify articles are described. In any content analysis, the information can be systemized and qualitative data can be converted into quantitative data, leading to a (iii) descriptive analysis of the coded content. However, the most important and rewarding step is the (iv) interpretation of the coded content. Thanks to the interpretation, we are able to determine five categories where the research on business groups and internationalization have concentrated, described below.

First, *institutions and other external factors* relates to interactions between institutions, business groups, and internationalization. Second, *internal capabilities and competitive advantage* includes how firms affiliated to business groups deploy their inner capabilities to internationalize, and how internationalization is a resources-seeking strategy. Third, *corporate strategy* alludes to the impact of different firm strategies, such as product diversification or innovation, on internationalization, and how internationalization may facilitate (hinder) different corporate strategies. Fourth, *firm performance* category is mainly based on the relationship between internationalization and performance, moderated by business groups affiliation. And finally, *corporate governance* refers to the connection between corporate governance attributes, such as ownership and board characteristics, and the internationalization of business groups. *Grosso modo*, the findings reveal that the literature is still anchored in large business groups from emerging economies, and that business groups have been used as instruments to explain the internationalization output.

Chapter 2 also includes an explanation about the algorithmic identification of business groups, briefly described above. A closed detailed agenda with promising avenues for future research on business groups and internationalization also comprises this chapter. Basically, there is an appeal for studies centering on small business groups from developed economies. Other relevant specific questions can be further analyzed. For instance, there is still room for further research in analyzing the political connections of business groups, or in exploring whether they engage in unethical strategies when internationalizing.

Collecting massive and international data about corporate governance structures implies a challenge to any empirical research. In our dataset, we are fortunate to count on governance level characteristics of business groups, which allows us to disentangle some of the relevant issues in

the governance of business groups. Previous research on business groups has remained stagnant on the role of these organizations as substitutes for weak institutions and market failures, but little attention has been devoted to explore the governance structures.

Chapter 3 adresses the agency problem between headquarters and affiliates in business groups (Kim, Prescott, & Kim, 2005). Interlocking directors, those who simultaneously sit on boards of the headquarters and the affiliate, may increase the control and coordination between firms in a business groups (Maman, 1999). Drawing on agency and resource dependence theory, we explore the monitoring and advising role of interlocking directors, who have privileged access to key information about both companies. However, information is limited by barriers, such as geographic, institutional and industrial distances, which may hinder the information capacity of interlocking directors. In order to answer this question, we analyze a sample of 39,911 business groups from the OECD countries, for the year 2016. Our results conclude with a negative association between information barriers and the decision to interlock directors. We also find that some characteristics of the business groups, such as the place that occupies the affiliate in the structure of the group and and its economic importance within the business group, also matter for that decision. Furthermore, we observe that executive directors tend to interlock more than non-executives, probably motivated by the access to relevant information by executives. This finding suggests the relevance of information acquisition costs in relation to the costs derived from the executives' time constraints of being involved in daily-managerial tasks.

The presence of women in the boardroom is still limited. In the US, women directors only represent the 21.20% of board positions at S&P 500 companies. We are far from achieving the gender equality on boards and this topic has aroused interest beyond politicians and citizens. A great core of research has explored the situation of women on boards (Kirsch, 2018), from different

points: (i) the organizational and governance outcomes of having women in the boardroom (e.g, Adams & Ferreira, 2009; Faccio, Marchica, & Mura, 2016); (ii) the differences that exist between women and men to attain positions on boards and how they behave within the boardroom; and also (iii) the determinants that drive women's access to boards (e.g., Doldor, Sealy, & Vinnicombe, 2016). Chapter 4 joins those articles that have tried to explain the determinants of board gender diversity, but this is the first work that analyzes the determinants in the context of business groups or other organizational networks.

The research question in Chapter 4 asks whether there is a potential cascading effect, or spillover effect, between board gender diversity in the headquarters and board gender diversity in affiliates. Besides the traditional determinants to women's access to boards that have been formerly studied, affiliated firms in business groups furthermore have to face the instructions from headquarters, which control affiliates. This chapter builds upon two different logics: the institutional one or inter-organizational dynamics approach; and the psychological one or homophily theory. On the one hand, the inter-organizational approach suggests that a firm is influenced by its exchange partners, in particular, their more powerful exchange partners. On the other hand, homophily theory considers women to be closer to other women due to similarities in experience and behavior.

Our results indicate that there is a positive relationship between the representation of women on boards in affiliates and the presence of women directors in headquarters. This finding opens an exciting debate on the two potential channels that may lead to women representation on affiliates' boards: (i) the determinants of women's access to headquarters' boards may spread to the affiliates, through the control ties that link companies within the business groups, based on inter-organizational network approach; or (ii) whether women on headquarters' boards exert their power

to appoint more women onto affiliates' boards, based on homophily theory. Moreover, the positive association is catalyzed or inhibited by three moderating factors: the level of the affiliate in the group (diminisher), the percentage of ownership that the headquarters own in the affiliates (enhancer), and the importance of affiliates in terms of income (enhancer). We furthermore explore the role of women executives in headquarters, as a signal of women empowerment, on women representation in affiliates. We observe that an increase in power of women executives is not translated into higher presence of women directors in affiliated firms. This finding suggests that women's representation in affiliates supports the channel of the spread of headquarters' gender determinants rather than homophily.

Finally, Chapter 5 concludes with the main findings and presents how this thesis aims at contributing to the previous research.

2. BUSINESS GROUPS AND INTERNATIONALIZATION: EFFECTIVE IDENTIFICATION AND FUTURE AGENDA

Published article:

Aguilera, R. V., Crespí-Cladera, R., Infantes, P. M., & Pascual-Fuster, B. (2020). Business groups and internationalization: Effective identification and future agenda. *Journal of World Business*, Volume 55, Issue 4, 101050.

https://doi.org/10.1016/j.jwb.2019.101050

https://www.sciencedirect.com/science/article/pii/S1090951618309301

3. INTERLOCKING DIRECTORS IN HEADQUARTERS-AFFILIATE RELATIONSHIP OF BUSINESS GROUPS

Abstract. This study aims at disentangling the decision of interlocking directors along the hierarchy of business groups. Considering boards as information-processing groups and grounded in agency theory and resource dependence theory, the monitoring and advising functions in the relationship between headquarters and affiliates may be better achieved through interlocks.

Analyzing an international sample of 512,607 boards' positions in affiliates of business groups, our model empirically checks whether three contingent factors –geographic, institutional, and industrial distances between headquarters and affiliates- as proxies of the cost of information acquisition, hinder the decision to appoint interlocking directors. We find that geographic, institutional and industrial distances reduce the presence of interlocking directors in the relationship headquarters-affiliates. We also provide evidence suggesting that there is an association between the type of directors –executive and non-executive directors- and the probability of being an interlocking director. Furthermore, we find that there are characteristics of business groups -such as ownership links and the position of affiliates in the hierarchical structure - that influence this decision.

Keywords. Business groups; interlocking directorates; information acquisition costs; geographic distance; institutional distance; industrial distance

3.1. Introduction

Business groups, broadly defined as a gathering of legally independent firms, occupy a relevant place in the competitive setting of many economies across the world (Holmes, Hoskisson, Kim, Wan, & Holcomb, 2018; Manikandan & Ramachandran, 2015).[1] Within the field of business groups there are two perspectives: the instrumental one and the operational one (Colli & Colpan, 2016). The operational side concentrates on corporate governance issues within business groups and is still in its infancy compared to the instrumental side (Boyd & Hoskisson, 2010), which highlights the importance of business groups as mechanisms for filling voids in underdeveloped markets and for improving control by owners.[2]

Academics have empirically focused on the importance of the composition of boards in the case of individual firms (e.g. Boone, Casares Field, Karpoff, & Raheja, 2007; Lehn, Patro, & Zhao, 2009; Linck, Netter, & Yang, 2008), but there are few studies addressing how business groups structure their boards. Several authors have assessed the importance of boards in subsidiaries focusing mainly on multinational entities (e.g. Du, Deloof, & Jorissen, 2011; Gillies & Dickinson, 1999; Kim, Prescott, & Kim, 2005). To the best of our knowledge, we expand this literature with the analysis of board composition along the hierarchy of business groups.

Based on agency theory (Fama & Jensen, 1983; Jensen & Meckling, 1976), we argue that a potential principal-agent problem between headquarters (principals) and affiliates (agents) may

[1] They are broadly defined as a gathering of legally independent firms joined by formal- such as ownership or interlocking directorate – and informal ties – such as family, kinship, friendship, religion or language – (Guillen, 2000; Granovetter, 1994; Yiu, Bruton, & Lu, 2005) whose aims are the achievement of operational links and the shared use of group's resources (Mahmood et al., 2017) both within and across national borders. For instance, geographic networks, firms that tie based on geographic proximity and operate in complementarity industries -such as Silicon Valley, are not considered business groups. For further clarification about the definition of business groups or the separation of this organizational form from other firm networks, see Cuervo-Cazurra (2006).

[2] To improve the control by owners, the literature has identified the use of pyramids structures (Almeida & Wolfenzon, 2006; Khanna, 2000; Morck & Yeung, 2003).

arise in the context of business groups. This principal-agent dilemma has been studied in the works of Kim et al., (2005) and Ambos, Kunisch, Leicht-Deobald, & Schulte Steinberg (2019), who explore the headquarters-subsidiary relationships in multinationals. We advance the research on boards in business groups by studying directors who simultaneously hold directorship in the headquarters and in the affiliated firms (interlocking directors), as a mechanism to solve this principal-agent conflict (e.g. Maman, 1999). Empirically, directors are extensively interlocked within business groups, as reflected in our data, where almost 37% of board positions in affiliates are occupied by interlocking directors. Moreover, drawing on resource dependence theory (Pfeffer & Salancik, 1978), these directors may also provide valuable advice to the board of affiliated firms. Additionally, and along the same line, these interlocking directors may act as a mechanism to obtain information for advising from the affiliates to the headquarters to better design the overall strategy of the group.

Directors usually need specific information about the firm to provide valuable monitoring and advising (Adams & Ferreira, 2007; Harris & Raviv, 2008; Raheja, 2005). However, information may be costly and these directors may become useless if the costs of acquiring information are too high. For example, Harris & Raviv (2008) specifically explore a theoretical model showing that non-executive directors become irrelevant when the cost of acquiring information is too high. In such a situation, shareholder value is maximized without these directors.

For the case of business groups, this Chapter aims at analyzing three different scenarios where information acquisition costs arise, considering the bilateral relationship between headquarters and affiliates. Specifically, we analyze whether geographic, institutional, and industrial distances between headquarters and affiliated firms influence the decision of interlocking directors in business groups. Geographic distance may lead to an increase of

information acquisition costs due to the difficult of attending board meetings (Knyazeva, Knyazeva, & Masulis, 2013; Lerner, 1995), time zone differences or less access to current local information (Coval & Moskowitz, 1999, 2001). Business groups operating in very different institutional contexts have to overcome the problem of acquiring information in environments where they have less knowledge of country rules, laws and regulations (Kostova, 1999; Kostova & Zaheer, 1999; Xu & Shenkar, 2002), leading to an increase of the costs of acquiring information. Additionally, due to industry specific knowledge, industrial distance among sectors may drive an increase of the costs of acquiring information for any director moving from one industry to another (Dass, Kini, Nanda, Onal, & Wang, 2014; Kang, Kim, & Lu, 2018; Khanna, Jones, & Boivie, 2014).

Analyzing an international sample of 172,760 firms affiliated to 39,911 business groups, we find that geographic distance acts as an impediment to interlock directors between headquarters and affiliates. We also observe that institutional and industrial distances hinder the decision to interlock directors. Additionally, we explore the role of the type of director on the interlocking decision and find that executives tend to interlock more than non-executives, consistently with a reduction of costs of acquiring information. We also control for several business groups-specific traits. For example, we find that the organizational structure –measured as the level that each affiliate occupies within the structure of the business group- is considered to interlock directors, since affiliates located at the bottom of the structure are less likely to interlock directors. The percentage of ownership that the headquarters has on each affiliate also impacts on the decision of interlocking directors. Our results show that those affiliates owned with a larger percentage are more likely to interlock directors with the headquarters.

The contribution of this study is threefold. First, previous research has analyzed the intersection of business groups and corporate governance via conceptual frameworks (in e.g., Boyd & Hoskisson, 2010; Colli & Colpan, 2016). However, our research empirically contributes to this intersection. In particular, this Chapter sheds light on the structure of boards within business groups, an avenue of research that has received scarce attention (in e.g. Ambos et al., 2019; Du et al., 2011; Kim et al., 2005).

Second, we contribute to the literature of information processing and barriers (Boivie, Bednar, Aguilera, & Andrus, 2016) by identifying three potential barriers that influence the decision of interlocking directors within business groups. This study joins previous literature considering how different characteristics of cross-national distance may influence managerial decisions (e.g., Berry, Guillen & Zhou, 2010; Ghemawat, 2001). This literature has argued that cross-national differences increase uncertainty by preventing the information flow between countries. Specifically, we consider two dimensions of cross-national distance –geographic and institutional, since different types of distance may affect firm and managerial decisions differently. We also take into account the industrial distance between the headquarters and the affiliates, therefore providing a richer framework in the analysis of information barriers. Moreover, we provide empirical evidence to the literature of information acquisitions costs on board of directors (Boone et al., 2007; Lehn et al., 2009; Linck et al., 2008).

Third, we complement limited research on the empirical identification of business groups using massive datasets (e.g., Belenzon, Hashai, & Patacconi, 2019; Masulis, Pham, & Zein, 2011) through formal ties, such as ownership links. Research on business groups heretofore has been developed mostly thanks to the application of secondary databases (e.g. Fisman & Khanna, 2004; Khanna & Rivkin, 2001). However, we build a novel dataset of hierarchical business groups from

raw ownership data of stand-alone firms, where we implement an algorithm able to empirically detect business groups from ownership ties among firms. A detailed explanation of the procedure is discussed in the empirical section. We hope that the empirical identification of business groups and the use of massive datasets of individual firms will spur more fine-grained studies of business groups, when data on business groups' affiliation is not disclosed or available.

The remainder of the Chapter is structured as follows. The next section presents the review of the literature of corporate governance, business groups and interlocking directors. In section 3.3, the hypotheses are proposed. Section 3.4 addresses the data collection process and the methodology used to identify business groups. Section 3.5 presents the empirical results and offers additional robustness checks. Section 3.6 offers a discussion of results and concludes with our main contributions.

3.2.Literature review

3.2.1. Agency conflict between headquarters and affiliates in business groups

Corporate governance in business groups can be considered as a hierarchical system that delegates the function of governing but safeguards the best interest of the whole group, through the complex ties of affiliates (Colli & Colpan, 2016; Teen & Bennett, 2014).

The aforementioned delegation of authority and decision-making from headquarters to affiliates within the hierarchical structure of business groups leads to a potential conflict of interests between headquarters and affiliates, the well-known agency conflict. According to agency theory, our study introduces a different framework to the typical principal-agent conflict, adapted to the landscape of business groups (e.g. see Kim et al., 2005, and Ambos et al., 2019). Thus, we consider headquarters of a business group to be the principal and affiliates to be the agents, giving

place to information asymmetries between headquarters and affiliates, and consequent agency costs. Applied to the context of business groups, boards may represent an efficient mechanism for monitoring strategies and decisions taken in affiliates, and, thus, serve as watchdogs for headquarters (Adams, Hermalin, & Weisbach, 2010).

Interlocking directors within business groups is a potential tool for solving the agency problem between headquarters and affiliates. Following Maman (1999), we refer to internal interlocking directors, or interlocks within business groups, as the executives and non-executives from group headquarters who deputize to represent the group in the boards of affiliated firms (Manikandan & Ramachandran, 2015). The scarce literature on intra-group interlocking has agreed on the role of interlocking directors as a mechanism to enhance control and coordination between firms in a business group (Maman, 1999). According to Collin (1998) and Keister (1998), interlocking directors create a pool of information for business groups, which enhances monitoring abilities by headquarters.

Two main theories are important to understand the composition and behavior of boards of directors (Hillman & Dalziel, 2003). On the one hand, agency theory focuses on the monitoring role of directors, insofar as directors serve the interests of shareholders by monitoring the decisions of managers (Fama & Jensen, 1983; Jensen & Meckling, 1976). On the other hand, according to the resource dependence theory (Pfeffer & Salancik, 1978), directors not only serve as a link between the firm and external forces and reduce uncertainty and external dependencies, but also bring resources -such as information, skills and access to stakeholders- to the firm (Gales & Kesner, 1994). The board of directors constitutes the so called board capital, a conjunction between human capital -experience, expertise, skills, and reputation- and relational or social capital -networking to other external forces (Hillman & Dalziel, 2003).

The agency role of interlocking directors may provide some benefits in terms of better monitoring, potentially ensuring the control of the affiliate. These directors may offer some firm-specific relevant information (Fama & Jensen, 1983) to boards in affiliates that leads to a better evaluation of managerial competence and strategic initiatives (Kim et al., 2005).

The resource dependence role of interlocking directors may provide specific resources to affiliates, increasing the function of advising. Interlocking directors inside business groups can provide their information, experience and other cognitive resources to contribute to better corporate decision-making and development of strategies (e.g., see Ortiz-de-Mandojana, Aragón-Correa, Delgado-Ceballos, & Ferrón-Vílchez, 2012, for the case of interlocking directors in individual firms). Besides providing better advice to affiliates, the dual directionality of interlocking directors may also imply advice to the headquarters, which may be relevant to the overall group (e.g., information about the competitive landscape of an affiliated firm that works in a different industrial sector).

3.2.2. Interlocking directors as information processing individuals

For any board, an effective monitoring and advising function depends on the information that directors can obtain, process and share (Fama & Jensen, 1983; Jensen & Meckling, 1976; Pfeffer & Salancik, 1978). In that sense, the dual directionality of interlocking directors may lead to the following: interlocking directors can provide information to improve monitoring and advising functions in the affiliates, but also offer better advising to the headquarters in issues related to the affiliated firm.

However, the decision to appoint interlocking directors is contingent on the barriers that hamper the effectiveness of information processing. These barriers can be defined as ‘the factors

that constrain and limit the ability of the board to function as an effective information-processing group or team' (Boivie et al., 2016: 6). We complement the barriers to effective board monitoring discussed in the work of Boivie et al. (2016) by focusing on three contingency factors of business groups. These distances may hamper the decision to appoint interlocking directors, leading to a reduction in their information-processing capabilities and the resulting monitoring and advising benefits. First, we analyze the geographic distance between headquarters and affiliates. Geographic distance may arise internationally or nationally, depending on the location of the affiliate across the globe. Firms operating in many different geographic contexts require higher levels of information processing from their directors (Boivie et al., 2016). Second, we also focus on the difference between institutional contexts of headquarters and affiliated firms, which may negatively affect the information-processing capabilities and the monitoring and advising function of interlocking directors located in different institutional environments. Institutional distance can be expected to hinder information-sharing flows (Ho, Ghauri, & Larimo, 2018). Third, we study industrial distance between headquarters and affiliates, as a potential barrier to information given the disparity of industry-specific knowledge (Boivie et al., 2016).

3.3.Hypotheses

Previous literature has considered how different characteristics of cross-national distance may influence managerial decisions (e.g., Berry, Guillen & Zhou, 2010; Ghemawat, 2001). Cross-national differences increase uncertainty by preventing the information flow between countries. Porter (1998) agrees that distance can hinder business dealings between firms in different countries and proximity is always a key provider of better information. According to Ghemawat (2001), distance still matters for companies around the world, despite all the improvement and advance in

technology and communication, and most of the costs and risks in business result from barriers created by distances.

In our theoretical framework we specifically consider two dimensions of cross-national distance –geographic and institutional, since different types of distance may affect firm and managerial decisions differently. Geographic distance is not the same as institutional distance, although both concepts may apparently seem alike. A similar geographic distance between two pair of countries may be associated with two different institutional differences. For example, the geographic distance between Spain and France is similar to the geographic distance between Spain and Morocco, but the institutional distance in the second pair of countries is very much larger. The decision to appoint interlocking directors may be fostered not only by the proximity between two countries, but because of the similarity between institutional settings. We also take into account the industrial distance between the headquarters and the affiliates. Business groups are considered to be largely diversified entities, especially in unrelated industries. For example, for an interlocking director who is used to deal with the production and selling processes of coal it is very difficult to apply all his knowledge to the production and selling of software.

The use of different cross-national and cross-industry differences provides a richer framework in the analysis of information barriers and its associated information-acquisition costs. A fine-grained explanation of the impact of each distance on the decision to appoint interlocking directors and the analysis of costs is detailed below.

3.3.1. Interlocking directors: geographic distance

Geographic distance "increases the difficulties for headquarters to obtain complete and accurate information and to control [...] subsidiaries" (Du et al., 2011: 159). When business groups follow a geographic diversification strategy, either within a country or beyond the borders of a country, the decision to appoint interlocking directors may incur travel and accommodation costs due to the distance between the headquarters and the affiliate. Travel and accommodation costs imply all the subsistence allowance when headquarters directors must develop their functions of monitoring and advising on the board of an affiliate located in a different city or country. Due to the nature of the geographic diversification, the travel and accommodation costs may appear as potential relevant barriers for the decision to appoint interlocking directors. The director's ability to monitor and advise is undermined due to geographic distance (Masulis, Wang, & Xie, 2012). Between all the potential reasons that hamper their monitoring and advising roles are the difficulty to attend board meetings and make on-site visits (Knyazeva et al., 2013; Lerner, 1995); the time zone differences and time and energy consumed while travelling; or less access to current information about firms' operations and performance (Coval & Moskowitz, 1999, 2001), in the case of multinational business groups. This leads to the following testable hypothesis:

Hypothesis 1. The higher the geographic distance between headquarters and affiliates, the lower is the probability of interlocking directors.

3.3.2. Interlocking directors: institutional distance

Institutional distance between two countries refers to the extent of difference and dissimilarity between the institutions of the two countries (Kostova, 1996). As organizations tend

to reflect the institutional environment in which they operate, it is difficult to correctly understand distant institutional environments. Thus, the larger the institutional distance, the more difficult it is for the headquarters to transfer strategic routines to foreign affiliates (Kostova, 1999; Kostova & Zaheer, 1999; Xu & Shenkar, 2002). Foreign affiliates may "act as intermediaries to meet a host country's legal and political requirements and/or to reflect a headquarters' strategic postures and considerations" (Kim et al., 2005: 46), in the case of internationalized business groups.

Multinational business groups deal with multiple institutional environments. Therefore, it should be easier to adjust to the institutional requirements of an affiliate country that is institutionally similar to its headquarters country than one that is institutionally different.[3] Interlocking directors working simultaneously in the headquarters and in affiliates located in very different institutional settings may find potential hindrances in their monitoring and advising roles -e.g., less knowledge of country rules, laws and regulations, governance standards and management methods, leading to the following testable hypothesis:

Hypothesis 2. The higher the institutional distance between headquarters and affiliates, the lower is the probability of interlocking directors.

3.3.3. Interlocking directors: industrial distance

Diversification can be defined as the process of a firm seeking to expand the scope of their activities, for instance, into multiple lines of business (Mayer, Stadler, & Hautz, 2015). Industrial diversification refers to the number of different sectors in which a firm operates. Many business

[3] Although within-county institutional distance may also be found, we only focus on between-country differences in business groups' multiple institutional environments. Within-country institutional variance tends to be smaller than between-country institutional variance, since there are some domestic institutions superseding local institutions in case of conflict (Kostova & Zaheer, 1999).

groups are considered as diversification networks (Cuervo-Cazurra, 2006), where the unrelated diversification is driven by the existence of market imperfections (Khanna & Palepu, 1997) or the intrapreneurship of managers. Many business groups, thus, do not invest and produce in a single sector; on the contrary, they diversify their range of products in different industries.

We propose industrial distance between headquarters and affiliates as one scenario where information acquisition costs arise. When a director of a firm in a given sector moves to another firm in a different sector, she/he faces a larger cost of acquiring the relevant information in the second firm the more different is the industrial sector of the second firm. That is, interlocked directors face larger information costs in more diversified business groups.

The previous arguments support the case of diversification as an impediment to the decision to interlock directors between headquarters and affiliates, implying the following testable hypothesis:

Hypothesis 3. The higher the industrial diversification level between headquarters and affiliate, the lower the probability of interlocking directors.

3.4.Empirical methods

3.4.1. Data collection and business group determination

The source data for this study come from the ORBIS database by Bureau van Dijk, a specialized company in data collection of ownership structures and financial statements of public and private firms around the globe. Initially, we apply our algorithm of vertical business groups' identification to a sample of 11,235,349 firms, for the year 2016. For each one of these firms, we also gathered information about its subsidiaries from ORBIS. We work on an international sample covering more than 200 countries to present generalized results by regions or countries. We check

for the representativeness of ORBIS coverage by comparing the 11 million firms with the number of enterprises included in the official dataset from OECD Structural and Demographic Business Statistics (OECD, 2019).[4] We observe that the number of firms from ORBIS represent the 4.89% and 97.54% of the population of firms with 1-9 employees and more than 9 employees in OECD countries, respectively.[5] The underrepresentation of firms below 10 employees responds to the inclusion of self-employers in the count of number of enterprises in OECD stats, which are not reported in ORBIS. Therefore, our initial database provides great coverage among firms with more than 9 employees.

To achieve our methodological objective, we apply a classification criterion based on ownership links between companies. This criterion has been formerly but barely used in the literature (e.g., Belenzon et al., 2019; Masulis et al., 2011) and implies ownership ties with a threshold of more than 50 percent. Control-subsidiary relations occur when a controlling firm (headquarters) owns more than 50 percent shareholding of subsidiary firms (affiliated firms) (Mahmood, Zhu, & Zaheer, 2017). The requirement of strictly more than 50 percent is determined to avoid possible problems of 'double accounting', although it leaves outside business groups' affiliated firms controlled through minority ownership (Altomonte & Rungi, 2013). 'Double accounting' occurs when a company belongs to more than one business group, for example, if A and B both own 50 percent of C.

[4] The list of OECD member countries by 2016 is Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

[5] Out of the 35 OECD countries by 2016, the Structural Business Statistics only covers 30 countries accounting for the number of enterprises. We complemented the OECD breadth with data from the United States Census Bureau for the case of enterprises located in the United States. We were not able to find available data for Canada, Chile, Korea, and Mexico, for 2016.

Our algorithm allows to identify what a business group is, as well as to overcome the problem of constrained data-access about business groups' affiliation.[6] After running our algorithm, out of 11,235,349 firms and their subsidiaries, we classified 9,716,527 firms as stand-alone firms and we identified 3,527,769 affiliates of 879,427 business groups.

With our algorithm, we found a 0.22% of identified affiliates belonging to more than one business group. To solve this problem, in spite of applying the more than 50 percent of ownership threshold, we randomly associate these firms to one business group. Therefore, we end up with a sample of 3,398,487 affiliated firms. We also checked the resulting sample from the algorithm with information provided by OECD stats. The initial sample of business groups, which only considers those headquarters and affiliates located in the 31 OECD countries for which data are available, represents 21.05% of firms with more than 9 employees, and shows a high representativeness of its total employment figures –for instance, firms in business groups with 10-49 employees and firms with 50-249 employees account for the 20.73% and 51.28% of total employment of the OECD population, respectively.[7] Therefore, our business group identification shows that business groups are relevant actors in the economy of these countries.

3.4.2. Sample

To deal with data problems, we apply a set of 11 filters on sample cleaning, shown in Table 5. The cleaning criteria account for missing or erroneous information in variables of interest for the study. In Panel A, we remove observations that may involve any problem at the business group

[6] Unlike the case of countries such as Japan, Taiwan or India with access to predetermined sources about business groups' affiliation (e.g. *Business Groups in Taiwan* compiled by the China Credit Information Service, or *Prowess Database* of the Center for Monitoring the Indian Economy), information is often restricted.

[7] For employment figures we use data for 29 OECD economies. We were not able to find available data for Canada, Chile, Israel, Japan, Korea, and Mexico, for 2016.

level. First, we drop business groups due to missing data about board composition in headquarters (584,127 business groups), since we cannot explore the role of interlocking directors in headquarters without board composition information. Second, we also delete business groups with negative income and total assets in headquarters (119,936), which may be a problem of the original database, and missing information on headquarters age (141), since we control for age in our regression analyses. Third, we furthermore remove those business groups whose headquarters' board is only composed by one individual (57,094), which can be a signal of rubber stamping. Finally, given that we also remove some affiliated firms (Panel B), we drop business groups ending the screening with only one firm per business group (72,020), as those business groups do not fall into the definition of business groups.

In Panel B of Table 5, we remove misleading observations at the affiliate level. First, we delete affiliates with missing data on board composition (110,010 firms). Second, we also delete affiliated firms with negative income and total assets (1,719,005). Third, we delete affiliated firms with missing data on industry (16,621) and institutional information (177), since these two variables are essential for the model of distances we analyze. Finally, we also remove affiliates with boards composed by one individual (34,672). This generates a sample with 46,109 business groups and 196,406 firms (headquarters and affiliates).

As most of the headquarters are located in the OECD countries -only 13% are located outside- in Panel C we remove those business groups that do not belong to the OECD countries. This characteristic of our dataset might be due to differences in coverage by the ORBIS database in different countries. Therefore, in order to reduce the potential bias due to this difference in coverage, we restrict our analysis to business groups with headquarters located in the 35 OECD

countries, analyzing 172,760 firms within 39,911 business groups (86% of the total number of business groups and 88% of the total number of affiliates, after applying the filters).

In Table A1 in the Appendix, we include the distribution of business groups per countries. Although some economies lose relevance in terms of percentage over the total number of business groups, such as the case of United States, the overall sample is still representative when we compare with OECD stats. We observe that OECD firms belonging to our final sample of business groups represent the 2.64% of total firms with more than 9 employees in the 31 OECD countries with available data; however, they account for a significantly higher share of employment –40.71% of persons employed.

Nevertheless, we consider as a unit of analysis the position of directors on boards of affiliated firms. Empirically, we cannot disentangle the direction of the interlocking decision, whether directors from the headquarters move to affiliates or vice-versa. However, we can study the positions on boards of affiliates and analyze the relationship with the information barriers and the rest of control variables. Therefore, we work on a sample composed by 512,607 board positions in affiliates, which belong to business groups operating in the 35 OECD countries and 87 sectors.

Insert Table 5 about here

Table 6 presents summary statistics of the 39,911 business groups in our final sample. Panel A reports summary statistics for the overall sample. On average, business groups are formed by 4.33 firms, with 18 boards' positions per business group and firms located in 1.50 countries. The average number of firms per business group is similar to the results found in White, Hoskisson, Yiu, & Bruton (2008), 4.22 firms per group. The average group total income and assets is 1,078.04 and 4,435.99 million €, respectively. Business groups, on average, operate in 2.29 sectors for

NACE 2-digits and 2.72 sectors for NACE 4-digits. This is consistent with the results from Khanna & Yafeh (2007), who, on average, show that groups in nine emerging economies operate in 2.82 two-digit industries. In terms of income and total assets, the Herfindahl Index is 61% and 56% respectively, showing some degree of concentration in one or few firms within the group.[8] We measure the distance in levels between the headquarters and the affiliates in a business group. For instance, an affiliate of level 1 refers to an affiliate which is owned directly by the headquarters; and an affiliate of level 3 means that such affiliate is owned indirectly by the headquarters through two affiliates. On average, the maximum affiliate level reached by business groups is around 1.31. From that, we can assume that business groups in our sample present a very horizontal organizational structure. However, the maximum level for certain business groups in the sample is 9, synonym of a more vertical organizational structure. In the overall sample of business groups, we find a 55.79% of groups integrated by two firms. We assume that these business groups may be different from larger business groups, as they may behave similar to individual companies. Panel B of Table 6, thus, reports descriptive statistics for business groups composed by more than two firms. These business groups are, on average, bigger in terms of number of firms (7.27), number of boards' positions (30.33), income (2,244.41€) and total assets (9,393.87€), and have a superior deployment in different sectors (3.18 NACE 2-digits) and countries (2.04).

Insert Table 6 about here

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[8] The Herfindahl Index [H] of concentration is calculated as $H = \Sigma^{n}{}_{i=1} P_i^2$, where P_i is the proportion of business groups sales (or assets) in firm *i*. It takes a maximum value of 1 in case of a high level of concentration of income and assets, and a minimum value of 0 otherwise.

3.4.3. Empirical model

Our empirical model examines the relationship between the decision to appoint interlocking directors (defined as a dichotomous variable) and the geographic distance (Hypothesis 1), institutional distance (Hypothesis 2), and industrial distance between headquarters and affiliates (Hypothesis 3).

We empirically test our model by using a dataset of positions in boards of affiliates (N=512,607 observations) –analyzing the determinants of those directors also holding directorships in the headquarters. In the empirical model, we differentiate between variables calculated at board position level (i,j,k), HQ-affiliate level (i,j), and business group level (i).

Our dependent variable of *Interlocking directors* (i,j,k) is a dummy variable that equals 1 if it is an interlocking director sitting in both headquarters and affiliates, and 0 otherwise. The measure of our dependent variable is similar to the vertical internal interlocking ties between the parent firm of the group and firms owned by the parent company in Maman (1999). Similarly, Silva, Majluf, & Paredes (2006) measure interlocking directors within business groups as the fraction of board directors who are also board members in other firms of the group.

In our model we include three key explanatory variables. First, *Geographic distance* (i,j) considers both firms located in distant cities within a same country as well as firms located in cities from different countries. We geo-localized all the ZIP codes, cities and countries of each firm in the sample using the package Google Earth (Google Earth, 2017), which returns back all the coordinates in terms of latitude and longitude. Then, we compute geodetic distances in thousands of kilometers for each pair of headquarters and affiliates.[9] We provide a more accurate measure of

[9] Geodetic distances or geographic coordinates consider latitude and longitude. We compute the length of the shortest curve between two points along the surface of a mathematical model of the earth, through the command 'geodist' in Stata (Picard, 2010).

geographical distance than in related articles, such as in Du et al. (2011), who measure it as the distance in kilometers between the capital cities of headquarters' country and capital cities of subsidiaries' countries. In the context of cross-borders mergers and acquisitions, Ragozzino (2009) similarly calculates the geographic distance between acquirers and sellers by collecting latitude and longitude coordinates of firms (see also Coval and Moskowitz, 1999).

Second, we capture the degree of institutional development using the Global Competitiveness Index (GCI), reported by the World Economic Forum (Schwab & World Economic Forum, 2017). GCI is a composite of twelve indicators of competitiveness scoring from 1 to 7 for 138 countries for the year 2017.[10] Wu, Wang, Hong, Piperopoulos, & Zhuo (2016) apply a similar measure of institutional development from World Governance Indicators (WGI). GCI Index is strongly and positively correlated with WGI Index (r=0.85). We compute *Institutional distance* (i,j) as the differences of GCI Index of headquarters and GCI Index of affiliates.

Third, to measure *Industrial distance* (i,j), we compute the difference between NACE 4-digits codes of headquarters and affiliates (Dass et al., 2014; Kang et al., 2018; Khanna et al., 2014).[11] We identify five different values: value of 4 if the first digit of NACE 4-digits of the headquarters is different to the first digit of NACE 4-digits of the affiliate (no similarity between industries), value of 3 if the first digit is equal but the second digit is different (similarity), value of 2 if the first two digits are equal but the third digit is different (more similarity), value of 1 if the first three digits are equal but the fourth digit is different (even more similarity), and 0 if all

[10] GCI twelve pillars indicators are: (1) institutional environment, (2) efficiency of infrastructures, (3) macroeconomic environment, (4) health and primary education of the workforce, (5) higher education and training of the workforce, (6) product market efficiency, (7) labor market efficiency, (8) financial market development, (9) technological readiness, (10) market size, (11) business sophistication, and (12) innovation.

[11] These authors also calculate the level of similarity between industries by using SIC and NAICS codes. Dass et al. (2014) and Kang et al. (2018) proxy the level of industry experience of directors through the level of similarity between SIC codes.

four digits are equal (total similarity). The larger the value of this variable is, the larger is the industrial distance is.

Business group level (i) control variables. First, to account for differences between the largest and the smallest business groups, we include a measure of size through the logarithm of the total amount of income per group for the last year observed (*BG size*). Larger business groups may exhibit a larger number of affiliated firms and, therefore, we expect a lower probability of any director in an affiliated firm holding a position in the headquarters.

Second, young firms tend to be in greater need of advice and guidance for growth (Field, Lowry, & Mkrtchyan, 2013), thus motivating the decision to appoint interlocking directors in order to ensure these two functions. *BG age* is included to control for differences between more established firms and young firms (Lamin, 2013) and is measured as the difference between foundation year, provided by ORBIS, and 2017. We expect that younger business groups would interlock more than more established groups, since they are in need of more control and advising.

Third, we expect the greater the number of positions on the board of headquarters, the easier the interlocking between headquarters and affiliates (*Board positions in HQ)*, since we are studying the probability of a director in an affiliated firm also holding a position in the headquarters. Considering that positions in headquarters are randomly assigned, if there are more positions in headquarters, a director in an affiliate has more possibilities to find a position in headquarters. However, if the total number of boards' positions in all affiliates (*Board positions in affiliates*, our fourth variable) is larger, the probability of a director from any affiliate to be chosen to interlock to the headquarters is lower.

HQ-affiliate level (i,j) control variables. Fifth, we control for the structure of the business group. If an affiliate is found at lower levels of a business group (high score in this structure

variable), it may be more difficult or less convenient to interlock directors due to distances in chain of command. *Affiliate level* represents the level that each affiliate occupies within a business group. We categorize levels from 0 (the upper level for headquarters) to 9 (the lower level for affiliates) along the hierarchy of a business group.

Sixth, business groups may have a greater awareness of their most important affiliates, as they are key firms to the good functioning of the group. Building on the insight that "units that are strategically important and generate or require significant cash are likely to be […] monitored directly by […] headquarters" (Belenzon et al., 2019: 7), we propose that the higher the importance of the affiliate, the higher the incentives to interlock directors in order to ensure the control of these key affiliates and their relevance in the overall strategy of the group. *Affiliate weight,* operationalized as the percentage that each affiliate has over the total income of a business group, represents the importance of an affiliate within the group.

Seventh, we build on the idea that ownership and board composition are two mechanisms of internal corporate governance, which are strongly correlated (Sur, Lvina, & Magnan, 2013). A firm's ownership drives boards 'to seek and retain individuals who will be able to respond to owners' action desires'(Sur et al., 2013: 374). Headquarters with a high degree of ownership in a determined affiliate would have more power on deciding who would be sitting on that board of affiliate. This way, interlocking directors and ownership could be complementary or substitutive governance mechanisms. The larger the headquarters ownership, the larger is the headquarters' power to appoint interlocking directors to reinforce the control of the affiliate (complementary effect). Moreover, there is an economic incentive to exert control over those affiliates in which headquarters has a large ownership stake, since a large proportion of profits of the overall group comes from those affiliates. Unlike, the larger the headquarters ownership, the lower is the need

to use interlocking directors to control the affiliate's board (substitute effect). Therefore, the expected effect on the presence of interlocking directors is undetermined. *Ownership percentage* is measured as the percentage of ownership that headquarters has on each affiliate within a business group. We also include an *Ownership dummy* variable that equals 1 if the ownership percentage is 100% and 0 otherwise, to capture that other large shareholders may have representatives in the board when headquarters' ownership is lower than 100%. Then, if the affiliate is not wholly owned by the headquarters, the headquarters may be more interested in having an interlocking director in the affiliate to ensure control (substitute effect); therefore, leading to a negative effect of this *Ownership dummy* on the presence of interlocking directors. However, the complementary effect could predominate. Thus, we have not a clear expectation regarding the sign of the effect of this variable on the presence of interlocking directors in affiliated firms.

Board position level (i,j,k) control variables. We are also interested in disentangling the relationship between the role of executive and non-executive directors and the probability of being an interlocking director. While executives are involved in the daily management of the firm, non-executives are not full-time employees. On the one hand, executive directors could interlock less than non-executives due to their time-demanding involvement with the management of the firm. Connected research from Sarkar and Sarkar (2009) reports that holding multiple directorships by executive directors is negatively related to firm performance, while non-executive directors with multiple directorships is positively related to firm performance of Indian listed companies. Liu and Paul (2015) furthermore find that the negative effects of director busyness are even more pervasive for executives than for non-executives. On the other hand, based on the cost of acquiring information related to the business activity, we expect that executive directors tend to interlock more than non-executive directors within business groups. Executives are involved in daily

managerial tasks, and their access to key information is less costly, which may be easily transferred to other firms' decision-making processes (Sánchez & Barroso-Castro, 2015). Unlike the case of individual firms, we emphasize the information arguments in business groups, where executives stand in a privileged position based on information knowledge. Therefore, our conjecture of interlocking directors providing advice to the headquarters in matters related to the affiliated firm, and facilitating control (by headquarters) and advice to the affiliates, is more reliable if these interlocking directors are executives in the affiliated firm. Thus, we introduce the type of director as an additional control variable. *Executive director (i,j,k)* is a dummy variable that takes the value of 1 if a director is an executive director in the affiliated firm, and 0 if a director is a non-executive director.

Additionally, we control for the effect of directors with multiple horizontal board appointments inside the business group. We only consider appointments in other affiliates – horizontal directorships within the business group- but not appointments in the headquarters, which would lead to clear endogeneity. Holding too many positions in several boards of affiliated firms may worsen the effectiveness of directors. Nevertheless, directors holding positions in several affiliated firms may provide more information given their horizontal view, and consequently may lead to better control and advice. This horizontal interlock may contribute to maintain transactions across affiliates, to keep the unity of the group, and to create a communication network (Orru, Hamilton, & Suzuki, 1989). We argue that the headquarters may limit the number of directorships in different affiliates in order to avoid ineffectiveness by busy directors. Therefore, we expect a positive effect of *Horizontal director* on the probability of being an interlocking director. Our measure is consistent with prior work by Ferris, Jagannathan, &

Pritchard (2003) and Fich & Shivdasani (2006), who apply a threshold of three directorships for classifying directors as busy.

The description of variables and their expected effect on the dependent variable are presented in Table 7. In the empirical model we also introduce fixed effects for industry sectors and countries to control for corresponding unobserved characteristics.

Insert Table 7 about here

We test our set of hypotheses using the following probit model of board positions in affiliated firms:

$$\begin{aligned} P(Interlocked\_Aff = 1 \mid X) = \Phi(&\alpha + \beta_1 Geog\_dist_{i,j} + \beta_2 Inst\_dist_{i,j} + \beta_3 Indust\_dist_{i,j} + \beta_4 BG\_size_i \\ &+ \beta_5 BG\_age_i + \beta_6 HQ\_positions_i + \beta_7 Affiliate\_positions_i + \beta_8 Affiliate\_level_{i,j} \\ &+ \beta_9 Affiliate\_weight_{i,j} + \beta_{10} Owner\_perc_{i,j} + \beta_{11} Owner\_dummy_{i,j} \\ &+ \beta_{12} Exec\_direc_{i,j,k} + \beta_{13} Horiz\_direc_{i,j,k} + S_{i,j} + C_{i,j}) \end{aligned} \quad [1]$$

Where $S_{i,j}$ is the industry fixed effect and $C_{i,j}$ is the country fixed effect (see Table 7 for a description of the rest of abbreviations). Our empirical model estimates whether the probability of interlocking directors is affected by geographic, institutional and industrial distances, considering a set of control variables. We compute robust standard errors (Huber, 1967; White, 1980, 1982) clustered by business group (Petersen, 2009).

3.5.Empirical results

3.5.1. Descriptive analysis

Table 8 reports descriptive statistics of our variables. Panel A provides the proportion of interlocking directors, considering as unit of analysis the position in the board of directors of affiliated firms (level i,j,k). In our sample, 37% of positions in the boards of affiliates are occupied by interlocking directors, and 45% by executives. Additionally, non-tabulated analysis shows that executive directors exhibit a higher percentage of interlocking (41.53%) compared to non-executive directors (33.58%). The percentage of horizontal directors among affiliates is 12%, considerably lower than prior work by Fich & Shivdasani (2006), who find that 52% of outside directors are classified as busy by analyzing board positions in stand-alone firms, but more consistent with the 6% found in Ferris, Jagannathan, & Pritchard (2003).

Panel B shows the distribution of independent and control variables at the level of HQ-affiliate relationship (i,j). The average distance in kilometers between pairs of headquarters and affiliates is 1,536 kilometers, approximately the distance between Madrid and London. The average institutional distance between pairs of headquarters and affiliates is 0.12, similar to the institutional distance between United States and Germany. The average industrial distance between headquarters and affiliates is 2.78. This result indicates that headquarters and affiliates roughly have NACE 4-digits codes with the same first digit but different second, third and fourth digits, in e.g. NACE 4-digits of the headquarters is 3600 (water collection, treatment and supply) and NACE 4-digits of the affiliate is 3811 (collection of non-hazardous waste). Each affiliate of a business group, on average, has a 14% of the total income of the business group. On average, headquarters own 88% of each affiliate. Panel C provides the distribution of variables where the level of analysis is the business groups as a whole (i). The average age of headquarters is around

27 years (similar to the results in Gaur, Kumar, & Singh, 2014, for the case of Indian affiliated firms, and Tan & Meyer, 2010, for affiliated firms to Taiwanese business groups) and their boards are composed, on average, by 5.22 directors. The average number of board positions in all the affiliates in business groups is 12.84 seats.

Insert Table 8 about here

3.5.2. Estimations of the empirical model

Table 9 reports the correlation matrix of variables in the empirical model. Regarding the decision to appoint interlocking directors, supporting Hypothesis 1, *Geographic Distance* is significantly and negatively correlated with *Interlocking Directors*. *Geographic Distance* is positively correlated with the measure of the size of business groups (*BG Size lnIncome € million)*, suggesting that bigger groups tend to diversify geographically in more distant countries. Table 9 also shows that *Institutional Distance* and *Industrial Distance* are significantly and negatively correlated with *Interlocking Directors*, supporting Hypothesis 2 and 3. Additionally, in Table 9 we find the expected results regarding the association of control variables and the decision to appoint *Interlocking Directors*. We test for multicollinearity using the Variance Inflation Factor (VIF) (Aiken & West, 1991); all the VIF statistics were well within the range, with the highest value being 2.67.[12]

Insert Table 9 about here
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[12] We tested for multicollinearity in a model including two proxies for the size of the business groups -number of firms and total income; since they presented symptoms of multicollinearity (VIF above 5) we decided to remove the number of firms from the model.

Table 10 shows the probit regression results with the control variables and each of the independent variables (Models 2, 3 and 4), and with all independent variables (Model 5). Results provide a strongly support for Hypothesis 1. We see in Models 2 and 5, that *Geographic Distance* between the headquarters and the affiliate is negatively and significantly related to the presence of interlocking directors in affiliated firms. We report the marginal effect of the geographic distance, evaluated at the means of the data, beneath its t-statistics in Model 5. The results in Model 5 suggest that, if geographic distance increases by 1,000 km (0.29 of its standard deviation), the likelihood of interlocking directors decreases by 0.018. Given that the fraction of interlocking directors in our data is 0.37; this means that the average affiliate located 1,000 km from headquarters is roughly 4.9% less likely to interlock directors. In Models 3 and 5 of Table 10, *Institutional Distance* between headquarters and affiliates is negatively and significantly related to the probability of interlocking directors, so Hypothesis 2 is also supported by our data. From coefficients in Model 5, an increase in the institutional distance by 0.1 (0.35 of its standard deviation), approximately the institutional distance between US and Germany, leads to a decrease by 0.030 in the likelihood of interlocking directors, which amounts to a 7.1% reduction in the probability of interlocking directors.

Hypothesis 3 suggests that having a higher industrial distance between the headquarters and the affiliate curbs the probability of interlocking directors. We find that the probability of interlocking decreases with *Industrial Distance* (Models 4 and 5). The coefficient associated with this variable is negative and significant; hence, Hypothesis 3 is supported. Results in Model 5 suggest that an industrial distance increase from 0 to 1 amounts to a reduction in the probability of interlocking directors of 4.05% -a headquarters operating in NACE 4-digits 6511 (life insurance) and an affiliate operating in NACE 4-digits 6512 (non-life insurance). If industrial distance

increases from 0 to 2, there is a decrease of interlocking probability by 8.11% -a headquarters operating in NACE 4-digits 4771 (retail sale of clothing in specialized stores) and an affiliate operating in NACE 4-digits 4719 (other retail sale in non-specialized stores). An increase in industrial distance from 0 to 3 leads to a decrease in the probability of interlocking directors of 12.16% -a headquarters operating in NACE 4-digits 3600 (water collection treatment and supply) and an affiliate operating in NACE 4-digits 3811 (collection of non-hazardous waste). Finally, if industrial distance increases from 0 to 4, the decrease in interlocking probability is 16.21% -a headquarters operating in NACE 4-digits 3511 (production of electricity) and an affiliate operating in NACE 4-digits 5510 (hotels and similar accommodation).

Moreover, from Models 1-5 we can find that control variables yield significant results in all specifications, with the expected sign (consistent with the correlation analysis in Table 9). The size of the business group (*BG Size lnIncome € million*) hampers the decision to appoint interlocking directors, the coefficient of this variable is negative and significant. This result suggests a difference between large and small business groups in terms of interlocking decisions; for a director in an affiliated firm it seems to be more difficult to hold a directorship in headquarters of large business groups, which usually exhibit a larger number of affiliated firms (correlation equals 0.553). As *BG Age* has a significant and negative impact on interlocking decision, we could interpret that younger business groups are in need of greater monitoring and advising of affiliated firms. Generally, young firms tend to be in greater need of advice and guidance for growth (Field et al., 2013). The number of board positions in the headquarters (*Board Positions in HQ*) is statistically significant and positively associated to the probability of interlocking directors, but the board size of the overall affiliates in a business group (*Board Positions in Affiliates*) have a negative and significant impact on the probability of interlocking, according to our predictions. It

seems to be more likely to obtain a directorship in headquarters the larger is the number of headquarters' positions, and to be less likely to obtain such directorship the larger the number of positions in affiliated firms is. In addition, there are some inherent characteristics of affiliated firms that matter for the decision of interlocking. We find that the level that each affiliate occupies within the overall structure of the business group (*Affiliate Level*) has a negative and significant effect on the decision to appoint interlocking directors, suggesting that affiliates located farther away from the headquarters have a lower presence of interlocking directors. On the contrary, the relative importance of an affiliate, in terms of the amount of income over the total income of the overall business group (*Affiliate Weight*), has a positive and significant effect on the decision to appoint interlocking directors, consistent with the idea that headquarters pay more attention to the most important affiliates. Finally, variables related with the level of ownership show that the complementary effect dominates, with a positively significant impact on interlocking decisions. These results may be related to the power and the economic interest of the headquarters to nominate trusty directors onto boards of affiliated firms where ownership by headquarters is large (*Ownership Percentage*), which is especially relevant in wholly owned affiliates (*Ownership Dummy*).

According to our focus on the relevance of information acquisition costs, our assumption that executive directors may interlock more than non-executives is supported by the data. This result provides insights to the fact that executive directors are an important source of firm-specific information for boards (Raheja, 2005), suggesting that business groups could be more prone to interlock executive directors. Non-executive directors have to face larger information acquisition and processing costs in adapting their general expertise to the specific requirements of firms where

they serve as directors (Linck et al., 2008). Thus, our results suggest that business groups may have fewer incentives to interlock this type of directors.

Insert Table 10 about here

3.5.3. Robustness analysis

3.5.3.1. Alternative samples

We analyze whether our results remain robust with different samples of business groups. Besides the business groups from OECD countries, the first robustness check consists in including those groups from countries that do not belong to the OECD. The total amount of business groups from OECD and non-OECD countries is 46,109 –6,198 business groups added. The results of the new estimations (Panel A of Table 11) do not differ from the ones reported in Table 10.

Table A1 shows the distribution of business groups per countries. Comparing the initial sample (column 2) and the final sample of the OECD business groups after the sample cleaning (column 3), we observe that there are some countries that have a smaller loss of observations in terms of the total number of business groups. This is the case of countries such as UK, Norway, Sweden, Spain and Finland. For instance, before the sample cleaning Norway only represented 1.16% of the total number of business groups in the OECD countries, and after the sample attrition, Norway represents 11.39% of the total number of OECD business groups. Therefore, in this second robustness test we run our model in a subsample composed by these economies to avoid introducing any potential bias those underrepresented countries. Results from this analysis are shown in Panel B of Table 11. We observe that results for main variables remain qualitatively the same.

The third robustness test discards business groups integrated by only two firms, since we might not consider those business groups falling into the definition of what a business group is, and they may actually behave as stand-alone firms. Panel C of Table 11 yields similar results as in the model of positions in affiliates in Table 10.

We also implement two additional robustness analyses. We remove large business groups, those with more than 8,074 employees (the 95th percentile)[13], which show extremely large values in the number of employees, total income and total assets[14], in order to discard any bias in our results due to their specific characteristics. Moreover, we run our probit regression on a sample integrated by business groups that have not lost any affiliated firm during the sample attrition presented in Table 5 (Panel B) –they account for the 29% of the whole sample. The results from these robustness analyses (omitted to save space and available upon request) do not vary qualitatively.

Insert Table 11 about here

3.5.3.2. Alternative measures of explanatory variables

We use an alternative proxy of institutional distance. Instead of using differences in the GCI Index between headquarters and affiliates, we proxy institutional distance using the World Governance Indicators (WGI), applied in the work of Wu et al. (2016) (the correlation with the

[13] In Table 6 of summary statistics we observe that the mean value of the total number of employees by business groups is 3,732.83. When we remove business groups with more than 8,074 employees, the mean value of this variable is 218 employees by business group.

[14] On average, these 2,015 business groups have 65,465 employees, 16,234.70 € millions of income, and 72,243.89 € millions of total assets. Among these business groups, we find the American group Wal-Mart Stores, Inc., with more than 2 million of employees.

GCI Index is 0.85). We find that results for all the variables remain qualitatively the same (Panel A of Table 12).

As an extended analysis, we include in our model the type of the largest owner as a control variable. The type of the largest owner is given by the variable Global Ultimate Owner, provided by ORBIS Bureau van Dijk. In case there is an identified shareholder, the shareholder (individual, family, a company or the state) is the Global Ultimate Owner, according to the ownership links requirements by ORBIS. Based on this information, we create a dummy variable that equals 1 if the Global Ultimate Owner is a family and 0 otherwise. In our sample, we find that almost 20% of business groups are family-owned. Panel B of Table 12 presents the results from this extended analysis. We observe that family business groups are significantly and positively associated with the presence of interlocking directors on boards. This result indicates that the decision of interlocking directors is more likely in family business groups, probably motivated by the family members' wish of having the control of the group firms in their hands. The rest of results remain consistent with the ones in Table 10.

We also measure the size of the business group by the log of the total number of firms in the group. The results do not vary substantially and are omitted to save space (but available upon request), although the *Board Positions in HQ* shows a non-significant coefficient.

Insert Table 12 about here

3.5.3.3. Analysis of board positions in headquarters

Likewise, we empirically test our hypotheses by analyzing the probability of a director in the headquarters holding a position in an affiliated firm, using a dataset of board positions in

headquarters. As we said before, we cannot establish the direction of the movement of interlocking directors and then we limit our study to the analysis of board positions in headquarters.

We introduce a variation of the three key explanatory variables, as we do not consider bilateral HQ-affiliate relationship. We calculate the average distance in kilometers, the average of differences in GCI Index, and the average of differences between NACE 4-digits codes of all affiliates in a business group. Control variables at *i,j* level vary in terms of the definition –*Affiliate Level* is calculated as the average level of all the affiliates within the business group *(Average Level), Affiliate Weight* is computed as the total sum of the percentages of income that affiliates have *(Sum Weights), Ownership Percentage* is calculated as the average percentage of ownership of the headquarters over all the affiliates in a business group *(Average Ownership),* and the variable *Ownership Dummy* is now represented as the proportion of wholly owned affiliates in a business group (*Wholly Owned Affiliates*). Control variables at *i,j,k* level consider the characteristics of directors sitting in the headquarters. *Horizontal Director* cannot be included in this robustness analysis due to endogeneity, as this variable is calculated as the number of directorships in affiliates and only would have values for interlocking directors –directors sitting in both the headquarters and any of the affiliates.

The expected effect remains the same for almost all variables in the board positions in headquarters, except for the *Board Positions in HQ* (-) and the *Board Positions in Affiliates* (+). The interpretation of these two variables is different when we consider the positions in headquarters. In this case, we expect the more positions in the board of headquarters, the lower the probability of interlocking between headquarters and affiliates (*Board positions in HQ),* since the probability of being chosen to go to one affiliate is lower. In contrast, we expect the more positions in the board of affiliates, the higher the probability of interlocking between headquarters and

affiliates (*Board positions in Affiliates)*, since there are more possibilities to find a position in one affiliate.

The results from the probit regression of board positions in headquarters are provided in Table 13. Hypothesis 1, 2 and 3 are also supported by the results in Models 2-5. Consistently, *Board positions in HQ* and *Board positions in Affiliates* yield the expected sign. The results from the remaining control variables do not vary from the ones found in the dataset of board positions in affiliates (Table 10), all are statistically significant and with the expected sign. We also obtain a positive effect for the variable *Executive Director*. This suggests that the information advantage of executives from headquarters is also useful for the controlling and advising functions in the business group.

Insert Table 13 about here

3.5.3.4. Propensity Score Matching (PSM)

We furthermore test our hypotheses using a different methodology, Propensity Score Matching (PSM). In particular, we apply caliper matching and nearest neighbor matching (Caliendo & Kopeinig, 2008). This methodology generates the counterfactual outcome by identifying non-treated observations (non-interlocking directors) that are similar to treated observations (interlocking directors) in terms of a set of observable characteristics (control variables).

To implement this method, we apply matching techniques. First, we run a probit model to estimate the conditional probability of being an interlocking director (Table 14). We use the

estimated probabilities from model 1-3 as a propensity score for matching treated and non-treated observations in the next step.

Insert Table 14 about here

Second, PSM generates the average treatment effect by comparing respectively the geographic, institutional and industrial outcomes when an interlocking director occupies a board position to the counterfactual outcome when a non-interlocking director occupies a board position. In Table 15 the results from PSM show that interlocking directors and non-interlocking directors are seated in affiliated firms that are identical in the observed control variables, but different in the outcome variables –geographic, institutional and industrial distances to the headquarters, respectively. For example, in the first column we show that the PSM identifies a matching sample composed by 321,693 non-treated observations (non-interlocking directors) for 71,168 treated observations (interlocking directors). We observe that treated and non-treated samples do not present statistically significant differences in the set of control variables, but the geographic distance is larger for the non-treated sample and this difference is statistically significant (-0.028), according to Hypothesis 1. Results in columns 2 and 3 support Hypothesis 2 and 3, respectively.

Insert Table 15 about here

3.6. Discussion and concluding remarks

This Chapter aims at improving the current understanding of board composition in business groups. Our theoretical framework contributes to the knowledge of the convergence between

corporate governance and business groups' research (Boyd & Hoskisson, 2010; Colli & Colpan, 2016). Specifically, we analyze the role of interlocking directors in the headquarter-affiliate relationship as a mechanism of corporate governance in business groups (Ambos et al., 2019; Du et al., 2011; Kim et al., 2005). A potential agency-problem between headquarters and affiliates may be solved through interlocking directors, who may provide better monitoring and advising functions thanks to their access to information both in the headquarters and in the affiliates (Hillman & Dalziel, 2003). Interlocking directors' information advantages may operate in two channels: a better monitoring and advising from headquarters to affiliates, and a better advising from affiliates to headquarters.

However, better monitoring and advising from interlocking directors are hindered by costs associated to information barriers. We contribute to the literature of information barriers (Boivie et al., 2016), focusing on geographic distance, institutional distance and industrial distance as barriers to information skills of interlocking directors. We find that geographic distance between headquarters and affiliates, differences in institutional development between their countries, and industrial distance hamper the decision to appoint interlocking directors.

By analyzing a dataset of 512,607 board positions in affiliated firms of business groups, we find that the probability of holding an interlocking position (simultaneously in the headquarters and the affiliates) is lower when the geographic, the institutional, and the industrial distances between the headquarters and the affiliated firms are higher. We interpret this result in terms of the cost of acquiring the relevant information to provide the monitoring and advising functions to board directors (Boone et al., 2007; Lehn et al., 2009; Linck et al., 2008). This interpretation is reinforced by a larger probability of interlocking directors when they serve as executive directors.

Moreover, we extend the literature identifying business groups with algorithms based on ownership links using large databases (for instance, Belenzon et al., 2019; Masulis et al., 2011). From a stand-alone firm's database, we define an algorithm based on ownership links to form business groups. This methodology overcomes the problem to access constrained data about business groups' affiliation, and facilitates a generalizable comparison across countries.

However, this Chapter is not exempt from limitations. The main limitation is the potential existence of reverse causality. Our theory predicts that geographic, institutional, and industrial distances determine the decision to appoint interlocking directors. However, the direction of causality may be the opposite. For example, we may expect that a business group, which has already defined its policy of appointing interlocking directors, choose the geographic distance after this interlocking decision has been established. Once the decision to appoint interlocking directors has been set, this may be the cause of the allocation of foreign affiliates in not distant countries.

Therefore, the estimates of our analyses may be biased. Unfortunately, we cannot solve this problem because of the cross sectional nature of our data. To cope with this limitation, longitudinal data or instrument variables are needed to this end. Given these reasons, we carefully interpret our results as associations between variables rather than causal relations.

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4. BOARD GENDER DIVERSITY IN BUSINESS GROUPS: EXPLORING THE CASCADING EFFECT BETWEEN HEADQUARTERS AND AFFILIATES

Abstract. This study explores the cascading effect of board gender diversity within business groups. In particular, we empirically test whether board gender diversity in headquarters is positively associated with board gender diversity in lower layers of hierarchical business groups. We, moreover, analyze the empowerment of women directors in the boardroom, and we moderate by some business groups characteristics that may impact the influence of headquarters. We find a positive relationship between board gender diversity in headquarters and affiliates. This suggests that the existence of women at the top stimulates gender diversity in affiliates, and that this finding is influenced by several business group characteristics. However, the presence of women in board executive positions is not associated with an increase in gender diversity across business groups' affiliates.

Keywords. Women directors; board gender diversity; business groups; inter-organizational dynamics; homophily theory

"When the second woman came, I loved having her there. There is a difference when another woman is in the room. It is helpful. You generally share perspectives and it is easier to have two who feel the same way. We supported each other, but it was also a mental check"

A woman director on a *Fortune 1000* board, interviewed by Konrad, Kramer, and Erku (2008)

4.1. Introduction

Although board gender diversity is increasing, women remain underrepresented (Catalyst, 2018b). In 2017, 77.40% of MSCI ACWI Index companies had at least one woman director, but women only held 17.30% of directors positions (Eastman, 2017).[15] In European countries, women only comprise approximately 25% of board seats in the largest publicly listed companies (European Commission, 2018), and in the US women only hold 21.20% in S&P 500 companies (Catalyst, 2018a).

Women's appointment to the boardroom has not only raised interest in the media but also among academics over the last years. [16] Namely, the research has focused on organizational and corporate governance outcomes, such as performance, risk-taking effects and corporate social responsibility implications, of having women sitting in the boardroom (e.g., Adams & Ferreira, 2009; Faccio, Marchica, & Mura, 2016). Another stream of research has analyzed the differences between women and men in boards. For example, women are able to change boardroom interactions, since they are less conformist than their men counterparts (e.g., Adams & Ferreira, 2009); firms with women directors engage in more competitive interactions, and their decision-

[15] MSCI is a research company that develops global equity indexes. The MSCI ACWI Index contains equity returns for 23 developed and 24 emerging economies.
[16] Kirsch (2018) exhibits in her literature review a set of more than 300 gender-related articles from 1981 to 2016.

making may suffer less from groupthink (e.g., Chen, Crossland, & Huang, 2016). Kirsch (2018) classifies the factors that drive women's access to boards into three different levels: macro-level (formal and informal institutions); meso-level (boards, organizations and industries); and micro-level (appointment processes). At the macro-level, studies, first, have analyzed the role of institutions and legislations in the board gender composition (Terjesen & Singh, 2008; Chizema, Kamuriwo, & Shinozawa, 2015a), specifically how culture supports feminine values (e.g., Alesina, Giuiliano, & Nunn, 2013). Second, articles study the role of key actors –e.g. shareholders, executive search firms, lobbying groups- in the representation of women on boards (Doldor, Sealy, & Vinnicombe, 2016). At the meso-level, articles have explored the relation between board, firm and industry characteristics, and board gender diversity (Adams & Kirchmaier, 2016; Hillman, Shropshire, & Cannella, 2007; Mínguez-Vera & Martin, 2011). At the micro-level, studies have examined the appointment processes that hinder women from accessing boards; for instance, women suffer from discrimination from men directors, who are responsible for the nomination, due to social factors (Hutchinson, Mack, & Plastow, 2015). Further, women might not be able to enter the boardroom when already a woman is in the boardroom (Farrell & Hersch, 2005).

So far, these determinants have been considered in the context of individual firms, but many companies established themselves within business groups. Business groups, defined as a collection of legally independent firms joined together by formal and informal ties that conduct coordination action (Granovetter, 1994; Khanna & Rivkin, 2001), are mainly prevalent in emerging markets. For instance, firms affiliated to business groups represent 51% and 44% of listed companies in South Korea (*Chaebols*) and Taiwan (*Guanxi qiye*), respectively (Khanna & Yafeh, 2007). However, relevant business groups are also present in Western developed

economies, such as the Virgin Group in Britain or the Wallenberg Group in Sweden. For a survey of business groups in the West, see Colpan & Hikino (2018).[17] Nevertheless, most research on board gender composition has neglected the role of business groups across the world, and, thus, how the aforementioned determinants may affect affiliated firms differently. Therefore, the appointment of women directors to boards in affiliates of business groups has not been analyzed yet.

In this Chapter, we analyze whether a cascading effect (or spillover effect) of gender diversity occurs between the headquarters and affiliates of business groups. There are two potential channels for the cascading effect in this relation: (1) the gender determinants on headquarters may spread along the hierarchy to affiliates, due to the inter-organizational exchanges between firms and propelled by the control over affiliates, and (2) the women directors in headquarters may influence board gender diversity in affiliates, due to homophily.

On the one hand, the inter-organizational approach suggests that a firm is influenced by its exchange partners, in particular, its more powerful exchange partners (DiMaggio & Powell, 1983; Galaskiewicz, 1985; Pfeffer & Salancik, 1978). Within the structure of a business group, affiliated firms are influenced by the actions of headquarters. By extension, there is likely a direct link between the determinants of gender diversity of a firm and the board gender diversity in its exchange partner (Beckman & Phillips, 2005). In the context of business groups, the determinants of women representation on headquarters' boards can be translated into a higher presence of women directors in affiliates. On the other hand, homophily theory considers women to be closer to other women due to similarities in experience and behavior. Several disciplines have analyzed

[17] Business groups are organized either vertically –such as Japanese *keiretsu*- or horizontally –such as South Korean *chaebols*, through equity ties. In vertical business groups there is a more pronounced hierarchy between the headquarters and their affiliates, which are controlled by the headquarters.

this framework (e.g., Cohen & Huffman, 2007). For example, in education, students receive better feedback and evaluation when they match teachers' gender (Dee, 2005); in television, shows run by women producers have a higher percentage of women leading characters (Glascock, 2001); and in the business context, owners' gender positively associates with employees' gender (Carrington and Troske, 1995).

By using data from 132,849 affiliated firms of 39,911 business groups located in the OECD countries, we analyze the relationship between board gender diversity in affiliates and board gender diversity in headquarters. We furthermore disentangle the association of the role of women within the headquarters' boardroom –executives or non-executives- and board gender diversity in affiliates, which can be understood as a signal of women empowerment. Moreover, we examine the potential moderating role of some inherent characteristics of hierarchical business groups, such as the level of affiliates within the structure, the importance of the affiliates in terms of income, and the percentage of ownership held by the headquarters over the affiliates. We conduct different alternative analyses to check for robustness and the results remain unaltered.

We find a positive relationship between board gender diversity in affiliated firms and board gender diversity in headquarters, suggesting the existence of spillover effects within the business group. These findings provide evidence for the influence of inter-organizational exchanges (Beckman & Phillips, 2005) and also are consistent with the homophily explanation of women preferences (Cohen & Huffman, 2007; Konrad et al., 2008). However, we observe that the empowerment of women, as executives, on boards of headquarters is not related with an increase in the number of women in affiliates' boards. This result suggests that determinants of appointing more women directors on boards of headquarters may affect the representation of women in affiliates, rather than homophily. Further, considering affiliate level and affiliate ownership as

moderating effects, we find potential top to the bottom effects in the organizational hierarchy of the business group. Furthermore, our findings not only have relevant implications for the relationship between external factors of firms (country and industry) and gender diversity, but also for the link between different inner characteristics of firms (such as size) and the presence of women on corporate boards, subject to the context of business groups.

Our Chapter contributes to the literature in several ways. First, we contribute to the research on inter-organizational spillover effects of board gender diversity (e.g., Aldrich & Zimmer, 1986; Beckman & Phillips, 2005), by analyzing the cascading effect of board gender diversity between headquarters and affiliated firms. Second, our study joins a larger body of research on homophilic relations between women in social networks (e.g., Cohen & Huffman, 2007; McPherson, Smith-Lovin, & Cook, 2001). Third, we shed light on the scarce literature about corporate governance within business groups (e.g., Boyd & Hoskisson, 2010; Colli & Colpan, 2016). More specifically, we explore the role of women directors in business groups. To the best of our knowledge, this is the first attempt to analyze board gender diversity within the inter-organizational networks of business groups. Last, we complement the literature on the effects of the country context –macro level- (e.g., Li & Harrison, 2008) and the industry –meso level- (Brammer, Millington, & Pavelin, 2007) on the board composition. Specifically, we expand research on the relationship between institutional environment and the representation of women in corporate boards across countries (e.g., Lewellyn & Muller-Kahle, 2019), and the lower prevalence of women in men-dominated industries (e.g., Adams & Kirchmaier, 2016).

The Chapter is structured as follows. First, we review the literature on board gender diversity and its connection with business groups' structures, and propose our hypotheses. Second, we present the empirical design. Third, we show the results from the descriptive and regression

analyses and check the validity of the results by conducting several robustness tests. Then, we discuss our findings and conclude.

4.2. Related literature and hypotheses

The work from Kirsch (2018) presents an exhaustive literature review of all the determinants and factors that shape board gender composition, which have interested scholars from 1981 to nowadays. These factors are range from the macro, meso to micro level. At the macro level, *formal* and *informal institutions*, and *key actors* may influence the women access to boards. Countries with a high level of gender equality in employment facilitate women accessing boards (e.g., Terjesen & Singh, 2008), or those where the legislation enables work-family balance (*formal institutions*) (e.g., Iannotta, Gatti, & Huse, 2016). Culture also appears to be relevant in shaping board gender diversity: feminist and less religious cultures exhibit a larger number of women directors (*informal institutions*) (e.g., Alesina et al., 2013; Chizema et al., 2015). Among *key actors*, shareholders, executive search recruiters, besides different lobbying groups and the media can force changes to current norms in terms of women representation on boards. For instance, recruiters may adapt the selection process to be more inclusive (Doldor et al., 2016).

At the meso level, *board*, *firm* and *industry* type also seem to influence women access to the boardroom. Larger boards, boards connected to other boards with women directors, larger firms, established firms, family firms, and firms with foreign institutional investors have more women representation (e.g., Burke, 1999; Geiger & Marlin, 2012; Hillman et al., 2007; Mínguez-Vera & Martin, 2011; Nekhili & Gatfaoui, 2013). Moreover, the employment of women in some industries, for example retail industries with a higher presence of women directors versus STEM industries with a lower presence (Adams & Kirchmaier, 2016), also determines the

representativeness of women on boards. Besides the arguments linked to the role of the women employment in the industry, other studies have explored how industries whose clients are preferably women have more women on boards, satisfying stakeholders' requirements (see Brammer et al., 2007, for the case of UK companies).

At the micro level, *social factors*, *social networks* and the role of *corporate elite* are the leading determinants of the director appointment processes. For instance, incumbent directors – who are predominantly men- tend to recommend individuals that present similar characteristics, excluding women from their appointment decisions (Kirsch, 2018). This reasoning draws on different social concepts, such as homosocial reproduction (Kanter, 1977) or homophily (Ibarra, 1992). Other stream of studies has shifted their focus on the role of *social networks*, such as personal contacts and recommendations, as a key factor for women to access board positions (e.g., Burke, 1997; Sheridan & Milgate, 2005). Lastly, *corporate elites* may prevent more women from being appointed to board seats if there already is a woman on board (Farrell & Hersch, 2005). The body of research agrees on the idea that selectors elect a woman simply to fulfill the demand for diversity.

Many studies have suggested that the representation of women in leadership groups has a cascading effect to lower levels (e.g., Cohen & Huffman, 2007). The presence of women on boards leads to a women-friendly culture within the organization, which may foster the retention of women at lower levels and, therefore, enhance their opportunity to climb several positions of the professional ladder to the top management team (Bilimoria, 2006). The existence of women directors may also attract women-talented workforce to become potential employees (Bilimoria & Wheeler, 2000). Furthermore, homophily relationships between women –when women prefer to interact with other women- promotes an environment where mentoring and social exchanges

are relevant to women's career development, which allows them to reach the upper echelons in a firm (Konrad et al., 2008).

These findings in the literature shed light on the existence of an intra-organizational cascading effect among leadership groups, from boards to top management teams in the setting of individual firms. However, studies exploring inter-organizational spillovers of board gender diversity are limited, such as the analysis of boards of headquarters and affiliates within a business group and its connectedness. As an exception, Beckman and Phillips (2005) observe that law firms whose key clients are firms with women representation on boards are more prone to promote women attorneys. Kleinbaum, Stuart and Tushman (2013) find a higher proportion of gender homophilic interactions within organizational structures –business units, functional units and offices- than across their boundaries. In this sense, people of the same gender are likely to interact more with each other within their business unit or office rather than across different units. Nevertheless, the authors observe that for the case of women, they communicate with other women both within and across their business units and offices.

Therefore, the organizational structure of a firm solidly influences the interaction patterns within it (Kleinbaum et al., 2013). However, the business structure of a hierarchical business group is far from the one of a stand-alone firm, since the headquarters subjugate and control the multiple business divisions (affiliates).

Extrapolating to the context of inter-organizational exchanges in hierarchical business groups and with the evidence that women transcend the boundaries of business units to communicate with other women, under the arguments of homophilic interactions and gender preferences, we can expect that women on boards of headquarters may also influence the presence of women on boards in affiliated firms. Specifically, we are interested in examining the cascading effect of

board gender diversity between headquarters and affiliated firms. We also emphasize the role of executive women in the headquarters boardroom and whether this signaling of women empowerment is associated with board gender diversity in affiliates. Additionally, we consider how different business groups' attributes may facilitate or inhibit the former two relationships, which may suggest a potential directionality (or theoretical causality) from headquarters to affiliates.

4.2.1. Board gender diversity in headquarters and board gender diversity in affiliates

Our theoretical foundations of the relationship between board gender diversity in headquarters and board gender diversity in affiliates draw on two different approaches: an institutional logic based on the inter-organizational approach, and a psychological logic, built upon the homophily theory. Due to the connectedness between headquarters and affiliates, we consider two plausible channels: (i) the determinants of women access to headquarters' boards may expand to the affiliates, and therefore affiliates are influenced by these women representation's factors (inter-organizational approach); or (ii) whether women in headquarters may affect women representation on boards of affiliates (homophily theory).

On the one hand, an inter-organizational approach suggests that a firm is influenced by its exchange partners (Beckman & Phillips, 2005). Research on inter-organizational links (Galaskiewicz, 1985), resource dependence (Pfeffer & Salancik, 1978), and institutional theory (DiMaggio & Powell, 1983) has widely agreed on the idea that firms are influenced by their more powerful exchange partners. In the inter-organizational context of business groups, board demographic composition in headquarters –which have the power to exert control over affiliates-

may influence board demographic composition of affiliates –which are controlled by the headquarters through ownership ties.

On the other hand, homophily theory establishes that similar individuals, who tend to have similar background, prefer to interact and work among them (McPherson et al., 2001). Related literature on homophily theory in organizational contexts (for an example, see Ibarra, 1992) follows this general set of ideas. If women are more prone to interact with women, following homophily perspective, headquarters with women in the boardroom may be more likely to foster the representation of women on boards of affiliates. Also, this framework is related to the concept of "homosocial reproduction", coined by Kanter (1977), which refers to the tendency of women to hire other women. For instance, when women evaluate women candidates for a job position, they are less subject to pregnancy bias (Halpert, Wilson, & Hickman, 1993). Using data for the US census, Cohen & Huffman (2007) find that women in high-level managerial positions reduce the gender wage gap among non-managerial employees.

Although we do not empirically analyze the determinants of women access to boards in headquarters, once we observe board gender diversity in headquarters we hypothesize a positive relationship with women representation in affiliates. We are interested in exploring the cascading effect of board gender diversity in hierarchical business groups, considering the control of headquarters over affiliated firms. Given these arguments, we hypothesize that the presence of women on corporate boards of headquarters is positively related to the number of women on boards of affiliates:

Hypothesis 1.a. Board gender diversity in headquarters is positively associated with board gender diversity in affiliates.

4.2.2. Empowering women on boards

Following with the two previous arguments: (i) whether the determinants of having women directors in headquarters may spread to the affiliates and influence its gender diversity, or (ii) whether women on boards of headquarters may exert their power to influence the women's access to boards in affiliated firms, this hypothesis builds on power and information acquisition. Executive directors within boards have more decision power and information than non-executives, thanks to their daily involvement in managerial decisions. Thus, women who occupy an executive position in headquarters may acquire and use their inherent power and information to influence what happens not only in the headquarters, but also in the rest of affiliated firms, which are controlled by the headquarters. Focusing on homophilic relations, we argue that the additional power of women, gained by their role as executives, may translate into a higher presence of women directors in affiliates. Given these information and power arguments, we expect that women executives are also positively related to the representation of women in the boardrooms of affiliated firms:

Hypothesis 1.b. When women in headquarters are executives, they may force a higher presence of women directors in affiliates, due to the inherent power of their positions.

4.2.3. Moderating role of business groups characteristics

There are certain characteristics of business groups that may positively or negatively affect the positive relationship between board gender diversity in headquarters and board gender diversity in affiliates, potentially driven by the control of headquarters over affiliated firms. First, regarding the level of the affiliate, we expect that if an affiliate is found at lower levels of a

business group, it is more difficult for the headquarters to control that affiliate, because headquarters has to overcome all the intermediaries found in the middle along the hierarchy. Belenzon, Hashai, & Patacconi (2019) find that a subsidiary's (affiliate) autonomy from headquarters increases with organizational distance. Likewise, it may be more difficult to have women directors, since the influence of headquarters may be diluted in affiliates located at the lowest levels. Therefore, we propose the following hypothesis of the moderating effect of the affiliate level in the relationship between board gender diversity in headquarters and board gender diversity in affiliates:

Hypothesis 2.a. Affiliate level negatively moderates the relationship between board gender diversity in headquarters and board gender diversity in affiliates.

Moreover, business groups may have greater awareness about their most important affiliates, as they are key firms for the good functioning of the group. If headquarters want gender diversity in affiliated firms, either motivated by the determinants of women access to boards or by the importance and power of women in the boardroom, we would expect that this effect is more pronounced in those relevant affiliates. For instance, if a business group is keen on satisfying the women quota demands from stakeholders' pressures, the group would try to expose its gender awareness in important affiliates. We therefore propose the following hypothesis of the moderating effect of affiliate importance on the relationship between board gender diversity in headquarters and board gender diversity in affiliates:

Hypothesis 2.b. Affiliate importance positively moderates the relationship between board gender diversity in headquarters and board gender diversity in affiliates.

A firm's ownership drives boards 'to seek and retain individuals who will be able to respond to owners' action desires' (Sur, Lvina, & Magnan, 2013: 374). Women sitting on boards of those headquarters with a high degree of ownership in a determined affiliate, or the determinants of board gender diversity in those headquarters, would have more power on deciding who would be seating on that board of affiliate, and due to the cascading effect, they can choose women to be present in affiliate's boardroom. Thus, we propose the following hypothesis of the moderating effect of affiliate ownership on the relationship between board gender diversity in headquarters and board gender diversity in affiliates:

Hypothesis 2.c. Affiliate ownership positively moderates the relationship between board gender diversity in headquarters and board gender diversity in affiliates.

A graphical depiction of our theoretical model is shown in Figure 3. Although theoretically we may predict a directionality of the cascading effect from the headquarters to the affiliates, given the hierarchical structure of the business groups we study, empirically we cannot establish causality and we interpret our results as associations between two variables. Figure 3 shows the main associations between board gender diversity in affiliates and board gender diversity in headquarters, and the positive additional effect when women have more power as executives in headquarters. Moreover, Figure 3 presents the moderating effects of the business groups' characteristics, which are the factors that may catalyze –the affiliate importance within the group and the ownership stake that holds the headquarters- or inhibit –the level of the affiliate in the group structure- the former two associations. Figure 3 also exhibits the control variables that may influence the presence of women on boards of affiliates, such as the industry and the country of the affiliate.

Insert Figure 3 about here

4.3.Empirical methods

4.3.1. Sample

The data in this study were collected from the ORBIS database by Bureau van Dijk, a private company specialized in data about ownership and financial information for listed and non-listed firms. The initial dataset was formed by more than 11,235,349 stand-alone companies in more than 200 countries worldwide, for the year 2016. Out of these companies, the methodological aim was to create business groups based on ownership links between firms (e.g., Aguilera, Crespí-Cladera, Infantes, & Pascual-Fuster, 2019; Belenzon et al., 2019; Masulis, Pham, & Zein, 2011). This allows us to establish vertical business groups by firstly identifying the headquarters and the subsequent affiliated firms integrated in the hierarchical network. The ownership threshold applied is more than 50%, and, thus, only considers control relations of majority owners. We were able to identify 3,398,487 firms within 879,427 business groups.

A detailed explanation of the sample attrition from 879,427 to 39,911 business groups is further included in Chapter 3 of this thesis, but the filters applied to clean the sample are mainly based on problems with missing data about board composition, missing information in other relevant variables for the study, and restriction to OECD countries.[18]

Therefore, our final sample is composed by 39,911 business groups whose headquarters are located in the 35 OECD countries. The sample of business groups contains information about

[18] The list of OECD member countries by 2016 is Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

172,760 firms (39,911 headquarters and 132,849 affiliates) and 720,766 board positions. Out of these board positions, we are able to detect the gender of 675,334 board positions (93.70% of total observations; we remove the gender-missing observations).

To check for the representativeness of the business groups sample, we compare the number of total firms within business groups in our final sample with statistical information from OECD Structural and Demographic Business Statistics (OECD, 2019). We observe that firms affiliated to business groups represent the 2.64% of all the firms with more than 9 employees reported by the OECD.[19] However, these firms signify the 40.71% of the total employment of firms in the 29 OECD countries.[20] Therefore, we can conclude that our sample is relevant.

4.3.2. Empirical model

Our empirical model examines the relationship between board gender diversity in affiliates and board gender diversity in HQ (Hypothesis 1a and 1b). Our model also tests whether these relationships are moderated by the effect of the affiliate level in the business group (Hypothesis 2a), the importance of the affiliate within the group (Hypothesis 2b), and the percentage of the affiliate's ownership held by the headquarters (Hypothesis 2c). We differentiate between variables calculated at affiliate level (i,j) and business group level (i).

Dependent variable: ***Board gender diversity in affiliates (i,j)***

Previous studies have measured women representation on boards differently –including the total number of women directors, the number of women directors expressed as a percentage of

[19] Out of the 35 OECD countries by 2016, the Structural Business Statistics only covers 30 countries accounting for the number of enterprises. We complemented the OECD breadth with data from the United States Census Bureau for the case of enterprises located in the United States. We were not able to find available data for Canada, Chile, Korea, and Mexico, for 2016.
[20] For employment figures we use data for 29 OECD economies. We were not able to find available data for Canada, Chile, Israel, Japan, Korea, and Mexico, for 2016.

total board seats (e.g, Abad, Lucas-Pérez, Minguez-Vera, & Yagüe, 2017; Adams & Ferreira, 2009), or Blau Index for gender diversity (e.g., Martín-Ugedo & Minguez-Vera, 2014). In the main analyses, we measure gender diversity in the boardroom as the number of women directors divided by the total number of directors on the board of each affiliate. In sub-section 4.4.3 of the robustness analyses, we apply different measures of the dependent variable, such as the total number of women directors, a dummy variable accounting for the existence or not of women on boards, and different gender diversity indexes (Blau index and Shannon Index).

Independent variables

Board gender diversity in headquarters (HQ) (i). Similarly, our key explanatory variable *Board gender diversity in HQ* is measured as the proportion of women directors on the board of the headquarters. We expect that a larger proportion of women in boards of headquarters is associated with a larger proportion of women in boards of affiliates (Hypothesis 1a).

Executive women in HQ (i). When women serve as executives, they have more decision power and informational advantages, translated in potentially more influence about the decisions of the firm. Then, we expect a larger influence in board gender diversity of affiliated firms (Hypothesis 1b). *Executive women in HQ* is measured as the proportion of women executive directors over the total number of directors in the board of the headquarters.

Interaction terms of business groups characteristics

Hypotheses 2a, 2b and 2c describe moderating relationships wherein the relationship between two variables depends on a third. Such relationships can be captured using interaction terms in a moderated regression (Aiken & West, 1991). The moderating factors are based on characteristics of business groups, such as the level of the affiliate within the group, the importance of the affiliate in the business group (in terms of total income), and the percentage of

ownership that the headquarters has in the affiliated firm. We believe that these factors amplify (or diminish) the relationship between board gender diversity in headquarters and board gender diversity in affiliates, as follows.

First, *Affiliate level (i,j)* represents the level that each affiliate occupies within a business group (meso level). We categorize levels from 1 (the upper level for affiliates) to 9 (the lower level for affiliates), along the hierarchy of a business group. According to Hypothesis 2a, the lowest the level of the affiliate (higher values in the variable *Affiliate level*), the weakest the positive relationship between board gender diversity in headquarters and the representation of women on boards of affiliates.

Second, *Affiliate importance (i,j)*, operationalized as the percentage that each affiliate has over the total income of a business group, represents the relevance of an affiliate within a group (meso level). Following Hypothesis 2b, the highest the importance of the affiliate, the strongest the positive relationship between board gender diversity in headquarters and the presence of women directors in affiliates.

Third, *Affiliate ownership (i,j)* is measured as the percentage of ownership that headquarters has in each affiliate within a business group (meso level). Regarding Hypothesis 2c, the highest the percentage of ownership in the affiliate, the strongest is the positive relationship between women directors in headquarters and women in affiliates' boards, since the influence of headquarters over the affiliate is larger.

As we also contemplate a positive association between executive women in headquarters and women on boards of affiliates, fueled by the power of executives, we expect a similar effect of the former three moderating variables. We multiply the values of the independent variable of interest –*board gender diversity in HQ* or *executive women in HQ*- with the former business

groups' characteristics to create interaction terms, which are included in the regression. As a result, we include three interaction variables: *Interaction 1* (*board gender diversity in HQ*affiliate level*), *Interaction 2* (*board gender diversity in HQ*affiliate importance*), and *Interaction 3* (*board gender diversity in HQ*affiliate ownership*), when we are keen on studying the association between *board gender diversity in HQ* and *board gender diversity in affiliates.* When we introduce in the regression the effect of the empowerment of women on boards – *executive women in HQ,* we include three additional interaction terms: *Interaction 4* (*executive women in HQ*affiliate level*), *Interaction 5* (*executive women in HQ*affiliate importance*), and *Interaction 6* (*executive women in HQ*affiliate ownership*).

Control variables

The cultural and political context is crucial when studying board diversity (Sealy, Doldor, & Vinnicombe, 2009). The study from Terjesen and Singh (2008) was the first to consider the role of social, political and economic environments on the presence of women on boards. Recent studies have also followed moving forward on the effect of the context on board gender diversity. For example, Carrasco, Francoeur, Labelle, Laffarga, and Ruiz-Barbadillo (2015) show that those countries with the greatest inequalities in power distribution and those that give more importance to the role of men have fewer women on corporate boards. Adams and Kirchmaier (2013) also examine how women labor force participation and different institutional and country-level characteristics are related to gender diversity in the boardroom.

We proxy the level of *Country gender equality (i,j)* (macro level) in a country with the index reported in the Global Gender Gap Report 2018 of the World Economic Forum, which has been previously used in the literature of gender diversity on boards (e.g., Fernandez-Feijoo, Romero, & Ruiz-Blanco, 2014; Lewellyn et al., 2019). It covers 149 countries and includes four

dimensions of gender inequality: Economic participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment. It represents the situation of gender parity for each of the 109 affiliates country included in the sample. The higher the Global Gender Gap Score (GGGS), the more gender equality does country have.

Men-dominated industries and occupations are particularly vulnerable to reinforcing masculine stereotypes that make it even more difficult for women to excel. Among some examples of men-dominated industries we find agriculture, forestry and fishing, construction or mining. In contrast, women show an overrepresentation in education, social services and health-related industries. In spite of the increasing participation of women in men-dominated industries –e.g., women's employment grew more than 10% in construction, mining, and transportation and utilities (The New York Times, 2018)- their representativeness is still low.

The reality of the industry may be also extrapolated to the gender composition in the board of directors of any firm. If an affiliate operates in a men-dominated industry, the composition of its board will reflect the composition of the employment in terms of a low presence of women. For example, a study from Catalyst (2011) shows the women's share of board seats in Canada and the US for 2011 for some of the most men-dominated industries. The results at the board level are consistent with the underrepresentation of women in total employment in these men-dominated industries.

A men-dominated industry contains 25% or less women in total employment (Catalyst, 2018b). By using demographic data about women employment in the US for 2016 (US Department of Labor, 2016), we classify industries as women-dominated when the proportion of men employed is below or equals 25%. We apply this classification and compare it with the industries contained in our sample –we follow the concordances by the US Census Bureau

between NAICS codes and NACE codes. *Women-dominated industry (i,j)* (meso level) is a dummy that takes the value of 1 if the industry is women-dominated and 0 otherwise. This measure focuses on the workforce arguments to support differences in gender related to industry, but there are other potential aspects of the industry –such as target-customers' gender, or industry regulation- that may also affect board gender diversity (e.g., Brammer et al., 2007).

Firm size (i,j) (meso level) has been considered as an organizational predictor of women representation on boards by total assets. Larger firms are more exposed to public scrutiny (Salancik, 1979; Suchman, 1995). In this sense, stakeholders –e.g., investors or customers- are more aware about large corporations and may pressure them to enhance gender diversity in their upper echelons (Hillman et al., 2007). Moreover, other studies have found a positive relationship between firm size and board gender diversity (e.g., Carrasco et al., 2015; Harrigan, 1981), mainly due to the evaluation and promotion processes of large firms that foster the participation of women. However, some studies observe a negative relationship between firm size and the representation of women on boards (e.g., Bertrand & Hallock, 2001). They find that in smaller companies is easier to detect the potential of women to be appointed to boards' positions. We predict that firm size, measured as total assets in € million, positively affects board gender diversity in affiliates.

According to Martín-Ugedo and Minguez-Vera (2014) and Byrnes, Miller, and Schafer (1999), women tend to be more risk averse than men. Therefore, we include affiliate's risk as a relevant control variable. We distinguish between *Financial risk (i,j)* (meso level), proxied by the average value of firm's financial leverage over the last three years, and *Economic risk (i,j)* (meso level), proxied by the standard deviation of the return on assets (ROA) during the period 2007-2016.

We test our set of hypotheses by using the OLS method, which estimates the association between board gender diversity in affiliates and board gender diversity in HQ, considering moderating effects and a set of control variables (equation 1). We also estimate the association between executive women in HQ and board diversity in affiliates, to check whether the power of executive women is related to board gender diversity in affiliates (equation 2). We compute robust standard errors (Huber, 1967; White, 1980, 1982) clustered by business group (Petersen, 2009). The final dataset applied in our analyses considers observations at the affiliate level (N=132,849 affiliates).

$$\begin{aligned} Gender\_aff_{i,j} = \alpha + \beta_1 Gender\_HQ_i + \beta_2 Inter1_{i,j} + \beta_3 Inter2_{i,j} + \beta_4 Inter3_{i,j} \\ + \beta_5 Women\_industry_{i,j} + \beta_6 GGGS_{i,j} + \beta_7 Firm\_size_{i,j} \\ + \beta_8 Financial\_risk_{i,j} + \beta_9 Economic\_risk_{i,j} + \mu_{i,j} \end{aligned} \quad [1]$$

$$\begin{aligned} Gender\_aff_{i,j} = \alpha + \beta_1 Gender\_HQ_i + \beta_2 Execwomen\_HQ_i + \beta_3 Inter1_{i,j} + \beta_4 Inter4_{i,j} + \beta_5 Inter2_{i,j} \\ + \beta_6 Inter5_{i,j} + \beta_7 Inter3_{i,j} + \beta_8 Inter6_{i,j} + \beta_9 Women\_industry_{i,j} + \beta_{10} GGGS_{i,j} \\ + \beta_{11} Firm\_size_{i,j} + \beta_{12} Financial\_risk_{i,j} + \beta_{13} Economic\_risk_{i,j} + \mu_{i,j} \end{aligned} \quad [2]$$

4.4. Empirical results

4.4.1. Descriptive analysis of board gender diversity

In our sample, 38.96% of firms in business groups have at least one woman on boards. Panel A of Table 16 presents some descriptive results of board gender diversity at the board position level. Among all the board positions in our sample of business groups (N=675,334), only the 14.81% are occupied by women directors. If we separate between headquarters (N=194,013) and affiliates (N=481,321), the proportion of women directors is 17.08% and 13.90%, respectively.

Unreported results from an industry analysis show that women have the lowest representation in sectors related to the extraction of minerals, construction, fishing, or manufacturing of automobiles. In contrast, they are very representative in industries connected with cinematography and arts, libraries and museums, education, health services, or garment manufacturing. However, the distribution of women on boards across countries does not offer a direct interpretation, since some very high human-developed countries popular for gender equality exhibit a low representation of women directors. We interpret that these results may be driven by other determinants, such as the importance of men-dominated industries in some countries. Nevertheless, when we force the effect to detect differences between the distribution of women and men on boards by country (according to the observations above the percentile 75 and below the percentile 25 of the GGGS index), we obtain the expected industry results. Panel B of Table 16 shows the distribution of women and men on boards of affiliates, differentiating between countries with a high level of gender equality (above p75 of the GGGS index) and countries with a low level of gender equality (below p25 of the GGGS index), as well as the values of t-test. We observe that there is a higher presence of women (14.51%) on boards located in more gender equal countries than boards in countries with lower gender equality (13.42%), and that this difference is statistical significant. Similarly, Panel C distinguishes between women and men on boards by industry, given by the dummy variable that divides the industries between women-dominated (value 1) and otherwise (value 0). As expected, those women-dominated industries (14.34%) have a significant higher presence of women on boards than the rest of industries (11.83), where women labor force representation is lower.

Panel D of Table 16 presents the distribution of directors by gender and type (executives or non-executives). Out of the total board positions in headquarters, we observe that the percentage

of women executives is 7.36%, against the 41.32% of men directors who are executives. Over the total of men directors, approximately the 50% are executives; however, for women directors only the 43.08% are executives. This result shows that among men directors, executives are more prevalent than among women directors. This finding is consistent with prior evidence, which finds that women are more likely to be non-executive directors than men (Post & Byron, 2015).

Insert Table 16 about here

Table 17 includes the main correlations. Results exhibit a positive correlation between board gender diversity in headquarters and board gender diversity in affiliates, supporting Hypothesis 1a. When we introduce the moderating role of affiliate level, importance and ownership, in the relationship between the dependent and independent variables, we observe that the results support Hypotheses 2a, 2b and 2c. The highest values of *Affiliate level* (above percentile 75) relate to affiliates located at the bottom of the business group, and the lowest values (below percentile 25) are related to affiliates located at the top. Following our assumption, we consider that the (negative) moderating role of *Affiliate level* (Hypothesis 2a) is supported by the results from correlation analysis, as the correlation between the dependent variable and board gender diversity in HQ is smaller when we focus on highest values of *Affiliate level*. For the case of *Affiliate importance* (Hypothesis 2b), the (positive) moderating role is also supported by correlation results. *Affiliate importance* takes larger values when affiliates are more important (in terms of total income) within the business group. The correlation is larger when we look at the highest values (above percentile 75) of *Affiliate importance*, supporting Hypothesis 2b. Similarly, correlation results offer support for the (positive) moderating effect of *Affiliate ownership*, according to Hypothesis 2c.

When we look at the correlation between board gender diversity in affiliates and the proportion of executive women over the total of directors, we find a positive and significant association, supporting Hypothesis 1b. When introducing moderating effects of business groups characteristics, results are consistent with Hypothesis 2a, 2b, and 2c, in line with those reported above.

Insert Table 17 about here

Table 18 reports descriptive statistics and the correlation matrix for the variables included in the empirical model. *Women-dominated industry* shows that on average the industries represented in our sample are non-women dominated (0.03). The mean of *Country gender equality* is 0.77, which means that on average the countries in the sample score the same value that Canada –out of 149 countries reported by the GGGS, Canada occupies the position 16. The average value of total assets (*Firm size*) is 623 € million. On average, affiliated firms exhibit a mean of the financial leverage (*Financial risk*) for the last three years around 27%. We test for multicollinearity using the Variance Inflation Factor (VIF) (Aiken & West, 1991). All the VIF statistics are well within the range, with the highest value being 1.16, which indicates that there are no multicollinearity problems.

Insert Table 18 about here

4.4.2. Multivariate analysis

Table 19 exhibits the results of the multivariate OLS regression analysis, to check on whether there is an association between board gender diversity in affiliates and board gender diversity in

headquarters, while introducing moderating effects of business groups characteristics and controlling for other variables that may affect the representation of women on affiliates boards (equation 1).

Model 1 only includes the board gender diversity in HQ and control variables, without interaction effects. Board gender diversity in affiliates is positively related with board gender diversity in HQ, supporting Hypothesis 1a. This empirical relation is maintained in all estimated specifications and may be considered as robust results. Regarding control variables, they confirm the expected effects. We find that women representation on boards of affiliates is significantly higher in women-dominated industries and in countries more gender-equal. Moreover, larger affiliates and those affiliates with lower economic risk exhibit a larger representation of women directors.

Models 2, 3 and 4 introduce interaction terms. As hypothesized, the level of the affiliate negatively moderates the relationship between board gender diversity in affiliates and the presence of women in HQ boards; therefore supporting Hypothesis 2a. We interpret this result as a dilution of the cascading effect due to the organizational distance between headquarters and affiliates located at the bottom of the pyramid. For headquarters, it is easier to exert control over closer affiliates than farther affiliates. Hypothesis 2b is also confirmed by models 3 and 5. The interaction term between board gender diversity in HQ and the importance of the affiliate within the business group shows a positive and significant coefficient. Headquarters take special care of their important affiliates, so we cannot discard that women directors in headquarters may wish to have more women in boards of relevant affiliates. Hypothesis 2c of the moderating role of affiliate ownership in the relationship between board gender diversity in HQ and affiliates is supported by models 4 and 5. As defined, affiliate ownership represents the percentage of ownership that the

headquarters have in the affiliate. Thus, two potential explanations may occur. On the one hand, women in headquarters, making use of the control over the affiliate, may impose higher representation of women in boards of those affiliates where the ownership stake is larger. On the other hand, the determinants that arise to foster women representation on boards of headquarters can be more easily translated to those affiliates when the headquarters has more power (in terms of ownership stake).

Insert Table 19 about here

The empowerment of women on boards of headquarters (Hypothesis 1b), as executive directors, is introduced in models of Table 20 (equation 2). Model 1 includes the two key explanatory variables (board gender diversity in HQ and executive women in HQ) and control variables. Model 2 introduces the moderating effect of the *Affiliate level*, interacted with the two independent variables; model 3 does the same for the moderating role of the *Affiliate importance*, and model 4 considers the moderating effect of the *Affiliate ownership*. Lastly, model 5 includes all interactions effects. In model 1 we observe that both the presence of women directors in headquarters and the role played by executive women are significant and positively associated with the proportion of women directors in affiliated firms. However, the significant effect of the power of executive women within the boardroom disappears when we include the interaction terms in models 2, 3, 4 and 5. This finding suggests that the presence of women in headquarters is enough to have more women' representativeness in boards of affiliates, but a higher power of executive women in headquarters is not relevant to spread board gender diversity in affiliated firms (not supporting Hypothesis 1b). Furthermore, interactions with the variable of executives in HQ are not significant (*Interaction 4* for the moderating role of *Affiliate level* and *Interaction*

6 for the moderating effect of *Affiliate ownership* are not significant in any of the specifications). Only the moderating role of *Affiliate importance* (*Interaction 5*) is weakly significant in all the specifications.

All the results from Table 19 remain, with the exception of Hypothesis 2a (not supported in model 5). These results indicate that the moderating effects of business groups' characteristics (*Affiliate level*, *Affiliate importance* and *Affiliate ownership*) are statistically significant stressors in the relationship between board diversity in HQ and women representation in boards of affiliates, but the power of executive women in HQ does not imply a relevant difference.

We additionally run these analyses (from Table 20) in a subsample excluding headquarters without executives, as we include as explanatory variable *Executive women in HQ*. All the results remain practically the same, with the exception of *Interaction 5* that becomes non-significant. This finding may confirm that the importance of the power of women within boards is not as relevant as simply having women on boards.

Insert Table 20 about here

4.4.3. Robustness analysis

To test the robustness of previous results, we conduct several additional analyses. These include the application of different subsamples, the introduction of other control variables, and the use of alternative measures to define the dependent variable, *Board gender diversity in affiliates*. First, we disregard those business groups composed by only two firms; since they may not be considered as business groups (Table 21). Results remain robust (as in Table 19). When

we include the proportion of executive women over the total of board directors in HQ (as in Table 20), results also remain robust (results omitted to save space).[21]

Insert Table 21 about here

Second, due to the large deviation in terms of total assets, we decide to restrict the sample to those affiliates whose total assets are in between the percentile 25 (above 3€ million in total assets) and percentile 75 (below 41€ million in total assets). The association between *Board gender diversity in HQ* and *Board gender diversity in affiliates* may be different depending on affiliate size. We find that results remain robust (results omitted to save space).

As a further robustness test, we also introduce the effect of gender quotas. First, we consider the effect of different institutional contexts of affiliates in terms of women representation in parliament, the effect of quotas in the political arena. Information about the country differences in gender diversity in parliaments is given by The Global Database of Gender Quotas. This index is an initiative from a joint project of the International IDEA, the Inter-Parliamentary Union and the Stockholm University. To do so, we introduce in our models a control variable with the values given by the previous index. The results from the regression analyses are shown in Panel A of Table 22. An increase in the value of the index leads to a higher representation of women on boards of affiliates. The rest of results remain consistent with the ones in Table 19.

Second, we also control for the role of corporate gender quotas. Norway was the first country to adopt a quota for female board members (40%) in 2004. Other nations followed Norway by adopting either quotas with a hard penalty (e.g., Germany, France, Belgium, Iceland, Italy) or with a soft penalty due to non-compliance (e.g., Austria, Finland, the Netherlands, Spain, Sweden,

[21] All the results omitted to save space are available upon request.

the UK), aiming at achieving a female representation ranging from 25% to 40% (e.g., Mensi-Klarbach & Seierstad, 2020). Data about corporate gender quotas in affiliates countries for the year 2016 has been retrieved from several sources, including Catalyst (2020), European Commission (2016), MSCI (2019), Deloitte (2017), and the article from Terjesen, Aguilera and Lorenz (2015). We consider both binding –hard quotas and soft quotas- and non-binding gender quotas –such as code recommendations- as proxies of gender legislation in a country.

The models in Panel B of Table 22 include a dummy variable that equals 1 if the affiliate country has introduced any corporate gender quota (hard quota, soft quota and recommendations in the codes of good governance) and 0 otherwise. We find that all results of main variables remain quantitatively the same to the ones shown in Table 19. The effect of corporate gender quotas on board gender diversity in affiliates is not significant, joining that body of research that does not find any relation between the introduction of gender legislation and an increase in women representation on boards.

Insert Table 22 about here

We furthermore control for potential differences between family and non-family business groups. Women with family connections to the controlling shareholder are more prone to be appointed to boards of those firms with concentrated ownership (Bianco, Ciavarella, & Signoretti, 2015). We classify business groups as family or non-family according to the definition of the Global Ultimate Owner by ORBIS. When there is an identified shareholder, the shareholder (individual, family, a company or the state) is the Global Ultimate Owner. Based on this information, the dummy variable *FBG* equals 1 if the global ultimate owner is a family and 0 otherwise. In our sample, we observe that almost 20% of business groups are family-owned.

When controlling by *FBG* in models included in Table 23, we find that the association between *Board gender diversity in HQ* and the dependent variable has the same expected effect, positive and significant. Moreover, the coefficient of the interaction term between *FBG* and *Board gender diversity in HQ* exhibits that there are no differences between family and non-family business groups.

Insert Table 23 about here

We also attempt to capture other potential effects of industry and country not captured by the variables included in the baseline model (see Brammer et al., 2007, for an alternative and plausible explanation about the pressure in women-customers' industries). *Women-dominated industry* only allows detecting differences regarding the labor force (women versus men employees). Furthermore, there are probably other country effects not entirely captured by the GGGS employed in *Country gender equality*. Instead of introducing these variables, we control for industry and country fixed effects. Results regarding the cascading effect of gender diversity in HQ in Table 24 confirm the ones obtained using *Women-dominated industry* and *Country gender equality* variables.

Insert Table 24 about here

We additionally employ alternative measures of the dependent variable in our empirical model. We proxy *Board gender diversity in affiliates* in four different ways. First, we use the total number of women directors. The results obtained with this proxy are robust (results omitted to save space).

Second, since the proportion of women over the total number of directors may be affected by either increases in the number of women directors or the size of the board (Carrasco et al., 2015), we substitute the proportion by a conservative dummy variable. The dichotomous variable equals 1 if there is at least one women director on board, and 0 otherwise (e.g., Bugeja, Matolcsy, & Spiropoulos, 2016). As the dependent variable is a dummy, we estimate our regressions by using a probit model (Table 25). Results keep unaltered compared to the ones obtained with the continuous variable in Table 19. Results when we include *Executive women in HQ* also remain robust (results omitted to save space).

Insert Table 25 about here

Third, former studies exploring gender diversity in boardrooms (e.g., Abad et al., 2017; Martín-Ugedo & Minguez-Vera, 2014) have considered different diversity indexes to properly capture gender diversity. The first one is Blau Index (Blau, 1977), calculated as $1 - \Sigma^{n}_{i=1} P_i^2$, where *Pi* is the percent of women and men on the board, and *n* is 2, representing the number of categories (women and men). The values of Blau Index ranges from 0 (only women or only men, no gender diversity) to 0.5 (equal proportion of women and men). The second one, more sensitive to small changes in gender diversity, is the Shannon Index (Shannon, 1948), measured as $- \Sigma^{n}_{i=1} P_i \ln P_i$, where *Pi* is also the proportion of each category (women or men) and *n* is the number of categories. The range of values of Shannon Index is between 0 (no gender diversity) and 0.69 (equal proportion of women and men). Table 26 exhibits the results when we proxy board gender diversity in affiliates by Blau Index. Results remain robust to the ones obtained in Table 19. Results for Shannon Index are similar but some key variables lose significance; for instance,

Board gender diversity in HQ becomes non-significant when we interact with the *Affiliate ownership* (results omitted to save space).

Insert Table 26 about here

Additionally, we use an alternative proxy for the importance of women on boards of headquarters, through the existence of a critical mass of women on boards. Critical mass can be defined as the presence of at least 2 or 3 women on boards for women to make a difference in the decision-making. In our sample, we find that around 20% of business groups (7,785 BGs) have a critical mass in its headquarters (2 women or more). In our model we include a dummy variable (*Critical mass in HQ*) indicating whether there is a critical mass of women directors in headquarters (value of 1) or not (value of 0). The results in Table 27 exhibit that the key independent variable of critical mass losses significance in Models 4 and 5, but the existence of a critical mass in the headquarters is positively related to a larger presence of women on boards in affiliates. Moreover, the interaction term between the *Critical mass in HQ* and the *Affiliate level* is not significant in Model 5. The rest of results do not vary qualitatively from the ones in Table 19.

Insert Table 27 about here

We furthermore recalculate the variable that proxies the empowerment of women on boards of headquarters. In the new variable (*Executive women in HQ 2*), the denominator is the total number of executive directors in the company, instead of the total number of directors –executives and non-executives- as applied before in Table 20. The new variable provides a measure of the

relevance of women among executives. The results from new estimations are reported in Table 28. We find that results remain consistent with the ones reported in Table 20.

Insert Table 28 about here

4.5.Discussion and conclusions

In many countries, more than a half of university graduates are women. Moreover, women have represented a significant part of the workforce during years. However, in spite of their educational levels and professional attainment at the lower echelons of firms, women on boards are still underrepresented (Smith & Parrotta, 2018). An intense debate about the underrepresentation of women in the boardroom emerges, which centers around two potential drivers that may lead societies to have this landscape. First, in society, women's professional responsibilities tend to be underestimated in comparison to the ones of men. These biases in responsibilities may be based on women discrimination by society, which hinders women from reaching positions in upper-level management and restricts them to certain industrial sectors (Martinez-Jimenez, 2009). Although there are some differences across countries, considering the cultural settings in countries, the underrepresentation of women in boardrooms is higher in countries with the greatest tolerance for inequalities (Carrasco et al., 2015). Second, it may be only a limited number of capable women available for board positions (Huse, 2016). For instance, when the gender quota in Norway obtained full compliance by January 2008, business leaders started to complain that there was a lack of qualified women directors (Ahern & Dittmar, 2012). In particular, frequent reasoning for this argument comes from women's lack of executive

experience. Qualitative research has shown that boards relate women without managerial experience as unqualified for boards (e.g. Mattis, 2000).

The previous literature has highlighted all the plausible and relevant determinants that may hinder women to access to boards (Kirsch, 2018). However, scholars have disregarded the board gender diversity in the context of inter-organizational networks, with the exception of Beckman and Philips (2005) in the relationship firm-customers. The aim of this Chapter is to explore the cascading effect of board gender diversity within business groups, considered as inter-organizational networks of legally independent firms. We especially look into the relation between board gender diversity in affiliated firms and board gender diversity in headquarters, motivated by two potential arguments, which may guide the debate for future research.

First, although we do not explicitly and empirically analyze the determinants of board gender diversity in headquarters, we assume that those determinants may affect board gender diversity in affiliates, through the complex ties of control along the hierarchy of business groups. Therefore, board gender diversity in an affiliated firm is not only influenced by the contextual determinants that affect any other firm, but also by the headquarters determinants propelled by their control. Second, we also consider the role of women in the headquarters and how they may exert their power to positively influence the representation of women in affiliates, according to the homophily explanation, which states that people of the same gender prefer to have relationships among them.

Regarding the results from the regression analyses, we observe that there is a positive association between board gender diversity in headquarters and board gender diversity in affiliates, confirming the existence of spillover effects within the business group. These findings provide evidence for the influence of inter-organizational exchanges and are consistent with the

homophily explanation of women preferences, in line with the work of Beckman and Phillips (2005). Additionally, executive women on boards of headquarters may exert their decisional power and use their information to force the presence of women in affiliates. However, we find that the empowerment of women in headquarters' board is not translated in a higher representation of women on boards of affiliates. This finding suggests that, rather than homophily arguments, the determinants of women representation in headquarters' boards move to affiliates. Regarding the moderating effects of business groups' characteristics, although our empirical methodology does not allow us to test causality, results seem to indicate the directionality of top-to-the bottom effects within the hierarchy, mainly driven by the affiliate's ownership and its level in the group structure.

Concerning control variables, we find that women representation on boards of affiliates is significantly higher for women-dominated industries and for countries more gender-equaled. Moreover, larger affiliates and those affiliates with lower economic risk exhibit a larger representation of women directors. This evidence brings to light some important issues. First, the presence of women on boards is still anchored to those industries where women have a higher representation, such as education, nursery and garment industry. Second, women-friendly countries, or those that are more egalitarian in terms of gender, also have more women on corporate boardrooms. Third, large firms, which feel more the pressure of different stakeholders and are more exposed to public scrutiny, engage in fostering the presence of women directors. Finally, we can confirm the issue of risk aversion by women, as we interpret that women occupy positions in those firms where economic risk is lower. However, we do not find a significant result for the case of financial risk.

We think that this Chapter contributes in several ways, besides opening the debate and creating a demand for further studies on board gender composition in business groups. First, we contribute to the research studying inter-organizational spillover effects of board gender diversity (e.g., Aldrich & Zimmer, 1986; Beckman & Phillips, 2005), by analyzing the cascading effects of board gender diversity between headquarters and affiliates. Second, our study joins a larger body of research that has examined the homophilic relations between women in social networks (e.g., Cohen & Huffman, 2007; McPherson et al., 2001). Third, we shed light on the scarce literature about corporate governance of business groups (e.g., Boyd & Hoskisson, 2010; Colli & Colpan, 2016). More specifically, we explore the role of women directors in business groups, which could represent an advance in the field of business groups and gender issues, nonexistent to date.

Moreover, at the macro level, institutional differences across countries are the basis for differences in their corporate governance structures (Aguilera & Jackson, 2003). In this sense, we complement to the literature that analyzes how the country context affects board composition (e.g., Hickson & Pugh, 1995; Li & Harrison, 2008) by comparing an international sample of 109 countries. Specifically, we contribute to the strand of the literature that has studied the relationship between cultural and institutional traits and the representation of women in corporate boards across countries (e.g., Carrasco et al., 2015). Regarding meso level dynamics, we find that women are more representative in those women-dominated industries (e.g., Adams & Kirchmaier, 2016). We also shed light on the inconclusive results about the relationship between firms size and board gender diversity (e.g., Bertrand & Hallock, 2001; Carrasco et al., 2015) by showing that larger firms tend to have more women on boards.

However, this Chapter offers some caveats. The main caveat is the potential existence of reverse causality. Our theory predicts that the role of women on boards in headquarters may have a potential cascading effect to the affiliates, thus increasing the number of women on boards of affiliates. However, the direction of causality may be the opposite. For example, women on boards of affiliates may promote to boards in headquarters, enhancing the representation of women on boards in the apex of the business groups.

Unfortunately, we cannot solve this problem because of the cross sectional nature of our data. To cope with this limitation, longitudinal data or instrument variables are needed to this end. Given these reasons, we carefully interpret our results as associations between variables rather than causal relations.

4.6.References

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5. CONCLUSIONS

The present doctoral thesis has focused on the relevance of business groups across countries. Business groups, defined as a gathering of legally independent firms that join together by formal or informal ties, have the aim of sharing resources and operations among its firms' members, both locally and abroad. Although most of the literature has focused on large business groups from emerging economies, there is still need for studies about small business groups from different kind of economies.

The study of business groups as substitutes for institutions in economies with institutional voids and market failures has received wide attention. The emergence of business groups in developing economies has been of interest among academics during the last decades. Despite this, only little attention has been devoted by the international business literature and corporate governance research to connect both topics with business groups. Therefore, with the purpose of shading some light on the internationalization of business groups and its corporate governance, there are three research questions on which this doctoral work has focused.

First, it has analyzed the association between internationalization and business groups in Chapter 2. Second, it has investigated the concept of interlocking directors in the relation headquarters-affiliates of business groups in Chapter 3. Third, it has examined board gender composition and the cascading effect between headquarters and affiliates in Chapter 4. To answer these questions, the present doctoral thesis has relied on two different databases. In Chapter 2, we use a set of articles published in international business journals from Web of Science. For Chapters 3 and 4, we apply a dataset of business groups in the OECD countries. All the stand-alone companies comprising these business groups were primarily obtained from ORBIS database, and

thanks to the implementation of our algorithmic identification we create amalgamations of firms through equity ties that lead to the analyzed business groups.

In a nutshell, results have shown that business groups are important drivers for firm internationalization, but their internationalization strategies have not been deeply analyzed yet. Moreover, given their distinctive feature, there is a potential agency problem between headquarters and affiliates, as a result of the delegation of authority and affiliates' autonomy. In this sense, interlocking directors may solve the agency conflict, thanks to their privileged access to key information about both firms. These results build upon the agency theory and the resource dependence theory, which state that board directors contribute with monitoring and advising functions to the firm, respectively. In this sense, interlocking directors have a dual directionality of these two functions. On the one hand, they provide better monitoring and advising to the affiliated firms; on the other hand, they provide advising to the headquarters. However, results have exhibited that information barriers may hinder the decision of interlocking directors. Findings also show a cascading effect of board gender diversity in headquarters and board gender diversity in affiliates, drawing on the idea of inter-organizational exchanges and homophily theory. In specific, results have shown:

i) A vast majority of articles in the field of international business are still anchored in the study of large business groups from emerging economies, but little has been said about the process of internationalization of business groups. There is a clear need of adopting fine-grained empirical measures of business groups, such as the empirical identification proposed in Chapter 2. Thanks to these empirical approaches, scholars could answer some of the prominent future research questions suggested in Chapter 2.

ii) The literature linking business groups and internationalization shows a lack of consensus and the persistence of mixed results. For instance, it is not clear whether business group membership leads to internationalize more or less by using shared resources. Additionally, the relationship between internationalization and performance and the moderating role of business group affiliation has provided unclear results. We do not know yet if the link between these concepts follows a linear (positive or negative) or a quadratic (U-shaped or inverted U-shaped) relation.

iii) Regarding the agency conflict between headquarters and affiliates in business groups, we find that three specific information barriers –geographic, institutional and industrial distances- may hamper the decision of interlocking directors, as a possible mechanism to solve agency problems. Probably it is due to acquisition and processing costs of information, which may hinder the potential benefits from monitoring and advising of interlocking directors.

iv) We also find other potential determinants that influence the decision of interlocking directors, such as the structure of the business group and the ownership links. Affiliates located at the bottom-line of business groups tend to interlock less, and wholly-owned affiliates interlock more, since headquarters have more decision power over them. Additionally, the probability of interlocking is larger in those smaller and younger business groups.

v) An interesting result comes from the analysis of executive positions on boards. We find that executive directors tend to interlock more than non-executives. Since executives have more relevant information about the functioning of both headquarters and affiliated firm, this finding supports the information explanation of interlocks within business groups.

vi) There is a positive relationship between board gender diversity in headquarters and board gender diversity in affiliates, which suggests the existence of a cascading effect of board gender diversity in business groups. These findings are in line with the influence of inter-organizational exchanges and the homophily explanation of women preferences. However, we observe that having more executive women on boards of headquarters is not associated with an increase in the number of women directors in affiliates, supporting that the determinants of having women directors in headquarters spread to the affiliates, rather than homophily.

vii) The moderating effects of affiliate level and affiliate ownership should appoint to a potential top-to-the-bottom effect of gender diversity in the hierarchy of the business group. Furthermore, our results not only have relevant implications for the relationship between country and industry and women representation on boards, but also for the association between inner traits of firms, such as size, and the presence of women directors.

The outcomes of our research contribute to the literature on internationalization and corporate governance of business groups. In specific, they offer guidelines to foster the study of business groups' internationalization through the application of empirical identification with algorithms. Indeed, thanks to the algorithm created to determine business groups internationally, we are able to answer different corporate governance questions comprising different economies, which allow us to make comparisons between countries.

In particular, while scholars have examined the headquarters-subsidiary relationship in the context of multinationals, we explore the setting of hierarchical business groups with formal ties. We also advance the understanding of the monitoring and advising roles of directors, especially for the case of interlocking directors. We furthermore contribute to the literature on information

processing and barriers by identifying three potential barriers that influence the decision of interlocking directors within business groups.

This thesis also contributes to previous studies on board gender composition and diversity. Specifically, we contribute to the research of inter-organizational spillover effects of board gender diversity by analyzing the cascading effect of board gender diversity between headquarters and affiliated firms. Our findings also join a larger body of research on homophilic relations between women in social networks. Lastly, we complement the literature on the effects of the country context and the industry on the board composition. Particularly, we expand research on the relationship between institutional environment and the representation of women on corporate boards across countries, and we join previous studies showing a prevalence of women in men-dominated industries.

In this sense, this doctoral thesis has attempted not only to create awareness around the role of business groups in corporate governance and internationalization strategies, but also to offer a framework to stimulate its consideration among scholars. However, some questions still remain open and deserve future attention.

First, a suggestion for further research is in the direction of the use of cross-country studies about business groups. So far, research work has been stagnant in the analysis of single-country business groups from, especially, emerging countries. Second, gaining a deeper insight into the internationalization strategies of business groups is also crucial. Third, another need for further research appears in the area of longitudinal studies of business groups. Due to the complexity to obtain historical data on business groups' composition, many studies have concentrated on cross-sectional data of business groups. Fourth, it would be of interest to investigate different typologies of business groups, like the ones linked by informal ties, such as religion or cultural links. Fifth,

corporate governance questions acquire importance especially in the presence of headquarters-affiliates relationship and its related agency problems. For instance, future research could analyze the impact of having interlocking directors on corporate boards. Sixth, related to the previous point, it would be worthwhile to examine the role of external interlocking directors, those who interlock to firms outside the business group. Seventh, another promising research question could be to analyze differences in boards' structures when comparing stand-alone firms versus affiliated firms to business groups. Regarding the previous idea, to check for differences in boards' structures depending on the position of the firm within the business group would be also of interest. Finally, offering a better understanding of the determinants of women representation on boards of business groups could represent a fruitful avenue for further research.

The presence of still numerous open questions to answer shows that the research presented throughout this doctoral thesis only represents a first step towards filling some important knowledge gaps. In any case, in spite of there is still much work to be done, the answers provided by this research work have made a contribution to the international business and corporate governance literature. Hopefully, and by raising further research questions, it is expected that it will also contribute to catch the attention of other practitioners to stimulate a lively and constructive debate on the role of business groups across countries.

APPENDIX

Table 1. Coding scheme

Parent category	Sub-categories	Explanation
Article type	Empirical	The articles is empirical, conceptual, or a review
	Conceptual	
	Review	
Research theme	Institutions and other external factors	Relationship between institutions (home and host), business groups, and internationalization
	Internal capabilities and competitive advantage	How firms affiliated to business groups deploy inner capabilities to internationalize, and internationalization as a resources-seeking strategy
	Corporate strategy	The impact of different strategies (e.g., diversification or innovation) on internationalization, and vice versa
	Firm performance	Relationship between internationalization and firm performance, and the moderating role of business groups affiliation
	Corporate governance	Relationship between corporate governance determinants (ownership and board characteristics) and internationalization
Where?	Emerging economies	Whether the international activity is focused on EE or DE
	Developed economies	
	Both	
How?	Export	Whether the international strategy followed is through exports or foreign-direct investment
	FDI	
	Both	
Dominant theory	Institutional / Neo-institutional theory	Theoretical framework
	Resource-based view	
	Resource dependence theory	
	Transaction cost theory	
	Agency theory	
	Network model	
	Internationalization theories	
	Others	
BG/BGMF	BG	Whether the unit of analysis is the business group as a whole or business groups member firms (affiliates)
	BGMF	
	Both	
Internationalization variable	Dependent	How internationalization plays in the empirical analysis
	Independent	
	Other explanatory	
Business groups variable	Dependent	How business groups plays in the empirical analysis
	Independent	
	Other explanatory	
Type of data source	Primary	Whether data come from primary or secondary sources
	Secondary	
	Both	
Business groups source	Independent sources	Whether the empirical definition of business group is given by an independent source or identified by the authors
	Identified	
Country	Emerging economies	Whether country of the sample belongs to EE or DE
	Developed economies	

	Both	
Scope of study	Single	Sample is on one country or a variety
	Cross-country	
Type of analysis	Longitudinal	The data applied is longitudinal (over time) or cross-sectional (at a given point of time)
	Cross-sectional	
Type of research	Quantitative	The type of research conducted is quantitative or qualitative
	Qualitative	

For parent categories *Internationalization variable* and *Business groups variable*, it is relevant to emphasize that we differentiate between independent variable and other explanatory variables (including control, moderator, and mediator variables). Following the discussion in Hayes (2017), we do not consider these explanatory variables as independent variables, as control, moderator and mediator variables are variables that help to describe the relationship between dependent and independent variables.

Table 2. Comparison between research themes categories in Griffith et al. (2008), Holmes et al. (2018), and this study

International business categories in *JIBS* (Griffith et al., 2008)	**Business groups categories in Holmes et al. (2018)**	**Internationalization and business groups categories in the present study**
Interactions between MNEs and other actors, organizations, institutions and markets; How international environment affects activities, strategies, structures and decision-making processes of firms	Internal markets; Economic impact	(1) Institutions and other external factors
International dimensions of organizational forms and activities	Internal markets	(2) Internal capabilities and competitive advantage
Activities, strategies, structures and decision-making processes of MNEs; International dimensions of organizational forms and activities	Corporate strategy; Innovation	(3) Corporate strategy
Cross-border activities of firms	Affiliate and business group performance	(4) Firm performance
International dimensions of organizational forms and activities	Corporate governance	(5) Corporate governance
Activities, strategies, structures and decision-making processes of MNEs	Corporate governance	(6) Organizational structure

Table 3. Summary of coded articles. N=83

Parent category	Sub-categories	Number of articles coded	Percentage of articles coded
Article type	Empirical	76	91.57%
	Conceptual	6	7.23%
	Review	1	1.20%
Research theme	Institutions and other external factors	21	25.30%
	Internal capabilities and competitive advantage	19	22.89%
	Corporate strategy	17	20.48%
	Firm performance	16	19.28%
	Corporate governance	22	26.51%
Where?	Emerging economies	27	32.53%
	Developed economies	4	4.82%
	Both	14	16.87%
	N/A	38	45.78%
How?	Export	10	12.05%
	FDI	48	57.83%
	N/A	17	20.48%
	Both	8	9.64%
Dominant theory	Institutional / Neo-institutional theory	26	31.33%
	Resource-based view	19	22.89%
	Resource dependence theory	4	4.82%
	Transaction cost theory	3	3.61%
	Agency theory	15	18.07%
	Network model	5	6.02%
	Internationalization theories	3	3.61%
	Others	34	40.96%
BG/BGMF	BG	27	32.53%
	BGMF	51	61.45%
	Both	5	6.02%
Internationalization variable	Dependent	38	50.00%
	Independent	31	40.79%
	Other explanatory	7	9.22%
Business groups variable	Dependent	9	11.84%
	Independent	48	63.16%
	Other explanatory	23	30.26%
Type of data source	Primary	7	9.21%
	Secondary	68	89.47%
	Both	1	1.32%
Business groups source	Independent sources	59	77.63%
	Identified	10	13.16%
	N/A	7	9.21%
Country	Emerging economies	59	77.63%
	Developed economies	15	19.74%
	Both	2	2.63%
Scope of study	Single	69	90.79%
	Cross-country	7	9.21%
Type of analysis	Longitudinal	61	80.26%
	Cross-sectional	16	21.05%
Type of research	Quantitative	73	96.05%
	Qualitative	3	3.95%

In some parent categories, such as *research theme* or *dominant theory*, the sum of percentages are higher than 100 because of the existence of articles belonging to more than one sub-categories. In other parent categories, such as *where?* or *how?*, we include the

N/A (not applicable) sub-category due to the impossibility to codify articles within the other sub-categories. The categories *internationalization variable, business groups variable, type of data source, business groups source, country, scope of study, type of analysis,* and *type of research* are calculated exclusively for the 76 empirical articles. Parent categories in bold are relevant to synthesize existing research at the intersection of internationalization and business groups.

Table 4. Business group's conceptual definitions

Author(s)	Article type	Definition of BGs	Output variable	Theoretical framework						
				Institutional	Transaction costs	Agency	Resource-based view	Politics and political economics	Social capital	Others
Barbero & Puig (2016)	Conceptual	'set of legally independent firms operating under a common central management, linked by persistent, formal and/or informal link' (p.7)	Business history	✓	✓	✓	✓	✓	✓	
Carney (2008)	Conceptual	'Business groups are 'collections of firms bound together in some formal and informal ways.' The scope of their activities is very broad and there is typically a high degree of ownership concentration in the hands of a family, the state, or financial institution sufficient to effect control and coordination over the affiliated firms' (p.595)	Origins in Asian countries	✓				✓		
Carney et al. (2017)	Review	'Business groups are a set of legally independent firms linked by ownership and a variety of other formal and informal ties that act in a coordinated manner' (p. 52)	Prevalence across countries	✓						✓
Carney et al. (2011)	Review	'firms which though legally independent, are bound together by a constellation of formal and informal ties and are accustomed to taking coordinated action' (2001: 47)"(p.437)	Affiliation, performance and context	✓	✓	✓			✓	✓
Chung & Luo (2019)	Book chapter	'Business groups are a set of legally independent firms that are bound together by formal and informal inter-firm ties and function coherently as an entity. Many of them diversify across unrelated industries and operate in emerging economies, while there are also business groups in some mature markets such as Japan and Sweden' (p.2)	Economic and sociological approaches	✓	✓		✓		✓	✓
Granovetter (2005)	Book chapter	'Business groups are sets of legally separate firms bound together in persistent formal and/or informal ways' (p.429)	Social organization of business groups						✓	
Holmes et al. (2018)	Review	'Business group are interorganizational networks of semi-autonomous firms bound through multiplex ownership, buyer-supplier, director interlock, and/or social ties. Though business group member firms (hereafter affiliates) pursue mutual objectives, they retain legal independence' (p.135)	International strategy	✓	✓	✓	✓		✓	✓
Khanna & Yafeh (2007)	Conceptual	'These groups typically consist of legally independent firms, operating in multiple (often unrelated) industries which are bound together by persistent formal (e.g., equity) and informal (e.g., family) ties' (p.331)	Structure, ownership and interaction with society	✓	✓	✓				

Locorotondo et al. (2012)	Review	'Business groups are a particular organizational form with several defining characteristics. First of all, all member firms are separate legal entities. [...] Second, stable and long-term ties between member firms are typical of business groups. [...] A third […] is the presence of a parent company that provides managerial coordination and administrative and financial control' (p.78 - 79). 'There is a general consensus in the literature that a business group can be defined as 'a collection of legally independent firms that are linked by multiple ties, including ownership, economic means, and/or social relations (family, kinship, friendship) through which they coordinate to achieve mutual objectives''(p.79)	Affiliation	✓	✓	✓				✓
Yaprak & Karademir (2010)	Review	'…BGS as collections of firms that are bound together in formal and informal ways in an intermediate sense to achieve an economic purpose, such as rapid market entry, and as coalitions of organizations that go beyond temporary alliances among two or more otherwise independent firms that do not constitute a legally consolidated or integrated entity' (p. 246-247)	International strategy	✓			✓			
Yiu et al. (2007)	Review	'Business groups usually consist of individual firms that are associated by multiple links, potentially including cross-ownership, close market ties (such as inter-firm transactions), and/or social relations (family, kinship, or personal friendship ties) through which they coordinate to achieve mutual objectives' (p. 1551)	Integrative framework of the four main theories		✓	✓		✓	✓	

Table 5. Filters applied on sample attrition

Panel A: Treatment of Business Groups (BGs)				
		#Firms in BG	#BGs	Filter
		3,398,487	879,427	
1 filter			584,127	Headquarters with missing data on board composition
	Sample attrition	2,668,165	295,300	
2 filter			119,936	Headquarters with negative income and total assets
	Sample attrition	2,249,566	175,364	
3 filter			141	Headquarters with missing data in age
	Sample attrition	2,248,881	175,223	
4 filter			57,094	Headquarters with one-individual board (rubber stamping)
	Sample attrition	2,148,551	118,129	
5 filter			72.020	BGs with one firm
	Sample attrition	2,076,531	46,109	

Panel B: Treatment of Affiliates				
		#Firms in BG	#BGs	Filter
		2,076,531	46,109	
6 filter		110,010		Affiliates with missing data on board composition
	Sample attrition	1,966,521	46,109	
7 filter		1,719,005		Affiliates with negative income and total assets
	Sample attrition	247,516	46,109	
8 filter		16,261		Affiliates with missing data on industry information
	Sample attrition	231,255	46,109	
9 filter		177		Affiliates with missing data on institutional information
		231,078	46,109	
10 filter		34,672		Affiliates with one-individual board (rubber stamping)
	Sample attrition	196,406	46,109	

Panel C: OECD countries			
	#Firms in BG	#BGs	
	196,406	46,109	
11 filter		6,198	BGs with HQs located outside the OECD countries
Final sample	172,760	39,911	

This table exposes the filters applied in the cleaning of the sample. It is also shown the impact of the sample attrition on the sample size, in terms of firms within BGs and whole BGs. When a business group is removed, there is consequently a reduction of firms in the sample. Panel A describes the filters implemented at the business group level, to discard whole business groups. Panel B describes the filters used to discard affiliated firms belonging to business groups included in the sample. Panel C shows the size of the final sample when only business groups with headquarters located in OECD countries are considered.

Table 6. Summary statistics on the characteristics of business groups

	Panel A: Overall sample			*Panel B: BGs > 2 firms (44.21%)*		
	# Observations (BG)	Mean	Std. Dev	# Observations (BG)	Mean	Std. Dev
# Firms in BG	39,911	4.33	8.53	17,644	7.27	12.21
Board Positions in BG	39,911	18.06	37.64	17,644	30.33	53.82
BG Total Income (€ million)	39,911	1,078.04	9,246.64	17,644	2,244.41	13,728.67
BG Total Assets (€ million)	39,911	4,435.99	81,393.25	17,644	9,393.87	121,849.10
BG Total Employees	39,911	3,736.68	30,054.40	17,644	6,965.28	41,4541.69
Total NACE 2-digits	39,911	2.29	1.84	17,644	3.18	2.44
Total NACE 4-digits	39,911	2.72	2.89	17,644	4.00	3.96
Total Countries	39,911	1.50	1.86	17,644	2.04	2.68
Herfindahl Index (Total Income)	39,911	0.61	0.21	17,644	0.51	0.20
Herfindahl Index (Total Assets)	39,911	0.56	0.23	17,644	0.48	0.21
Affiliate Maximum Level	39,911	1.31	0.74	17,644	1.66	0.98

Panel A provides the mean value of the general characteristics of the whole sample, 39,911 business groups. Total NACE 2-digits and Total NACE 4-digits are measured as the number of two-digit and four-digit industries in which the group operates. Panel B provides the mean for those business groups which are composed by more than two firms.

Table 7. Variable definitions

Variable	Abbreviation	Measure	Unit	Source	Expected effect
Dependent variable (i,j,k)					
Interlocking Directors	Interlocked_Aff	Dummy equals 1 if it is an interlocking director and 0 otherwise.	Binary	Own elaboration	
Independent variables (i,j)					
Geographic Distance	Geog_dist	Thousands of kilometers for each pair of headquarters and affiliates.	Real	Orbis Google Earth	(-)
Institutional Distance	Inst_dist	Difference between HQ's GCI values and affiliate's GCI value.	Real	GCI, 2016-2017	(-)
Industrial Distance	Indust_dist	Differences between HQ's NACE 4-digits and affiliate's NACE 4-digits	Real	Orbis Own elaboration	(-)
Control variables (i)					
BG Size	BG_size	Logarithm of the total income per group.	Log	Orbis	(-)
BG Age	BG_age	Number of years of the headquarters, from its creation until 2017.	Real	Orbis	(-)
Board Positions in HQ	HQ_positions	Total number of board positions in headquarters of a business group.	Real	Orbis	(+)
Board Positions in Affiliates	Affiliate_positions	Total number of boards positions in affiliates of a business group.	Real	Orbis	(-)
Control variables (i,j)					
Affiliate Level	Affiliate_level	Level of each affiliate in a business group, from 0 –headquarters– to 9 – lower level for affiliates– in a business group.	Real	Own elaboration	(-)
Affiliate Weight	Affiliate_weight	Percentage each affiliate has over the total income of a business group.	Percent	Orbis	(+)
Ownership Percentage	Owner_perc	Percentage of ownership that headquarters has on each affiliate.	Percent	Own elaboration	(?)
Ownership Dummy	Owner_dummy	Dummy variable equals 1 if a headquarters owns the 100% of an affiliate and 0 otherwise	Binary	Own elaboration	(?)
Control variables (i,j,k)					
Executive Director	Exec_direc	Dummy equals 1 if a director is executive and 0 if a directors is non-executive	Binary	Own elaboration	(+)
Horizontal Director	Horiz_direc	Dummy equals 1 if a director has horizontal directorship and 0 otherwise	Binary	Own elaboration	(+)

The column 'Abbreviation' shows the abbreviated names of the variables in equation [1]. 'Source' denotes whether variables have been created (Own elaboration) or they have been obtained from a secondary database (e.g. Orbis). The column 'Expected effect' indicates the effect of each independent and control variable on the dependent variable, *Interlocking Directors*.

Table 8. Descriptive statistics

Panel A: Board positions (i,j,k)

	#Observations (Board positions)	Mean	Std.Dev
Interlocking Directors (Affiliates)	512,607	0.37	0.48
Executive Director	512,607	0.45	0.50
Horizontal Director	512,607	0.12	0.32

Panel B: HQ-affiliates within the BG (i,j)

	#Observations (Affiliate)	Mean	Std. Dev
Geographic Distance	132,849	1,536.21	3,434.17
Institutional Distance	132,849	0.12	0.28
Industrial Distance	132,849	2.78	1.60
Affiliate Level	132,849	1.44	0.87
Affiliate Weight	132,849	0.14	0.22
Ownership Percentage	132,849	0.88	0.19
Ownership Dummy	132,849	0.57	0.49

Panel C: Business Group (i)

	#Observations (BG)	Mean	Std. Dev
BG Size (Income € million)	39,911	1,078.04	9,246.64
BG Age (years)	39,911	26.65	26.11
Board Positions in HQ	39,911	5.22	7.34
Board Positions in Affiliates	39,911	12.84	35.59

This table provides descriptive statistics of variables for board positions in affiliates. Panel A shows the distribution of interlocking directors over all board seats in affiliates of business groups Panel A also presents statistics for the control variables at the board position level of analysis (i,j,k) (N=512,607 obs.). Panel B shows the mean and standard deviation of independent and control variables at the HQ-affiliates level of analysis (i,j) (N=132,849 obs.). Panel C shows the distribution of control variables at the BG level of analysis (i) (N=39,911 obs.).

Table 9. Correlation matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	Interlocking Directors	1.000													
(2)	Geographic Distance	-0.278	1.000												
		(0.000)													
(3)	Institutional Distance	-0.276	0.509	1.000											
		(0.000)	(0.000)												
(4)	Industrial Distance	-0.107	0.044	0.020	1.000										
		(0.000)	(0.000)	(0.000)											
(5)	BG Size (lnIncome € million)	-0.482	0.400	0.386	0.081	1.000									
		(0.000)	(0.000)	(0.000)	(0.000)										
(6)	BG Age(years)	-0.223	0.186	0.228	0.013	0.420	1.000								
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)									
(7)	Board Positions in HQ	-0.127	0.117	0.099	0.017	0.270	0.141	1.000							
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)								
(8)	Affiliate Level	-0.139	0.030	0.027	0.090	0.209	-0.021	0.007	1.000						
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)							
(9)	Affiliate Weight	0.312	-0.224	-0.217	-0.073	-0.531	-0.212	-0.126	-0.207	1.000					
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)						
(10)	Board Positions in Affiliates	-0.292	0.122	0.183	0.032	0.595	0.277	0.170	0.185	-0.297	1.000				
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
(11)	Ownership Percentage	0.234	-0.220	-0.177	-0.041	-0.241	-0.049	-0.057	-0.185	0.125	-0.146	1.000			
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
(12)	Ownership Dummy	0.201	-0.158	-0.137	-0.048	-0.193	-0.068	-0.050	-0.201	0.090	-0.125	0.686	1.000		
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
(13)	Executive Director	0.082	-0.046	-0.067	-0.057	0.038	-0.027	0.001	0.060	0.010	0.033	0.060	0.001	1.000	
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.669)	(0.000)	(0.000)	(0.000)	(0.000)	(0.431)		
(14)	Horizontal Director	0.105	-0.058	-0.093	0.038	0.147	-0.027	-0.018	0.191	-0.299	0.131	0.037	0.050	0.070	1.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

N=512,607 obs. P-values are in parentheses.

Table 10. Probit regression of the impact of information-processing barriers on the decision of interlocking directors

Dependent variable: Interlocking Directors					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
BG Size (lnIncome € million)	-0.245***	-0.227***	-0.228***	-0.244***	-0.219***
	(-38.62)	(-35.60)	(-36.15)	(-39.78)	(-35.53)
BG Age (years)	-0.002***	-0.002***	-0.001***	-0.002***	-0.002***
	(-5.64)	(-5.47)	(-5.20)	(-5.76)	(-5.27)
Board Positions in HQ	0.002***	0.002***	0.002***	0.002***	0.002***
	(8.95)	(6.99)	(8.33)	(9.25)	(7.14)
Board Positions in Affiliates	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-4.65)	(-5.08)	(-4.93)	(-4.75)	(-5.22)
Affiliate Level	-0.108***	-0.115***	-0.109***	-0.103***	-0.107***
	(-5.93)	(-6.35)	(-6.01)	(-5.73)	(-6.08)
Affiliate Weight	0.552***	0.509***	0.506***	0.547***	0.485***
	(22.46)	(20.86)	(20.79)	(22.57)	(20.17)
Ownership Percentage	0.857***	0.748***	0.800***	0.857***	0.741***
	(13.80)	(12.09)	(13.10)	(14.17)	(12.46)
Ownership Dummy	0.099***	0.090***	0.105***	0.096***	0.094***
	(5.36)	(4.97)	(5.77)	(5.33)	(5.36)
Executive Director	0.163***	0.165***	0.165***	0.163***	0.166***
	(9.63)	(9.61)	(9.52)	(9.68)	(9.57)
Horizontal Director	0.816***	0.804***	0.801***	0.821***	0.800***
	(53.13)	(52.18)	(52.11)	(53.37)	(51.86)
Geographic Distance		-0.075***			-0.053***
		(-20.19)			(-14.67)
					[-0.018]
Institutional Distance			-1.077***		-0.778***
			(-23.42)		(-18.43)
					[-0.261]
Industrial Distance				-0.048***	-0.046***
				(-11.53)	(-11.16)
					[-0.015]
Constant	-0.537	-0.498	-0.152	-0.419	-0.101
	(-1.21)	(-1.14)	(-0.37)	(-0.97)	(-0.26)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
Observations	512,072	512,072	512,072	512,072	512,072
Pseudo R-squared	0.305	0.313	0.313	0.307	0.318

Analysis of cross-sectional data of directors' positions in affiliates of business groups for the year 2016. The dependent variable is a dummy variable that equals to one if the director is interlocked. All specifications in Models 1-5 include two-digit standard industrial classification industry dummies, and country dummies. See Table 7 for a description of the variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Marginal effects, evaluated at means, for the geographic distance, institutional distance, and industrial distance are reported in brackets. Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 11. Robustness analyses in different samples

	Panel A:OECD and Non-OECD countries		*Panel B: The most representative countries: UK, Norway, Sweden, Spain, and Finland*		*Panel C: BGs > 2 firms*	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
BG Size (lnIncome € million)	-0.235***	-0.211***	-0.241***	-0.234***	-0.257***	-0.230***
	(-42.95)	(-38.91)	(-32.20)	(-31.94)	(-32.97)	(-30.36)
BG Age (years)	-0.002***	-0.001***	-0.002***	-0.002***	-0.001***	-0.001***
	(-6.29)	(-5.63)	(-3.93)	(-3.85)	(-4.79)	(-4.59)
Board Positions in HQ	0.002***	0.002***	-0.006	-0.005	0.002***	0.002***
	(5.63)	(4.65)	(-1.60)	(-1.50)	(9.24)	(7.52)
Board Positions in Affiliates	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-5.30)	(-5.73)	(-4.44)	(-4.39)	(-4.12)	(-4.79)
Affiliate Level	-0.118***	-0.114***	-0.089***	-0.081***	-0.097***	-0.097***
	(-6.74)	(-6.77)	(-4.12)	(-3.86)	(-5.34)	(-5.55)
Affiliate Weight	0.563***	0.500***	0.533***	0.457***	0.788***	0.675***
	(25.69)	(23.16)	(17.84)	(15.46)	(22.09)	(19.38)
Ownership Percentage	0.805***	0.715***	1.018***	0.991***	0.838***	0.717***
	(15.02)	(13.83)	(13.08)	(12.94)	(11.91)	(10.67)
Ownership Dummy	0.087***	0.086***	0.077***	0.079***	0.081***	0.073***
	(5.26)	(5.40)	(3.55)	(3.67)	(3.67)	(3.45)
Executive Director	0.185***	0.186***	0.163***	0.162***	0.142***	0.146***
	(12.71)	(12.45)	(8.03)	(7.93)	(6.68)	(6.70)
Horizontal Director	0.814***	0.794***	0.856***	0.851***	0.895***	0.877***
	(57.15)	(55.73)	(46.34)	(45.76)	(56.24)	(54.96)
Geographic Distance		-0.046***		-0.427***		-0.051***
		(-15.43)		(-15.58)		(-12.73)
Institutional Distance		-0.484***		-0.311**		-0.773***
		(-14.34)		(-3.11)		(-16.37)
Industrial Distance		-0.044***		-0.036***		-0.044***
		(-11.76)		(-7.92)		(-8.50)
Constant	-0.582	-0.297	-0.959	3.265***	-0.476	-0.0469
	(-1.33)	(-0.76)	(-1.60)	(5.39)	(-1.07)	(-0.12)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	590,101	589,813	294,077	294,077	427,983	427,983
Pseudo R-squared	0.290	0.301	0.271	0.278	0.316	0.330

The dependent variable is a dummy variable that equals 1 if the director is interlocked. Panel A includes a sample of business groups located both in OECD and non-OECD countries. In Panel B only headquarters located in UK, Norway, Sweden, Spain, and Finland have been considered. The sample in Panel C excludes business groups integrated by two firms. See Table 7 for a description of the variables. All specifications in Models 1-6 include two-digit standard industrial classification industry dummies, and country dummies. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 12. Robustness analyses with different proxy variables

	Panel A: Institutional distance proxy by WGI		*Panel B: Family business groups*	
	(1)	**(2)**	**(3)**	**(4)**
BG Size (lnIncome € million)	-0.245***	-0.226***	-0.246***	-0.221***
	(-38.62)	(-36.60)	(-37.07)	(-34.43)
BG Age (years)	-0.002***	-0.002***	-0.002***	-0.001***
	(-5.64)	(-5.59)	(-5.09)	(-4.95)
Board Positions in HQ	0.002***	0.002***	0.002***	0.002***
	(8.95)	(7.43)	(9.29)	(8.02)
Board Positions in Affiliates	-0.001***	-0.001***	-0.001***	-0.001***
	(-4.65)	(-5.18)	(-4.60)	(-5.17)
Affiliate Level	-0.108***	-0.108***	-0.106***	-0.106***
	(-5.93)	(-6.08)	(-5.69)	(-5.87)
Affiliate Weight	0.552***	0.504***	0.550***	0.484***
	(22.46)	(20.92)	(21.69)	(19.54)
Ownership Percentage	0.857***	0.754***	0.865***	0.729***
	(13.80)	(12.54)	(13.26)	(11.68)
Ownership Dummy	0.099***	0.090***	0.101***	0.097***
	(5.36)	(5.09)	(5.25)	(5.30)
Executive Director	0.163***	0.163***	0.163***	0.166***
	(9.63)	(9.52)	(9.37)	(9.34)
Horizontal Director	0.816***	0.808***	0.823***	0.810***
	(53.13)	(52.52)	(52.67)	(51.60)
FBG			0.122***	0.100***
			(6.52)	(5.41)
Geographic Distance		-0.076***		-0.060***
		(-20.29)		(-14.86)
Institutional Distance				-0.787***
				(-18.11)
Institutional Distance 2		-0.153***		
		(-5.12)		
Industrial Distance		-0.046***		-0.046***
		(-11.10)		(-10.86)
Constant	-0.537	1.745***	-0.861	1.417
	(-1.21)	(6.54)	(-1.04)	(1.85)
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Observations	512,072	511,319	481,436	481,436
Pseudo R-squared	0.305	0.315	0.302	0.315

The dependent variable is a dummy variable that equals 1 if the director is interlocked. In Panel A, we proxy the variable institutional distance with the World Governance Indicators (Wu et al., 2016). In Panel B only those observations with information about the ultimate owner of the business group have been kept. *FBG* is a dummy variable that equals 1 if the business group is family-owned and 0 otherwise. See Table 7 for a description of the variables. All specifications in Models 1-4 include two-digit standard industrial classification industry dummies, and country dummies. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 13. Robustness analysis: Board positions in headquarters

Dependent variable: Interlocking Directors					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
BG Size (lnIncome € million)	-0.110***	-0.088***	-0.095***	-0.100***	-0.084***
	(-20.46)	(-16.00)	(-17.10)	(-18.07)	(-14.66)
BG Age (years)	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(-7.49)	(-6.91)	(-7.22)	(-7.33)	(-7.38)
Board Positions in HQ	-0.009	-0.011*	-0.010	-0.010*	-0.010*
	(-1.92)	(-2.27)	(-1.96)	(-1.96)	(-1.97)
Board Positions in Affiliates	0.002***	0.002***	0.002***	0.002***	0.002***
	(7.73)	(7.51)	(8.27)	(7.92)	(8.31)
Average Level	-0.044**	-0.004	-0.018	-0.001	0.029
	(-2.72)	(-0.24)	(-1.08)	(-0.04)	(1.67)
Sum Weights	0.892***	0.816***	0.864***	0.904***	0.854***
	(36.82)	(33.91)	(35.34)	(37.19)	(34.69)
Average Ownership	0.623***	0.523***	0.605***	0.575***	0.567***
	(11.70)	(10.13)	(11.43)	(10.87)	(10.75)
Wholly Owned Affiliates	-0.013	-0.007	-0.013	0.024	0.009
	(-0.47)	(-0.25)	(-0.49)	(0.89)	(0.32)
Executive Director	0.486***	0.423***	0.501***	0.485***	0.505***
	(35.85)	(32.40)	(36.57)	(35.83)	(36.60)
Geographic Distance		-0.079***			-0.065***
		(-14.86)			(-10.44)
Institutional Distance			-1.243***		-0.764***
			(-16.01)		(-9.72)
Industrial Distance				-0.089***	-0.067***
				(-14.06)	(-10.42)
Constant	-0.442*	-0.404*	-0.175	-0.359	-0.211
	(-2.27)	(-2.09)	(-0.87)	(-1.86)	(-1.06)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
Observations	208,159	208,159	208,159	208,159	208,159
Pseudo R-squared	0.195	0.199	0.200	0.197	0.204

Analysis of cross-sectional data of directors' positions in headquarters of business groups for the year 2016. The dependent variable is a dummy variable that equals to one if the director is interlocked. Independent variables –*Geographic Distance, Institutional Distance,* and *Industrial Distance*- are computed as the average value by business group. Control variables at *i,j* level vary on the definition –*Affiliate Level* is calculated as the average level of all the affiliates within the business group *(Average Level)*, *Affiliate Weight* is computed as the total sum of the percentages of income that affiliates have *(Sum Weights)*, *Ownership Percentage* is calculated as the average percentage of ownership of the headquarters over all the affiliate in a business group *(Average Ownership)*, and *Ownership Dummy* is represented as the proportion of wholly owned affiliates in a business group (*Wholly Owned Affiliates*). *Executive Director* is a dummy variable identifying executive directors in the headquarters. All specifications in Models 1-5 include two-digit standard industrial classification industry dummies, and country dummies. Standard errors are robust (Huber, 1967; H. White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 14. Robustness analysis: Propensity Score Matching. Probit model

Dependent variable: Interlocking directors			
	(1)	(2)	(3)
BG Size (lnIncome € million)	-0.191***	-0.187***	-0.182***
	(-164.06)	(-158.62)	(-153.38)
BG Age (years)	-0.001***	-0.001***	-0.001***
	(-9.27)	(-11.51)	(-8.74)
Board positions in HQ	0.001***	0.001***	0.001***
	(9.91)	(11.55)	(10.87)
Board Positions in Affiliates	-0.001***	-0.001***	-0.001***
	(-54.33)	(-57.78)	(-57.71)
Affiliate Level	-0.104***	-0.109***	-0.116***
	(-37.12)	(-38.78)	(-41.35)
Affiliate Weight	0.771***	0.778***	0.764***
	(74.34)	(75.15)	(73.77)
Ownership Percentage	0.689***	0.638***	0.624***
	(43.85)	(40.35)	(39.49)
Ownership Dummy	0.102***	0.107***	0.112***
	(17.87)	(18.74)	(19.62)
Executive Director	0.261***	0.273***	0.277***
	(61.70)	(64.46)	(65.45)
Horizontal Director	0.782***	0.792***	0.769***
	(161.54)	(163.86)	(158.80)
Geographic Distance		-0.066***	-0.046***
		(-67.94)	(-43.91)
Institutional Distance	-0.831***		-0.595***
	(-69.59)		(-46.48)
Industrial Distance	-0.059***	-0.058***	
	(-46.19)	(-45.86)	
Constant	0.029*	0.055***	-0.084***
	(1.96)	(3.64)	(-5.65)
Observations	512,607	512,607	512,607
Pseudo R-squared	0.285	0.285	0.285

Table 14 shows the probit model underlying the PSM. Estimated probabilities in Models 1-3 are used as a propensity score matching for matching treated and non-treated observations in the next step (Table 15).

Table 15. Robustness analysis: Propensity Score Matching

Variables	Mean difference (Treated – Non-treated)	Mean difference (Treated – Non-treated)	Mean difference (Treated – Non-treated)
	(1)	(2)	(3)
Outcome variable			
Geographic distance	-0.028***		
Institutional distance		-0.003***	
Industrial distance			-0.022**
Control variables			
Geographic distance		-0.003	-0.005
Institutional distance	-0.001		-0.001
Industrial distance	0.006	0.010	
BG Size	-0.006	-0.015	-0.006
BG Age	-0.082	-0.122	0.014
Board Positions in HQ	-0.004	-0.018	-0.056
Board Positions in Affiliates	-0.198	-0.520	0.051
Affiliate Level	-0.002	0.004	-0.003
Affiliate Weight	0.001	0.001	0.001
Ownership Percentage	0.000	0.000	-0.000
Ownership Dummy	0.000	-0.000	0.000
Executive Director	0.001	-0.002	-0.002
Horizontal Director	-0.003	-0.004	-0.003
Treated obs	71,168	71,145	69,052
Non-treated obs	321,693	321,693	321,693
Unmatched obs	119,746	119,769	121,862

This table shows the results from Propensity Score Matching (PSM) for board positions in affiliates (N=512,607 obs). PSM identifies treated observations (interlocking directors), which are similar to non-treated observations (non-interlocking directors) in terms of a set of observable characteristics (control variables). Column 1 presents the difference in means of outcome and control variables between the treated and non-treated observations for the geographic outcome (considering institutional and industrial distances as control variables); column 2 for the institutional outcome, and column 3 for the industrial outcome.

Table 16. Descriptive statistics of board gender diversity

Panel A: Board gender diversity in business groups

	#Observations (Board positions)	% women	% men
Total	675,334	14.81%	85.19%
Headquarters	194,013	17.08%	82.92%
Affiliates	481,321	13.90%	86.10%

Panel B: Board gender diversity in affiliates (by type of country)

	% women	% men	t-test
High gender equality	14.51%	85.49%	-7.64***
Low gender equality	13.42%	86.58%	

Panel C: Board gender diversity in affiliates (by type of industry)

	% women	% men	t-test
Women-dominated	22.10%	77.90%	-27.99***
Rest of industries	13.66%	86.34%	

Panel D: Director gender and type of director (executive or non-executive)in boards of headquarters

		Director type			
		Executive	Non-executive	Total	% executive men/women over total men/women directors
Gender	Man	41.32%	41.59%	82.92%	49.83%
	Woman	7.36%	9.72%	17.08%	43.09%
	Total				

Panel A exhibits the general distribution of women and men for the total board positions, positions in headquarters, and positions in affiliates. Panel B and C are based on observations of board positions in affiliates (N=481,321). To establish a threshold to differentiate between *high gender-equaled* countries and *low gender-equaled* countries we use all observations above percentile 75 and below percentile 25, respectively. The differences between *men* and *women-dominated industries* are given by a dummy that equals 1 for women-dominated industries and 0 otherwise. *T-test* column presents the t-test values. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*). Panel D considers observations of board positions in headquarters (N=194,013). The column *Total* shows results for all observations of board positions in headquarters. The column *Relative* is calculated as the percentage of men/women that are executives divided by the percentage of men/women directors, e.g. 41.32%/82.92% = 49.83%.

Table 17. Main correlations

		Board gender diversity in affiliates	
		Correlation coefficient	Hypothesis
Board gender diversity in HQ		0.4303***	H1a
Affiliate level	High	0.2462***	H2a
	Low	0.4894***	
Affiliate importance	High	0.6455***	H2b
	Low	0.2233***	
Affiliate ownership	High	0.4918***	H2c
	Low	0.2705***	
Executive women in HQ		0.2728***	H1b
Affiliate level	High	0.1749***	H2a
	Low	0.2997***	
Affiliate importance	High	0.4085***	H2b
	Low	0.1182***	
Affiliate ownership	High	0.2963***	H2c
	Low	0.1701***	

This table shows the main correlations between board gender diversity in affiliates and board gender diversity in HQ, and executive women in HQ. *Board gender diversity in affiliates* is the proportion of women directors over the total number of directors on boards of affiliates. Likewise, *Board gender diversity in HQ* is the proportion of women on boards of headquarters, over the total number of directors. *Executive women in HQ* is the number of executive women over the total number of executive directors on boards of headquarters. Table 15 also exhibits the correlations between the board gender diversity in affiliates and board gender diversity in HQ, and between board gender diversity in affiliates and executive women in HQ, when we divide the sample by affiliate level, importance and ownership. *High* corresponds to values above the percentile 75 and *Low* to values below the percentile 25, for each of the three moderating variables. *Correlation coefficient* column displays the correlation coefficient. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*). The column of *Hypothesis* represents the hypothesis supported by the results from correlation analysis. N = 132,849 affiliates.

Table 18. Descriptive statistics and correlation matrix

		Mean	Std. dev	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	Board gender diversity in affiliates	0.13	0.20	1.000							
(2)	Board gender diversity in HQ	0.17	0.18	0.430	1.000						
				(0.000)							
(3)	Executive women in HQ	0.08	0.14	0.273	0.582	1.000					
				(0.000)	(0.000)						
(4)	Women-dominated industry	0.03	0.38	0.056	0.036	0.034	1.000				
				(0.000)	(0.000)	(0.000)					
(5)	Country gender equality	0.77	0.04	0.056	0.051	-0.062	0.029	1.000			
				(0.000)	(0.000)	(0.000)	(0.000)				
(6)	Firm size (€ million)	623.60	16,036.85	0.009	0.007	0.017	-0.006	-0.027	1.000		
				(0.002)	(0.014)	(0.000)	(0.000)	(0.000)			
(7)	Financial risk	0.27	22.71	0.002	0.001	0.001	-0.001	0.003	0.000	1.000	
				(0.602)	(0.761)	(0.767)	(0.643)	(0.318)	(0.933)		
(8)	Economic risk	7.88	1,470.27	-0.003	-0.004	-0.002	-0.001	-0.000	0.001	-0.000	1.000
				(0.358)	(0.217)	(0.512)	(0.781)	(0.998)	(0.820)	(0.996)	
	Moderating factors										
	Affiliate level	1.44	0.87								
	Affiliate importance	0.14	0.22								
	Affiliate ownership	0.88	0.19								

This table exhibits descriptive statistics of the variables in the model and the correlation matrix. P-values are in parentheses. *Board gender diversity in affiliates* is the proportion of women directors over the total number of directors on boards of affiliates. Likewise, *Board gender diversity in HQ* is the proportion of women on boards of headquarters, over the total number of directors. *Executive women in HQ* is the number of executive women over the total number of executive directors on boards of headquarters. *Women-dominated industry* is a dummy which takes the value of 1 is the industry is women-dominated and 0 otherwise. *Country gender equality* is a continuous variables which scores the degree of gender equality in a country, according to the GGGS index. *Firm size* is the value of total assets of affiliates, in € million. *Financial risk* is calculated as the average value of the leverage ratio during the last three years. *Economic risk* is calculated as the average value of the standard deviation of ROA of affiliates during the period 2007-2016. Table 16 also presents the descriptive statistics for the moderating factors. *Affiliate level* represents the level of each affiliate within the business group and ranges from 1 (affiliates at the top) to 9 (affiliates at the bottom). *Affiliate importance* is the weight of each affiliate within the business group and it is measured as the proportion of affiliate's total income over the total income of the whole business group. *Affiliate ownership* is the percentage of ownership that headquarters owns in each affiliate of the group. N=132,849 affiliates.

Table 19. OLS analysis of board gender diversity in affiliates

	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.465***	0.567***	0.404***	0.142***	0.206***
	(42.15)	(33.27)	(27.40)	(4.54)	(4.72)
Women-dominated industry	0.048***	0.050***	0.048***	0.046***	0.047***
	(4.77)	(5.22)	(4.84)	(4.44)	(4.80)
Country gender equality	0.116***	0.128***	0.118***	0.075**	0.092***
	(4.20)	(4.70)	(4.33)	(2.81)	(3.56)
Firm size (€ million)	0.005**	0.005*	0.006**	0.006*	0.006*
	(2.59)	(2.38)	(2.70)	(2.51)	(2.52)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(1.31)	(1.40)	(1.33)	(1.32)	(1.38)
Economic risk	-0.002**	-0.001***	-0.002**	-0.002**	-0.002**
	(-2.94)	(-3.36)	(-3.11)	(-2.92)	(-3.28)
Board gender diversity in HQ * Affiliate level		-0.070***			-0.036**
		(-5.61)			(-2.68)
Board gender diversity in HQ * Affiliate importance			0.305***		0.252***
			(12.69)		(11.02)
Board gender diversity in HQ * Affiliate ownership				0.362***	0.292***
				(9.82)	(6.90)
Constant	-0.044*	-0.053*	-0.043*	-0.012	-0.022
	(-2.06)	(-2.52)	(-2.02)	(-0.57)	(-1.10)
Observations	103,872	103,872	103,872	103,872	103,872
R-squared	0.192	0.198	0.202	0.199	0.209

Analysis of cross-sectional data of affiliates of business groups for the year 2016. The dependent variable is the proportion of women directors over the total board directors in affiliates. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level, affiliate importance,* and *affiliate ownership*. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 20. OLS analysis of board gender diversity in affiliates. Empowerment of women directors in HQ

	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.439***	0.552***	0.378***	0.113**	0.181***
	(37.59)	(21.37)	(24.24)	(2.65)	(3.30)
Executive women in HQ	0.059**	0.034	0.053*	0.095	0.091
	(3.24)	(0.89)	(2.05)	(1.34)	(1.08)
Women-dominated industry	0.048***	0.049***	0.047***	0.046**	0.046***
	(4.61)	(5.00)	(4.66)	(4.36)	(4.70)
Country gender equality	0.135***	0.146***	0.140***	0.090**	0.109***
	(4.93)	(5.34)	(5.14)	(3.40)	(4.24)
Firm size (€ million)	0.005*	0.005*	0.005*	0.005*	0.005*
	(2.35)	(2.17)	(2.46)	(2.36)	(2.36)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(1.30)	(1.37)	(1.35)	(1.31)	(1.39)
Economic risk	-0.002**	0.001***	-0.002**	-0.002**	0.002***
	(-2.96)	(-3.39)	(-3.14)	(-2.93)	(-3.30)
Board gender diversity in HQ * Affiliate level		-0.077***			-0.038
		(-3.78)			(-1.78)
Executive women in HQ * Affiliate level		0.015			0.005
		(0.57)			(0.18)
Board gender diversity in HQ * Affiliate importance			0.276***		0.219***
			(10.51)		(9.25)
Executive women in HQ * Affiliate importance			0.098		0.108*
			(1.92)		(2.05)
Board gender diversity in HQ * Affiliate ownership				0.373***	0.305***
				(7.72)	(5.84)
Executive women in HQ * Affiliate ownership				-0.058	-0.072
				(-0.75)	(-0.90)
Constant	-0.059**	-0.067**	-0.060**	-0.024	-0.036
	(-2.79)	(-3.18)	(-2.82)	(-1.15)	(-1.79)
Observations	103,872	103,872	103,872	103,872	103,872
R-squared	0.193	0.199	0.203	0.200	0.210

Analysis of cross-sectional data of affiliates of business groups for the year 2016. The dependent variable is the proportion of women directors over the total board directors in affiliates. This table includes the proportion of executive women over the total of board directors in HQ. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level*, *affiliate importance*, and *affiliate ownership*. Thos table also includes the interaction terms between *Executive women in HQ* and the previous moderating factors. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 21. Robustness analysis: Business groups with more than 2 firms

	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.413***	0.495***	0.376***	0.157***	0.220***
	(29.83)	(24.96)	(22.38)	(4.50)	(4.56)
Women-dominated industry	0.046***	0.047***	0.046***	0.043***	0.045***
	(3.84)	(4.12)	(3.88)	(3.62)	(3.86)
Country gender equality	0.135***	0.145***	0.136***	0.101**	0.113***
	(4.22)	(4.60)	(4.26)	(3.25)	(3.80)
Firm size (€ million)	0.006**	0.006**	0.006**	0.006**	0.006**
	(3.02)	(2.80)	(2.76)	(2.89)	(2.58)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(1.49)	(1.53)	(1.36)	(1.47)	(1.38)
Economic risk	-0.002**	-0.002***	-0.002**	-0.002**	-0.002***
	(-3.17)	(-3.46)	(-3.26)	(-3.15)	(-3.41)
Board gender diversity in HQ * Affiliate level		-0.052***			-0.031*
		(-4.10)			(-2.24)
Board gender diversity in HQ * Affiliate importance			0.332***		0.278***
			(8.92)		(7.80)
Board gender diversity in HQ * Affiliate ownership				0.289***	0.238***
				(6.84)	(4.95)
Constant	-0.053*	-0.061*	-0.052*	-0.026	-0.035
	(-2.15)	(-2.50)	(-2.10)	(-1.09)	(-1.51)
Observations	87,161	87,161	87,161	87,161	87,161
R-squared	0.144	0.148	0.149	0.149	0.155

The sample in this table excludes business groups integrated by two firms. The dependent variable is the proportion of women directors over the total board directors in affiliates. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level*, *affiliate importance*, and *affiliate ownership*. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 22. Robustness analysis: The effect of gender quotas

	Panel A: Parliament gender quotas					*Panel B: Corporate gender quotas*				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.464***	0.566***	0.404***	0.138***	0.201***	0.466***	0.567***	0.405***	0.138***	0.198***
	(41.55)	(32.76)	(27.17)	(4.42)	(4.60)	(41.86)	(33.13)	(27.16)	(4.40)	(4.49)
Women-dominated industry	0.049***	0.050***	0.049***	0.046***	0.047***	0.049***	0.051***	0.049***	0.046***	0.047***
	(4.81)	(5.27)	(4.89)	(4.46)	(4.83)	(4.82)	(5.27)	(4.90)	(4.47)	(4.84)
Firm size (€ million)	0.006**	0.005*	0.006**	0.006**	0.006*	0.005*	0.005*	0.005*	0.005*	0.005*
	(2.65)	(2.44)	(2.70)	(2.60)	(2.55)	(2.37)	(2.14)	(2.49)	(2.37)	(2.37)
Financial risk	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(1.24)	(1.33)	(1.31)	(1.24)	(1.34)	(1.45)	(1.55)	(1.49)	(1.40)	(1.49)
Economic risk	-0.001**	-0.001***	-0.002**	-0.002**	-0.002**	-0.002**	-0.001***	-0.002**	-0.002**	-0.002**
	(-2.90)	(-3.33)	(-3.08)	(-2.90)	(-3.26)	(-2.95)	(-3.36)	(-3.12)	(-2.93)	(-3.28)
Parliament gender quota	0.063***	0.066***	0.050**	0.053**	0.045*					
	(3.52)	(3.67)	(2.74)	(2.98)	(2.57)					
Corporate gender quota						0.011*	0.011*	0.008	0.008	0.006
						(2.35)	(2.37)	(1.80)	(1.78)	(1.40)
Board gender diversity in HQ * Affiliate level		-0.070***			-0.036**		-0.069***			-0.035**
		(-5.57)			(-2.66)		(-5.48)			(-2.58)
Board gender diversity in HQ * Affiliate importance			0.302***		0.249***			0.304***		0.252***
			(12.44)		(10.92)			(12.52)		(10.95)
Board gender diversity in HQ * Affiliate ownership				0.364***	0.297***				0.367***	0.300***
				(9.86)	(7.01)				(9.92)	(7.03)
Constant	0.023***	0.022***	0.030***	0.027***	0.032***	0.035***	0.036***	0.041***	0.039***	0.043***
	(3.46)	(3.31)	(4.50)	(4.23)	(5.03)	(7.67)	(7.99)	(9.11)	(8.85)	(10.11)
Observations	103,877	103,877	103,877	103,877	103,877	103,877	103,877	103,877	103,877	103,877
R-squared	0.192	0.198	0.201	0.200	0.209	0.191	0.197	0.201	0.199	0.209

Panel A includes the effect of parliament gender quotas. *Parliament gender quota* is a variable that accounts for the percentage of women represented in countries parliaments. Panel B includes the effect of corporate gender quotas. *Corporate gender quota* is a variable that equals 1 if the country has any legislation about the representation of women on corporate boards –hard quotas, soft quotas or recommendations in codes of good governance- and 0 otherwise. In both panels A and B the variable *Country Gender equality* is removed due to the presence of high correlation with the quotas variables. The dependent variable is the proportion of women directors over the total board directors in affiliates. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level*, *affiliate importance*, and *affiliate ownership*. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 23. Robustness analysis: The effect of family business groups

	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.461***	0.564***	0.404***	0.138***	0.211***
	(34.56)	(30.39)	(24.55)	(4.24)	(4.75)
Women-dominated industry	0.051***	0.052***	0.051***	0.048***	0.049***
	(4.88)	(5.41)	(5.00)	(4.56)	(5.02)
Country gender equality	0.113***	0.127***	0.117***	0.072*	0.090**
	(3.69)	(4.18)	(3.84)	(2.40)	(3.13)
Firm size (€ million)	0.006*	0.005*	0.006**	0.006*	0.006*
	(2.57)	(2.36)	(2.59)	(2.50)	(2.44)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(1.23)	(1.30)	(1.20)	(1.24)	(1.25)
Economic risk	-0.002**	-0.002***	-0.002**	-0.002**	-0.002**
	(-2.94)	(-3.34)	(-3.11)	(-2.94)	(-3.28)
FBG	-0.004	-0.004	-0.006	-0.005	-0.007
	(-1.07)	(-1.06)	(-1.59)	(-1.44)	(-1.79)
Board gender diversity in HQ*FBG	0.027	0.021	-0.000	0.034	0.007
	(1.17)	(0.96)	(-0.00)	(1.50)	(0.32)
Board gender diversity in HQ * Affiliate level		-0.070***			-0.037**
		(-5.46)			(-2.68)
Board gender diversity in HQ * Affiliate importance			0.312***		0.256***
			(12.88)		(11.17)
Board gender diversity in HQ * Affiliate ownership				0.359***	0.287***
				(9.49)	(6.65)
Constant	-0.041	-0.052*	-0.041	-0.008	-0.020
	(-1.74)	(-2.19)	(-1.73)	(-0.35)	(-0.89)
Observations	98,398	98,398	98,398	98,398	98,398
R-squared	0.190	0.197	0.200	0.198	0.208

This table includes the effect of family business groups. Only those observations with information about the ultimate owner of the business group have been kept. *FBG* is a dummy variable that equals 1 if the business group is family-owned and 0 otherwise. The dependent variable is the proportion of women directors over the total board directors in affiliates. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level, affiliate importance,* and *affiliate ownership*. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 24. Robustness analysis: Industry and country controls

	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.452***	0.559***	0.387***	0.129***	0.201***
	(43.00)	(33.81)	(28.42)	(4.25)	(4.85)
Firm size (€ million)	0.006**	0.006**	0.006**	0.006**	0.006**
	(2.98)	(2.76)	(2.83)	(2.81)	(2.61)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(0.46)	(0.57)	(0.51)	(0.48)	(0.58)
Economic risk	-0.002*	-0.002**	-0.002**	-0.002*	-0.002**
	(-2.44)	(-2.71)	(-2.68)	(-2.41)	(-2.74)
Board gender diversity in HQ * Affiliate level		-0.074***			-0.040**
		(-6.38)			(-3.16)
Board gender diversity in HQ * Affiliate importance			0.319***		0.264***
			(14.53)		(12.31)
Board gender diversity in HQ * Affiliate ownership				0.360***	0.285***
				(9.97)	(7.02)
Constant	-0.019	-0.010	-0.003	-0.010	0.006
	(-0.27)	(-0.14)	(-0.05)	(-0.13)	(0.09)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
Observations	103,877	103,877	103,877	103,877	103,877
R-squared	0.209	0.216	0.220	0.217	0.227

In this table, all specifications include two-digit standard industrial classification dummies, and country dummies. For this purpose, we omit the variables *Women-dominated industry* and *Country gender equality*. The dependent variable is the proportion of women directors over the total board directors in affiliates. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level*, *affiliate importance*, and *affiliate ownership*. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 25. Robustness analysis: Dummy variable for the presence of women on boards

	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.978***	1.196***	0.861***	0.480***	0.665***
	(51.06)	(39.66)	(35.35)	(7.52)	(8.30)
Women-dominated industry	0.075***	0.078***	0.074***	0.071**	0.073***
	(3.47)	(3.88)	(3.53)	(3.25)	(3.62)
Country gender equality	0.130*	0.156**	0.135*	0.068	0.106
	(2.16)	(2.60)	(2.27)	(1.13)	(1.80)
Firm size (€ million)	0.040**	0.040**	0.041**	0.041**	0.041**
	(3.09)	(3.08)	(3.06)	(3.13)	(3.08)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(0.42)	(0.46)	(0.42)	(0.44)	(0.45)
Economic risk	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***
	(-3.49)	(-3.76)	(-3.58)	(-3.47)	(-3.72)
Board gender diversity in HQ * Affiliate level		-0.150***			-0.094***
		(-7.18)			(-4.26)
Board gender diversity in HQ * Affiliate importance			0.579***		0.466***
			(13.98)		(11.45)
Board gender diversity in HQ * Affiliate ownership				0.556***	0.398***
				(7.99)	(5.17)
Constant	0.090	0.071	0.092*	0.139**	0.114*
	(1.93)	(1.52)	(1.99)	(3.00)	(2.52)
Observations	103,872	103,872	103,872	103,872	103,872
R-squared	0.143	0.148	0.149	0.146	0.153

In this table, the dependent variable is a dummy variable that equals 1 if the affiliate has a least one women on board, and 0 otherwise. As the dependent variable is a dummy, the models are estimated with probit estimations. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level, affiliate importance,* and *affiliate ownership*. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 26. Robustness analysis: Blau Index

	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.416***	0.514***	0.363***	0.161***	0.241***
	(48.28)	(38.74)	(34.06)	(6.25)	(7.37)
Women-dominated industry	0.037***	0.038***	0.036***	0.035***	0.036***
	(3.93)	(4.39)	(3.99)	(3.65)	(4.04)
Country gender equality	0.124***	0.136***	0.126***	0.092***	0.109***
	(4.87)	(5.45)	(5.07)	(3.64)	(4.45)
Firm size (€ million)	0.011***	0.011***	0.012***	0.011***	0.011***
	(3.62)	(3.59)	(3.52)	(3.64)	(3.54)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(0.66)	(0.71)	(0.66)	(0.67)	(0.70)
Economic risk	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(-3.34)	(-3.65)	(-3.42)	(-3.34)	(-3.59)
Board gender diversity in HQ * Affiliate level		-0.068***			-0.041***
		(-7.52)			(-4.30)
Board gender diversity in HQ * Affiliate importance			0.261***		0.209***
			(13.78)		(11.30)
Board gender diversity in HQ * Affiliate ownership				0.285***	0.215***
				(10.08)	(6.92)
Constant	-0.025	-0.034	-0.024	0.000	-0.011
	(-1.27)	(-1.76)	(-1.26)	(0.01)	(-0.56)
Observations	103,872	103,872	103,872	103,872	103,872
R-squared	0.149	0.155	0.156	0.154	0.162

In this table, the dependent variable is the Blau Index, which accounts for board gender diversity. Blau Index is calculated as $1 - \Sigma^{n}_{i=1} P_i^2$, where *Pi* is the percent of women and men on the board, and *n* is 2, representing the number of categories (women and men). Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level*, *affiliate importance*, and *affiliate ownership*. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 27. Robustness analysis: Critical mass of women on boards

	(1)	(2)	(3)	(4)	(5)
Critical mass in HQ	0.084***	0.111***	0.062***	0.018	0.033*
	(20.34)	(18.30)	(13.67)	(1.80)	(2.21)
Women-dominated industry	0.063***	0.064***	0.061***	0.061***	0.061***
	(5.69)	(5.89)	(5.65)	(5.52)	(5.62)
Country gender equality	0.234***	0.241***	0.225***	0.213***	0.216***
	(7.23)	(7.51)	(6.91)	(6.83)	(7.04)
Firm size (€ million)	0.002	0.002	0.001	0.003	0.001
	(1.13)	(0.80)	(0.29)	(1.11)	(0.24)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(1.79)	(1.85)	(1.84)	(1.76)	(1.83)
Economic risk	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(-3.60)	(-3.98)	(-3.78)	(-3.55)	(-3.89)
Critical mass in HQ * Affiliate level		-0.018***			-0.007
		(-4.78)			(-1.77)
Critical mass in HQ * Affiliate importance			0.309***		0.296***
			(25.90)		(24.61)
Critical mass in HQ * Affiliate ownership				0.076***	0.048**
				(5.73)	(3.21)
Constant	-0.085***	-0.091***	-0.079**	-0.069**	-0.071**
	(-3.42)	(-3.68)	(-3.13)	(-2.88)	(-3.02)
Observations	103,872	103,872	103,872	103,872	103,872
R-squared	0.046	0.049	0.069	0.049	0.070

In this table, *Critical mass in HQ* is a dummy variable that equals 1 if the headquarters has a critical mass of women on boards (2 or more women directors), and 0 otherwise. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level*, *affiliate importance*, and *affiliate ownership*. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Table 28. Robustness analysis: Empowerment of women directors in HQ

	(1)	(2)	(3)	(4)	(5)
Board gender diversity in HQ	0.437***	0.536***	0.373***	0.127**	0.182***
	(39.51)	(21.84)	(25.33)	(3.18)	(3.64)
Executive women in HQ 2	0.046***	0.050*	0.047***	0.032	0.046
	(4.40)	(2.03)	(3.36)	(0.84)	(0.90)
Women-dominated industry	0.049***	0.050***	0.048***	0.046***	0.047***
	(4.73)	(5.19)	(4.79)	(4.41)	(4.78)
Country gender equality	0.132***	0.143***	0.137***	0.090***	0.109***
	(4.76)	(5.22)	(4.98)	(3.37)	(4.21)
Firm size (€ million)	0.005*	0.005*	0.005*	0.005*	0.005*
	(2.43)	(2.22)	(2.53)	(2.37)	(2.37)
Financial risk	0.000	0.000	0.000	0.000	0.000
	(1.39)	(1.47)	(1.42)	(1.38)	(1.45)
Economic risk	-0.002**	-0.001**	-0.002**	-0.002**	-0.002**
	(-2.83)	(-3.24)	(-3.00)	(-2.82)	(-3.20)
Board gender diversity in HQ * Affiliate level		-0.068***			-0.032
		(-3.58)			(-1.57)
Executive women in HQ * Affiliate level		-0.003			-0.006
		(-0.17)			(-0.33)
Board gender diversity in HQ * Affiliate importance			0.292***		0.245***
			(11.91)		(10.77)
Executive women in HQ 2 * Affiliate importance			0.042		0.033
			(1.53)		(1.20)
Board gender diversity in HQ 2 * Affiliate ownership				0.349***	0.280***
				(7.78)	(5.95)
Executive women in HQ 2 * Affiliate ownership				0.010	0.008
				(0.23)	(0.17)
Constant	-0.056**	-0.065**	-0.057**	-0.024	-0.036
	(-2.64)	(-3.07)	(-2.68)	(-1.15)	(-1.77)
Observations	103,872	103,872	103,872	103,872	103,872
R-squared	0.193	0.199	0.204	0.201	0.211

The dependent variable is the proportion of women directors over the total board directors in affiliates. This table includes the *Executive women in HQ 2*, calculated as the proportion of executive women over the total number of executive directors in HQ. Interaction terms are the result of multiplying the independent variable *Board gender diversity in HQ* times each of the moderating factors –*Affiliate level*, *affiliate importance*, and *affiliate ownership*. This table also includes the interaction terms between *Executive women in HQ 2* and the previous moderating factors. *Firm size*, in € million, and *Economic risk* are divided by 10,000 to avoid problems of scale in the distribution of these variables. Standard errors are robust (Huber, 1967; White, 1980, 1982) and clustered by business groups (Petersen, 2009). Values of t-statistics are in parentheses. Asterisks indicate significance at 1% level (***), 5% level (**), and 10% level (*).

Figure 1. Business group depiction by two different criteria

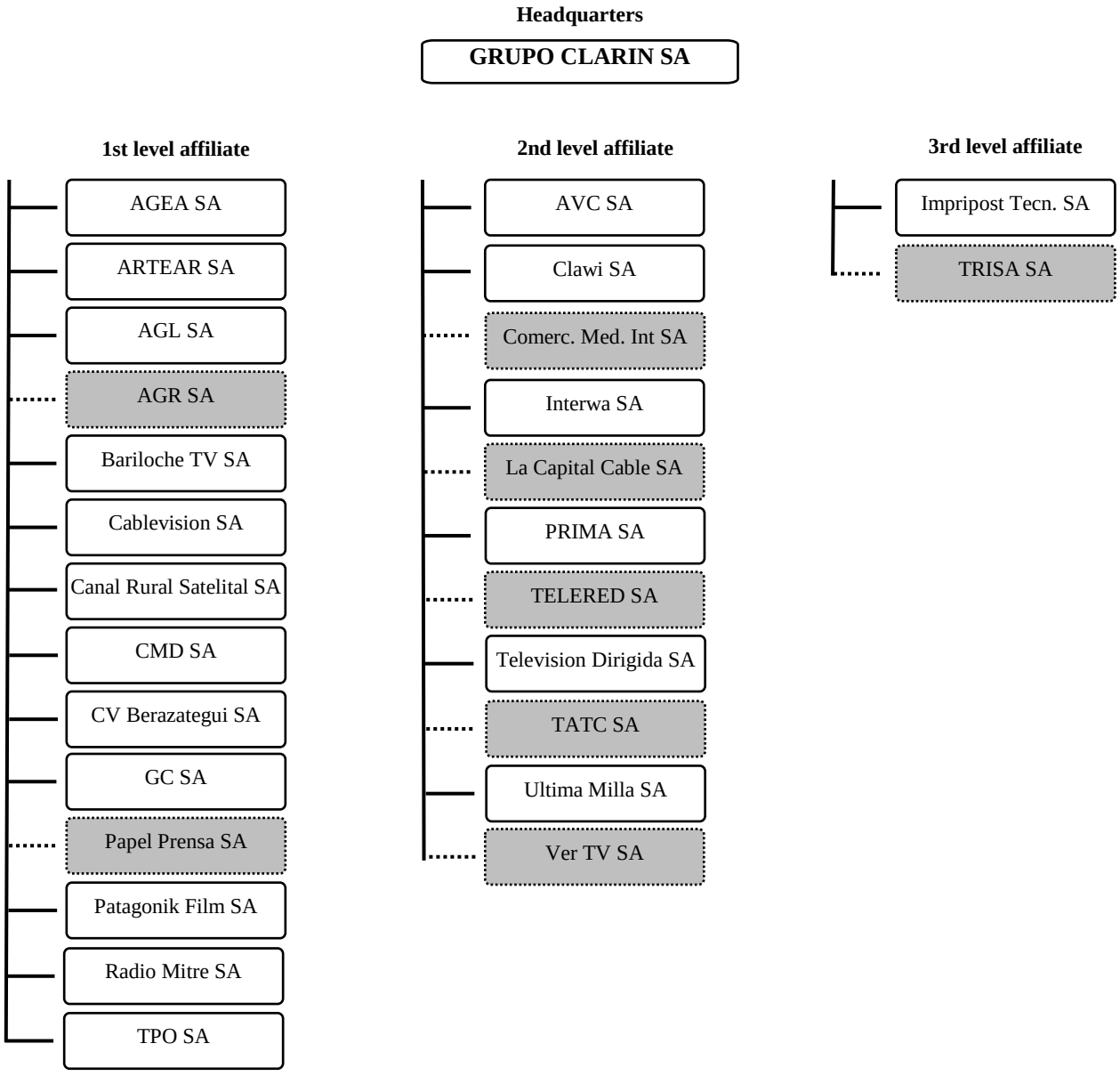

Figure 1 represents the business groups' tree of *Grupo Clarin*, leading group of media communication in Argentina. Solid lines show the ownership links between the headquarters and their affiliates, based on the more than 50% criteria. Figure 1 also depicts the hierarchical level of affiliates within the business group. *Grupo Clarin SA* head the business group structure, as the headquarters. *AGEA SA*, *ARTEAR SA* or *CMD SA*, among others, are in the first level of the hierarchy. They are owned directly by the headquarters. However, *Clawi SA* and *Interwa SA* are affiliates of second level. They are owned by affiliates of first level, in this case by *CMD SA*. In the third column of the Figure 1, affiliates of third level are depicted. Dashed lines show firms applying the interlocking directorates' criteria. *Papel Prensa SA* and *TRISA SA* are affiliates of *Grupo Clarin* because of interlocking directors. Information about business group composition has been corroborated with group website http://grupoclarin.com/ir/Informacion-Corporativa/Estructura-Corporativa and other webpages https://mapademedios.com.ar/2017/11/29/grupo-clarin/

Figure 2. Synthesis of the review in business groups and internationalization literatures

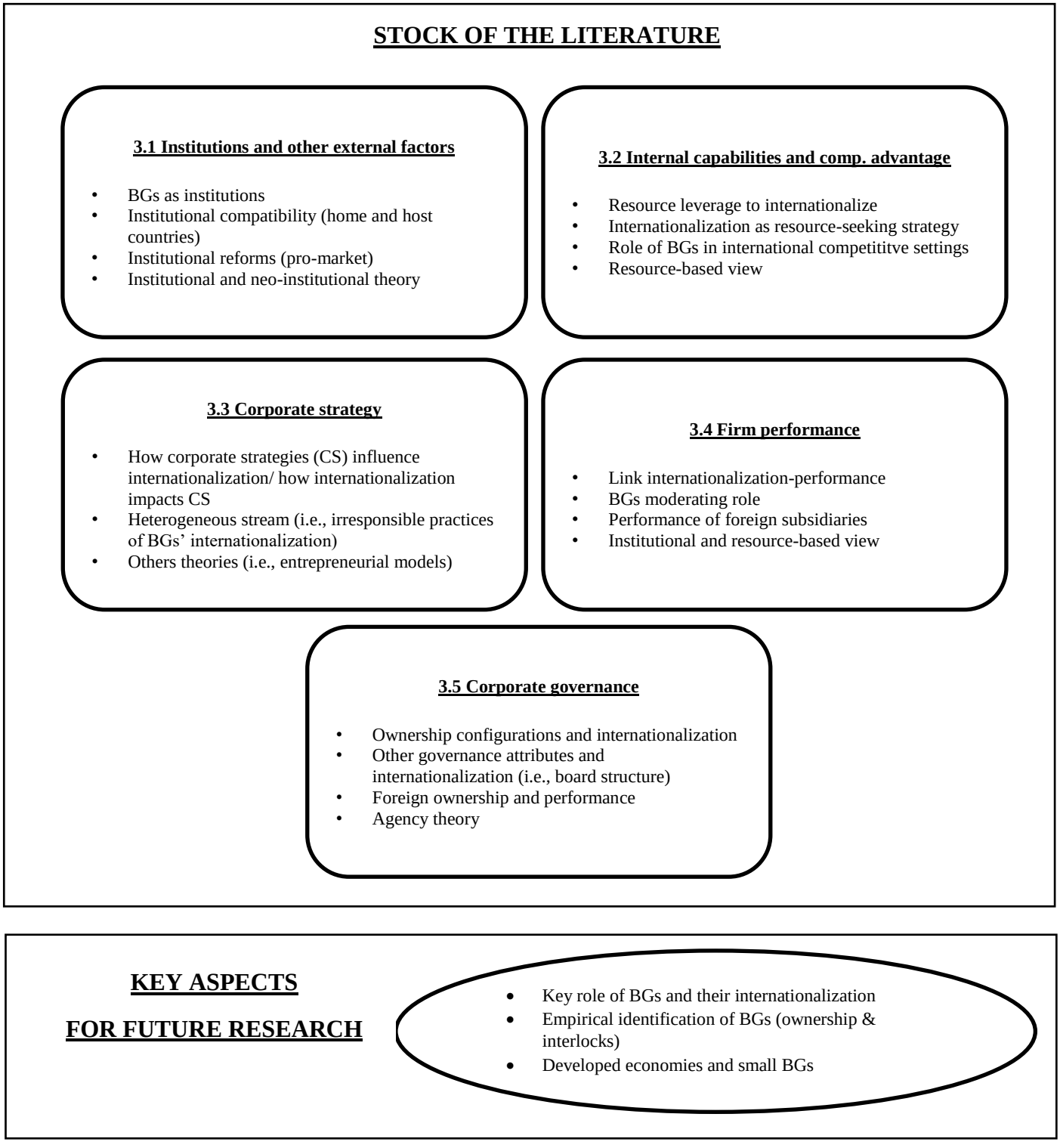

Figure 3. Theoretical model

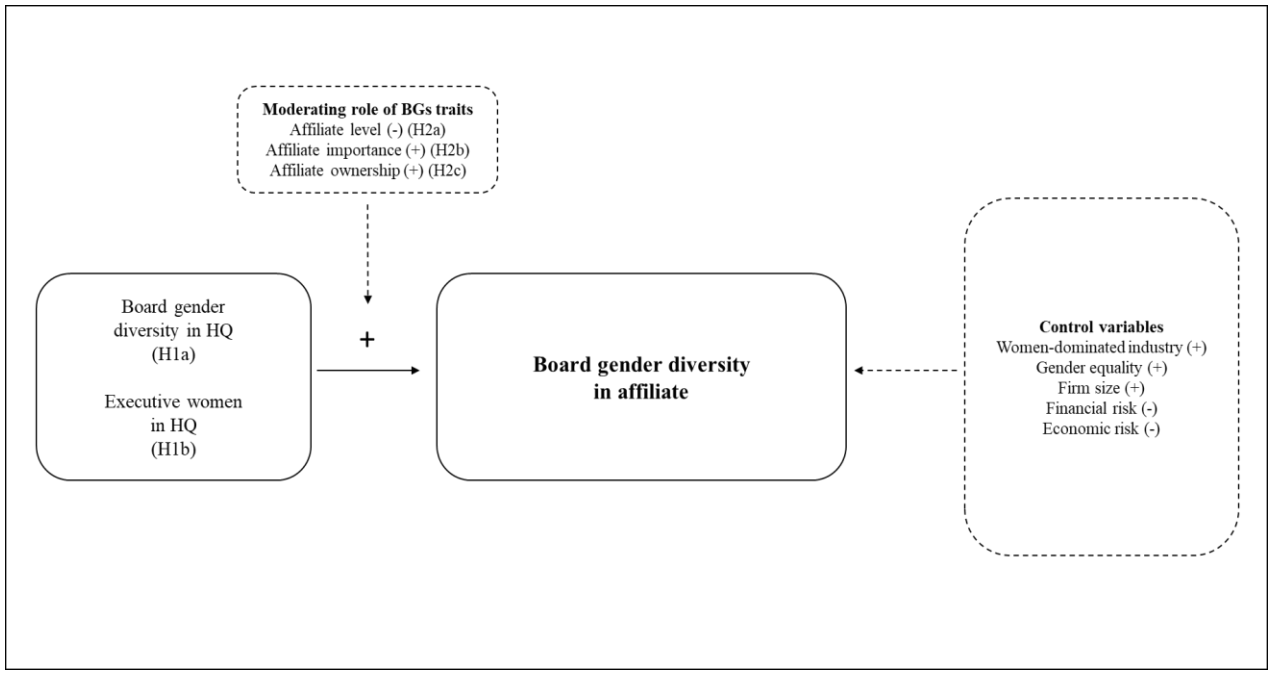

Figure 3 represents the theoretical model. Solid lines show the main association we intend to study –whether board gender diversity and executive women in headquarters, and board gender diversity in affiliates are positively associated (H1a and H1b). Dashed lines show the moderating role of certain business groups characteristics –level of affiliate, importance of the affiliate, and the percentage of ownership of the headquarters over the affiliate- in the relationship between board gender diversity in headquarters and affiliates (H2a, H2b and H2c); and the effect of control variables –country culture, women-dominated industry, total assets, financial leverage and ROA- on board gender diversity in affiliates.

Table A 1. Distribution of business groups per countries

Country	Initial sample: % of BGs over the total (# 810,930 BGs)	Final sample: % of BGs over the total (# 39,911 BGs)	Variation
Australia	1.71	4.59	2.88
Austria	0.77	0.01	-0.76
Belgium	1.11	2.51	1.4
Canada	2.08	0.55	-1.53
Chile	0.27	0.09	-0.18
Czech Republic	0.73	0.55	-0.18
Denmark	1.23	1.89	0.66
Estonia	0.15	0.75	0.6
Finland	0.61	5.91	5.3
France	2.49	2.18	-0.31
Germany	4.42	0.08	-4.34
Greece	0.14	0.58	0.44
Hungary	0.05	0.04	-0.01
Iceland	0.08	0.37	0.29
Ireland	0.41	1.06	0.65
Israel	0.37	0.16	-0.21
Italy	3.32	3.43	0.11
Japan	0.91	1.64	0.73
Korea	0.20	0.79	0.59
Latvia	0.09	0.34	0.25
Luxembourg	0.18	0.50	0.32
Mexico	0.05	0.06	0.01
Netherlands	4.72	0.07	-4.65
New Zealand	0.39	0.36	-0.03
Norway	1.16	11.39	10.23
Poland	0.67	0.02	-0.65
Portugal	0.54	2.19	1.65
Slovakia	0.19	0.10	-0.09
Slovenia	0.11	0.01	-0.1
Spain	2.56	10.15	7.59
Sweden	1.97	10.53	8.56
Switzerland	0.64	3.27	2.63
Turkey	0.21	0.70	0.49
United Kingdom	4.8	27.9	23.1
United States	60.67	5.23	-55.44
Total	100	100	0

This table represents the distribution of business groups per countries in the OECD, in terms of percentage over the total. Column 2 refers of business groups defined after the computation of the algorithm and it amounts up to 810,930 business groups located in the 35 OECD countries. Column 3 refers of the remaining list of business groups after the sample attrition shown in Table 5. Last column shows the variation on the sample distribution of business groups across countries comparing the initial and final sample.

Supplementary data of Chapter 2

Initially, the data collection comprised 22 journals from the 2016 Financial Times Research Rank. Although this rank includes 50 journals and we conduct our search in all the journals, only 22 of them included articles related to our focus –business groups and internationalization. Therefore, 28 journals were excluded.

The 22 journals are: in IB, *Journal of International Business Studies* (JIBS)*;* in management, *Academy of Management Journal* (AMJ), *Academy of Management Review* (AMR), *Administrative Science Quarterly* (ASQ), *Journal of Management* (JOM), *Journal of Management Studies* (JMS), *Journal of Operations Management* (JOOM)*; Management Science* (MS), *Organization Science* (OS), *Organization Studies* (OST), *Sloan Management Review* (SMR), and *Strategic Management Journal* (SMJ); in entrepreneurship, *Entrepreneurship Theory and Practice* (ETP), *Journal of Business Venturing* (JBV), and *Strategic Entrepreneurship Journal* (SEJ)*;* in finance, *Journal of Finance* (JOF), *Journal of Financial and Quantitative Analysis* (JFQA), *Journal of Financial Economics* (JFE), and *Review of Financial Studies* (RFS)*;* in the fields of ethics, innovation and marketing, *Journal of Business Ethics* (JBE), *Research Policy* (RP), and *Journal of Marketing* (JMK).

We complement this selection with the *Journal of World Business* (JWB), *Global Strategy Journal* (GSJ), *Management International Review* (MIR), *International Business Review* (IBR), *Journal of International Management* (JIM), *Asia Pacific Journal of Management* (APJM), and *Management and Organization Review* (MOR), from Gaur and Kumar (2018) and Tüselmann, Sinkovics, and Pishchulov (2016), and *Academy of Management Annals* (AMA) and *Journal of Economic Literature* (JEL), due to its relevance

to the field of study.

Table S1 provides a summary of the article sample by journal and year of publication. The final article sample is composed by 83 articles from 20 journals.

Table S2 contains a bibliographic detail of the final sample of articles, sorted by author alphabetical order.

Table S.1. Summary of article sample according to journal and year of publication

	1996	1997	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
AMJ	0	0	0	2	0	1	0	0	0	0	0	1	1	0	0	0	2	0	1	0	0	0	0	8
APJM	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	0	3	2	0	9
ETP	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
GSJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	4
IBR	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	2	1	1	0	0	0	8
JBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
JEL	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
JFE	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
JFQA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
JIBS	1	0	0	0	0	0	1	0	1	0	0	1	1	1	0	0	0	0	0	0	0	1	0	7
JIM	0	0	0	0	0	0	0	0	0	0	2	0	0	1	1	1	1	1	0	0	0	1	0	8
JMS	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
JOF	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
JWB	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	1	1	1	4	0	11
MIR	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2	1	0	0	0	5
MOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
MS	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
OS	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	3
RP	0	0	0	0	0	0	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	4
SMJ	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	5
Total	1	1	2	3	1	1	3	2	2	1	3	8	6	3	5	2	7	8	7	3	4	9	1	83

Note: *Academy of Management Journal* (AMJ), *Asia Pacific Journal of Management* (APJM), *Entrepreneurship Theory and Practice* (ETP), *Global Strategy Journal* (GSJ), *International Business Review* (IBR), *Journal of Business Ethics* (JBE), *Journal of Economic Literature* (JEL), *Journal of Financial Economics* (JFE), *Journal of Financial and Quantitative Analysis* (JFQA), *Journal of International Business Studies* (JIBS), *Journal of International Management* (JIM), *Journal of Management Studies* (JMS), *Journal of Finance* (JOF), *Journal of World Business* (JWB), *Management International Review* (MIR), *Management and Organization Review* (MOR), *Management Science* (MS), *Organization Science* (OS), *Research Policy* (RP),and *Strategic Management Journal* (SMJ).

Table S.2. Bibliographic detail of the sample's articles (by author alphabetical order)

Author	Year	Journal	Title
Alcantara and Mitsuhashi	2012	JIM	Make-or-Break Decisions in Choosing Foreign Direct Investment Locations
Ayyagari et al.	2015	AMJ	Strategic responses to FDI in emerging markets: are core members more responsive than peripheral members of business groups?
Baek et al.	2004	JFE	Corporate governance and firm value: evidence from the Korean financial crisis
Bamiatzi et al.	2014	IBR	Does business group affiliation help firms achieve superior performance during industrial downturns? An empirical examination
Banerji and Sambharya	1996	JIBS	Vertical keiretsu and international market entry: The case of the Japanese automobile ancillary industry
Belderbos and Heijltjes	2005	JIBS	The determinants of expatriate staffing by Japanese multinationals in Asia: control, learning and vertical business groups
Chari	2013	JWB	Business groups and foreign direct investments by developing country firms: An empirical test in India
Chari and Banalieva	2015	JWB	How do pro-market reforms impact firm profitability? The case of India under reform
Chen and Jaw	2014	APJM	How do business groups' small world networks effect diversification, innovation, and internationalization?
Chesbrough	2003	RP	Environmental influences upon firm entry into new sub-markets - Evidence from the worldwide hard disk drive industry conditionally
Chittoor and Ray	2007	JIM	Internationalization paths of Indian pharmaceutical firms - A strategic group analysis
Chittoor et al.	2009	OS	Third-World Copycats to Emerging Multinationals: Institutional Changes and Organizational Transformation in the Indian Pharmaceutical Industry
Chittoor et al.	2015	GSJ	Accumulative and assimilative learning, institutional infrastructure, and innovation orientation of developing economy firms
Chittoor et al.	2015	MIR	What Drives Overseas Acquisitions by Indian Firms? A Behavioral Risk-Taking Perspective
Chittoor et al.	2019	GSJ	Microfoundations of firm internationalization: The owner CEO effect
Choi et al.	2007	JFQA	The value of outside directors: Evidence from corporate governance reform in Korea
Choi et al.	2011	RP	Ownership and firm innovation in a transition economy: Evidence from China
Chung	2014	IBR	The role of family management and ownership on semi-globalization pattern of globalization: The case of family business groups
Chung and Dahms	2018	JIM	Ownership Strategy and Foreign Affiliate Performance in Multinational Family Business Groups: A Double-edged Sword
Chung et al.	2008	MIR	Multinational networks during times of economic crisis versus stability
Chung et al.	2008	OS	Institutional Logics or Agency Costs: The Influence of Corporate Governance Models on Business Group Restructuring in Emerging Economies
Chung et al.	2013	SMJ	Leadership succession and firm performance in an emerging economy: Successor origin, relational embeddedness, and legitimacy
Colpan	2008	APJM	Are strategy-performance relationships contingent on macroeconomic environments? Evidence from Japan's textile industry
Cuervo-Cazurra and Dau	2009	AMJ	Promarket reforms and firm profitability in developing countries
De Beule and Sels	2016	IBR	Do innovative emerging market cross-border acquirers create more shareholder value? Evidence from India
Delios and Henisz	2000	AMJ	Japanese firms' investment strategies in emerging economies
Dieleman	2010	APJM	Shock-imprinting: External shocks and ethnic Chinese business groups in Indonesia
Douma et al.	2006	SMJ	Foreign and domestic ownership, business groups, and firm performance: Evidence from a large emerging market
Filatotchev and Wright	2011	JMS	Agency Perspectives on Corporate Governance of Multinational Enterprises
Fuad and Sinha	2018	APJM	Entry-timing, business groups and early-mover advantage within industry merger waves in emerging markets: A study of Indian firms
Garg and Delios	2007	JIM	Survival of the foreign subsidiaries of TMNCs: The influence of business group affiliation
Gaur and Delios	2015	MIR	International Diversification of Emerging Market Firms: The Role of Ownership Structure and Group Affiliation
Gaur et al.	2014	JWB	Institutions, resources, and internationalization of emerging economy firms
Geringer et al.	2000	SMJ	Product and international diversification among Japanese multinational firms
Gubbi and Elango	2016	MIR	Resource Deepening Vs. Resource Extension: Impact on Asset-Seeking Acquisition Performance

Gubbi et al.	2015	OS	International Search Behavior of Business Group Affiliated Firms: Scope of Institutional Changes and Intragroup Heterogeneity
Guillen	2000	AMJ	Business groups in emerging economies: A resource-based view
Guillen	2002	AMJ	Structural inertia, imitation, and foreign expansion: South Korean firms and business groups in China, 1987-95
Guillen	2003	JIBS	Experience, imitation, and the sequence of foreign entry: wholly owned and joint-venture manufacturing by South Korean firms and business groups in China, 1987-1995
He and Ng	1998	JOF	The foreign exchange exposure of Japanese multinational corporations
Hearn et al.	2018	JWB	The institutional determinants of private equity involvement in business groups-The case of Africa
Hobdari et al.	2017	APJM	The home country of the MNE: The case of emerging economy firms
Hundley and Jacobson	1998	SMJ	The effects of the keiretsu on the export performance of Japanese companies: Help or hindrance?
Ilhan-Nas et al.	2018	JWB	Board composition, family ownership, institutional distance and the foreign equity ownership strategies of Turkish MNEs
Iona et al.	2013	GSJ	Business group affiliation, innovation, internationalization, and performance: a semiparametric analysis
Ito	1997	MS	Domestic competitive position and export strategy of Japanese manufacturing firms: 1971-1985
Jean et al.	2011	IBR	Ethnic ties, location choice, and firm performance in foreign direct investment: A study of Taiwanese business groups FDI in China
Kim et al.	2004	SMJ	Power dependence, diversification strategy, and performance in keiretsu member firms
Kim et al.	2010	JIBS	Does market-oriented institutional change in an emerging economy make business-group-affiliated multinationals perform better? An institution-based view
Kumar et al.	2012	MIR	Product Diversification and International Expansion of Business Groups Evidence from India
Lamin	2013	AMJ	Business groups as information resource: an investigation of business group affiliation in the Indian software services industry
Lamin and Dunlap	2011	JIM	Complex technological capabilities in emerging economy firms: The role of organizational relationships
Lechner and Leyronas	2009	ETP	Small-Business Group Formation as an Entrepreneurial Development Model
Lee and MacMillan	2008	IBR	Managerial knowledge-sharing in chaebols and its impact on the performance of their foreign subsidiaries
Lee et al.	2014	JIM	Innovative Knowledge Transfer Patterns of Group-Affiliated Companies: The effects on the Performance of Foreign Subsidiaries
Li et al.	2017	APJM	Marketized state ownership and foreign expansion of emerging market multinationals: Leveraging institutional competitive advantages
Liao	2015	IBR	Local clusters of SOEs, POEs, and FIEs, international experience, and the performance of foreign firms operating in emerging economies
Lin	2016	JWB	FDI decisions and business-group insider control: Evidence from Taiwanese group-affiliated firms investing in the Chinese market
Lu and Ma	2008	AMJ	The contingent value of local partners' business group affiliations
Luo et al.	2009	JIBS	How do corporate governance model differences affect foreign direct investment in emerging economies?
Ma et al.	2014	JWB	Facing global economic crisis: Foreign sales, ownership groups, and corporate value
Mahmood and Singh	2003	RP	Technological dynamism in Asia
Mahmood and Zheng	2009	RP	Whether and how: Effects of international joint ventures on local innovation in an emerging economy
Mukherjee et al.	2018	JWB	Business group reputation and affiliates' internationalization strategies
Park and Kim	2008	JWB	Corporate governance, regulatory changes, and corporate restructuring in Korea, 1993-2004
Peng et al.	2018	APJM	The growth of the firm in (and out of) emerging economies
Perkins et al.	2014	GSJ	Innocents abroad: the hazards of international joint ventures with pyramidal group firms
Popli and Sinha	2014	APJM	Determinants of early movers in cross-border merger and acquisition wave in an emerging market: A study of Indian firms
Purkayastha et al.	2017	APJM	Business group heterogeneity and the internationalization-performance relationship: Evidence from Indian business groups
Purkayastha et al.	2018	JWB	Business group effects on the R&D intensity-internationalization relationship: Empirical evidence from India
Rauch	2001	JEL	Business and social networks in international trade

Santangelo and Stucchi	2018	JIBS	Internationalization through exaptation: The role of domestic geographical dispersion in the internationalization process
Singh	2009	IBR	Export performance of emerging market firms
Singh and Delios	2017	JWB	Corporate governance, board networks and growth in domestic and international markets: Evidence from India
Singh and Gaur	2013	JIM	Governance Structure, Innovation and Internationalization: Evidence From India
Su and Tan	2018	JBE	Business Groups and Tax Havens
Surroca et al.	2013	AMJ	Stakeholder pressure on MNEs and the transfer of socially irresponsible practices to subsidiaries
Tan and Meyer	2010	JIM	Business groups' outward FDI: A managerial resources perspective
Wan et al.	2008	JIBS	The performance implications of relationship banking during macroeconomic expansion and contraction: a study of Japanese banks' social relationships and overseas expansion
Yi et al.	2013	IBR	The effects of innovative capabilities on exporting: Do institutional forces matter?
Yiu	2011	MOR	Multinational Advantages of Chinese Business Groups: A Theoretical Exploration
Zhao et al.	2005	JMS	A dual networks perspective on inter-organizational transfer of R&D capabilities: International joint ventures in the Chinese automotive industry
Zia	2008	JFE	Export incentives, financial constraints, and the (mis)allocation of credit: Micro-level evidence from subsidized export loans