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Structure analysis of the corporate network of interlocking directorates in Peru

TESIS PARA OPTAR EL GRADO ACADÉMICO DE DOCTOR EN GESTIÓN ESTRATÉGICA CON MENCIÓN EN GESTIÓN EMPRESARIAL Y SOSTENIBILIDAD

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To all those who attain a huge power through their position, relationships, knowledge, economic welfare, paternity, trust, or even from a lovely gesture, may God lead their paths to do good or may exist enough means to do justice.

Abstract

There is little knowledge about informal power structures and how they have influenced corporate governance and organizational behavior in Latin America. Firms' directors tend to establish informal mechanisms for control and influence, creating ties with other firms by sitting on their boards. These corporate connections are called Interlocking Directorates (IDs). Trying to adapt with the environment and to changes, firms create IDs for different reasons. As a result, business agents develop unique national power structures. This study is focused on an extended literature review related to IDs, analyzing the structure of the Peruvian corporate network of IDs, and its evolution through four periods under analysis: 2000, 2005, 2010, and 2015. The sample includes 5,591 registers (board sits), 2,689 directors, and 298 different firms distributed over the four periods previously mentioned. The study uses centrality measures, UCINET 6.0, and NetDraw in order to analyze the main structure of the Peruvian corporate network and its participants' characteristics within. The study's main finding suggests the existence of an evolving Peruvian corporate network of large firms connected through IDs. In addition, the research results provide evidence that this Peruvian corporate network of IDs would be resilient to global economic crises, while being more sensitive to local political crises. Another important findings suggest that its participants changed their roles over time, and that the 1990s privatization process allows for a growing Peruvian business elite of directors. Finally, paths for further research are also proposed.

Key words: interlocks, directors, corporate network, business elite, board interlocks

Resumen

Hay poco conocimiento acerca de cómo las estructuras informales de poder han influenciado el gobierno corporativo y el comportamiento organizacional en América Latina. Los directores de las empresas tienden a establecer mecanismos informales de control e influencia, creando vínculos con otras empresas, formando parte de sus directorios. Estas conexiones corporativas se llaman *Interlocking Directorates* (IDs). Tratando de adaptarse al entorno y a los cambios, las empresas crean IDs por diferentes razones. Como resultado, los agentes de negocios desarrollan estructuras nacionales de poder únicas. Este estudio está enfocado en una extensa revisión de literatura de IDs, analizando la estructura de la red corporativa peruana de IDs y su evolución a través de cuatro períodos de análisis: 2000, 2005, 2010, y 2015. La muestra incluye 5,591 registros (sillas de directorio), 2,689 directores, y 298 empresas diferentes distribuidas en los cuatro períodos mencionados previamente. El estudio usa medidas de centralidad, UCINET 6.0, y NetDraw para analizar la estructura principal de la red corporativa peruana y sus participantes. Los hallazgos principales del estudio sugieren la existencia de una red corporativa peruana de grandes empresas en evolución, conectadas a través de IDs. Adicionalmente, los resultados de la investigación proveen evidencia que esta red corporativa peruana sería resiliente a las crisis económicas globales, mientras es también más sensitiva a las crisis políticas locales. Otros hallazgos importantes sugieren que sus participantes cambian de rol en el tiempo, y que el proceso de privatización iniciado en los años 90 permite el crecimiento de una élite de negocios peruana conformada por directores. Finalmente, se proponen caminos para futuras investigaciones.

Palabras clave: directores, red corporativa, élite de negocios, directorios entrelazados

Table of contents

List of tables

List of figures

Introduction

A long time could be spent looking for good decisions and social wealth, but people as well as organizations need other people and other organizations to dedicate to the task, creating huge collaborative structures. According to De Trazegnies (1992), it is necessary to study the social structures through the comprehension of human individual behavior, as well as achieving understanding of human decisions through the study of the social context that surrounds them. Similarly, organizations seek allies to deal with environmental constraints together, rather than deal with them by themselves (Barringer & Harrison, 2000). As any economic activity is actually embedded in social networks (Granovetter, 1985), we are able to take advantage of connectedness benefits, but we cannot escape from the collateral effects of the establishment of interorganizational relationships (Barringer & Harrison, 2000). The search to always do better includes embracing the good with the bad as well. Humans' quest for power and influence (Naím, 2015) could lead them into a huge complex systems of relationships that they are not able to completely understand yet, affecting organizational behavior as well as many people's lives.

Formal mechanisms for corporate governance have been extended and studied before in developed countries, as well as informal ones, such as Interlocking Directorates (IDs). We already know the capability of IDs to, among other benefits for board connected firms, deal with environmental uncertainty (Schoorman, Bazerman, & Atkin, 1981; Martin, Gözübüyük, & Becerra, 2015), attract strategic financial resources (Burt, 1980; Richardson, 1987; Mizruchi & Brewster Stearns, 1988), and to spread knowledge for a better decision-making process in other firms (Davis, 1996; Barringer & Harrison, 2000; Johansen & Pettersson, 2013; Ginesti, Sannino, & Drago, 2017). In addition, Pffefer and Salancik (2003) considered IDs as realiable conduits to obtain new resources from outside the organization. On the other hand, IDs were also related to directors' individual interests of influence and power (Zajac, 1988; Zajac & Westphal, 1996), the diffusion of practices that could be against owners' interests (Stuart & Yim, 2010; Chiu, Hong Teoh, & Tian, 2013), as a mechanism for power of governments and civil societies (Ma & DeDeo, 2018), as instruments to facilitate collusion and anticompetitive practices (Mizruchi, 1996; Barringer & Harrison, 2000), and so on. Therefore, the importance of IDs research relies on their

already proved capability to influence several organizations' decisions and their diffusion capacity through the corporate network. In addition to this, interlocks research highlights a deeper analysis of a traditional and strong form of managerial elite, emphasizing its collective action affected by social networks embeddedness (Granovetter, 1985; Davis, 1996) and shared responsibility, rather than just an individual director's perspective related to the attained position of power in the organization (Pettigrew, 1992; Hambrick, 2007). Moreover, IDs are conceived as boundaries between business decisions and the hierarchical system in a firm, being capable of exerting power and influence from one firm to another, and at the same time forging the foundations of a business elite (Carroll & Fennema, 2002; Naím, 2015). Since large firms have the power to establish strong influential relationships at different levels in the society with almost all their related stakeholders (Durand, 2018), IDs research extends its scope through the most important society's spheres, due to its multiple resources exposure and the diversity of its members who come from political, social and business arenas (Pettigrew, 1992), affecting firms' strategies and financing (Fonseka, Al Farooque, Rajapakse, & Tian, 2018), or giving first-hand information to aid CEOs, stock market investors, or other stakeholders' decisions (Nam & An, 2018). In the end, interorganizational relationships such as interlocking directors exist for several reasons (Barringer & Harrison, 2000), which include alliances, performance, firms' needs, business environment, social interests, and so forth. The approach to these motives highlights the importance of IDs research as well.

What we still do not completely know is how IDs behave in emerging economies, the influence of their turbulent business environment in these corporate structures, and the nature of their multiple effects on firms' performance and behavior. IDs literature focused on Latin America is scarce, and this research aims to add an empirical study to the scant existing body of research. The Latin American context has been the focus of vast research, due to its complex and turbulent environment for business activities (Vassolo, Castro, & Gomez-Mejia, 2011; Jäguer & Sathe, 2014). This region is characterized by a hierarchical capitalism (Schneider, 2013), where business groups (BGs) exhibit a different behavior from their counterparts in the rest of the world. Moreover, "familiness" in businesses have a predominant role in the economy (Durand, 2017), and foreign capital and multinational companies

(MNCs) challenge local policies (Dávila, 2013). Local institutions usually become a constraint for firms in emerging economies, when they have to face global competition and their list of choices for strategic decisions grows slimmer (Young, Tsai, Wang, Liu, & Ahlstrom, 2014). When primary institutions begin to fail, firms seek to adapt their strategies and operational decisions to the 'new rules' of the market, and prevail (Consejo Privado de Competitividad - Perú, 2019). So, reinforcing regulations and institutions in emerging markets is needed in order to prompt sustainable growth for firms (Clarke, 2015). Hence, IDs research is relevant in emerging economies, because they provide a very different operational context that could serve to confront the IDs' methodologies largerly studied in the U.S. (Pettigrew, 1992). Moreover, these emerging markets are places where we know IDs represent an alternative instrument for firms to gain trust inside the business community, using this resource to overcome institutional weakness in the environment (Carroll & Fennema, 2002), or even boost their prestige by appointing directors from high-value firms (Rossoni, Aranha, & Mendes-Da-Silva, 2017). Furthermore, IDs operational advantages could certainly be undermined by the lack of proper institutional and local market conditions (Su & Liu, 2018), or could be challenged by huge global events at macro and micro levels, such as financial crises, since corporate governance failures depend mostly on these elite's decisions (Van Veen, 2018). Finally, a step forward on IDs research is to go through the structure analysis of the corporate network to understand the purpose of the network itself, and how these managerial elite's actors differ in behavior and background which is strongly related to firms' outcomes (Hambrick & Mason, 1984; Pettigrew, 1992). This research aims to solve the first step stated by Pettigrew (1992) with regard to having an overview of the entire Peruvian corporate network in order to do an analysis of its structure. After that, it also focused on analyzing its evolution over a 15-year period, considering the environmental elements that could naturally affect the composition of the Peruvian corporate network of interlocking directorates and the behavior of the actors who participate within.

Peru was one of the best Latin American region performers from 2002 to 2013, exhibiting nearly 6% growth of GDP. However, since 2014 its economic performance has decreased to 2%. The decade of the "Peruvian miracle" results in a temporary illusion, supported by a primary-product economy, strongly dependent of external situations (Justo, 2016, April 4). Poverty in the country was reduced and Peruvian

macroeconomic structure is ranked as number one; nevertheless, there is still a latent agenda to enhance competitiveness, which has to deal with infrastructure, informality, insecurity, employment, institutional weakness, technology and low productivity levels (Consejo Privado de Competitividad - Perú, 2019). These key challenges must be confronted in order to regain something previously promised, namely long-term economic growth. According to the Consejo Privado de Competitividad - Perú (2019), institutions' performance and public policies are real constraints to Peruvian social development, so both undermine initiatives related to open market and investment promotion, which would lead the country to better levels of productivity.

As far as the literature review allowed, there are few studies related to network structures using Peruvian firms' data, nor Peruvian business elite's studies. One study found focused on large firms, where Cárdenas (2015) used a sample size of 300 corporations (12 were Peruvian large firms) to identify possible transnational connections through interlocked boards. He concluded that there is weak connectivity levels in Latin America through board interlocks. In addition, Cárdenas (2016) made a comparison among the IDs networks of four Latin American countries: Mexico, Chile, Peru and Brazil; but the sample of Peru represented only 40 non-financial large firms and 10 financial large firms for 2012, with no possible evolution analysis of the country's corporate network. Durand (2019) mentioned IDs, among other informal or illegal instruments, as powerful devices with which firms coopt the State, such as happened in the corruption scandals of 2014 of Brazilian and Peruvian construction firms. Monsalve-Zanatti and Puerta Alarcón (2015) did a study of the changes of Peruvian corporate networks from 1944 to 1979, focusing on how business groups were connected and how some clusters started to form. In addition, they explained how directors inside the network changed their positions regarding eigenvector and betweenness degrees. Finally, another piece of research related to Peruvian firms' networks was developed by Wong, Parodi and Monsalve-Zanatti (2014) but it focused on medium-sized companies, using a case-study method and a qualitative research approach. They concluded that networks were useful to obtain financial resources as well as a competitive advantage.

Therefore, studying the structure of the corporate network of interlocking directorates in a country could reveal important information related to how firms are responding to the conditions of the business environment and market competition, as

well as how the local business elite behaveas. A network approach could be valuable to understand the dynamics in a country's economy (Takes & Heemskerk, 2016). Furthermore, this topic of research could shed light on how strategic resources are informally obtained by firms who are participating in this corporate structure and what type of resources are flowing through to it. Moreover, it could also reveal patterns about directors' behavior and interests in joining multiple boards, as a mechanism to gain experience and enforce the underlying objectives of an upper-class in the business community. Using 776 observations divided into four sets of data, including large firm boards' composition of non-financial and financial companies for 2000, 2005, 2010 and 2015, the present study aims to answer the following three research questions: (a) What is the situation regarding literature about IDs?, (b) What is the structure of IDs in Peru for 2000, 2005, 2010 and 2015?, and (c) How has the Peruvian business elite network structure of IDs evolved over time from 2000 to 2015 and how does the business environment affect its configuration? The long period of analysis selected permitted the evaluation of the stability of the corporate network over time and the understanding of interlocks' special features. Alongside these three research questions, the theoretical framework of the study sets two propositions. Research question number one is solved in the theoretical framework and summarized in the conclusions. Research questions number two and three are answered solving the two propositions that resulted from the literature review, and according to the findings of the research's fieldwork, after it was finished.

This research uses Social Networks Theory as a main framework for the study, focusing on the natural embeddedness of every business activity in a social context (Granovetter, 1985) and how these networks are conceived as reliable mechanisms for co-optation among organizations in the search for relational power and scarce resources (Granovetter, 1973; Burt, 1992; Pfeffer, 2010). Then the study focuses on a specific form of interorganizational relationship called interlocking directors, and uses Interlocking Directorates Theory to define its concept (Dooley, 1969; Boyd, 1990) and explain its main features (Mizruchi, 1996; Haunschild & Beckman, 1998; Davis, Yoo, & Baker, 2003; Shipilov, Greve, & Rowley, 2010; Fracassi & Tate, 2012). Then to understand the findings of the Peruvian IDs corporate networks, it will use the statements of the Resource Dependence Theory (Barney, 1991; Pfeffer & Salancik, 2003) and the Institutional Theory (Meyer & Rowan, 1977; DiMaggio &

Powell, 1983; Peng, Sun, Pinkham, & Chen, 2009). Both theories perform an overall analysis of the formation of this type of interorganizational relationships, and support an economic (Resource Dependence) as well a behavioral (Institutional) perspective (Barringer & Harrison, 2000) for the study.

The present study is organized in the following manner. The next section exhibits the theoretical framework related to the focus of the study, explaining the positioning literature of Social Networks, Resource Dependence Theory, Institutional Theory, and introducing the Interlocking Directorates (IDs) concept, following a categorization according to its outcomes for firms. The second chapter introduces a political, social and economic context for Peru from 2000 to 2015, as a Latin American country and member of different economic groups such as the Pacific Alliance, and the Asia-Pacific Economic Cooperation (APEC), dividing the information into three parts: (a) institutional background, (b) institutional environment, and (c) institutional arrangements. The third section describes the method and data applied in this research, explaining first the data characteristics and then the procedure of the analysis made. The fourth chapter focuses on the discussion of the results, describing the main findings in each period of analysis and then explaining how the Peruvian corporate network has changed over time and how these changes are related to business environment patterns in the country. The fifth section concludes the study, summarizing the results according to the three research questions previously proposed. Finally, the sixth section explains the limitations of the study and presents topics for further research.

Chapter 1. Theoretical framework

1.1. Social networks theory

Social networks have been the focus of vast research since the 1930s, starting with Karinthy's (1929) proposition of the theory of six degrees of separation between any individual around the world. This theory states that any node (individual) in a global network of people could reach another node using six connections or less. Based on this, Milgram (1967) stated some connectedness characteristics that a group of individuals has to comply with to be considered as a "Small World". Later, Travers and Milgram (1969) conducted an experiment by sending a package to a person choosen at random, without a name tag, just a profession, asking every intermediary person to send the package on again, as soon as they received it, to another person who they think may know the focal person. Their results corroborated Karinthy's theory, obtaining an average of five or six intermediaries needed to reach the focal person.

Going deeper into social networks analysis, Granovetter (1973) proposed that ties are different in nature and purpose. He argues that strong ties are related to obtaining support and trust and these are close ties (potentially family, for instance). On the other hand, he denominated weak ties as not so frequent ties (possibly friends), where the connection is focused on resources such as new information or knowledge, concluding that weak ties are more relevant than strong ones in professional or business relationships. For instance, direct ties (one-to-one connection) would have higher impact on firms' innovation process rathen than indirect ties (connection through an intermediary) (Ahuja, 2000). Breiger (1974) identified later the possibility of having two-mode networks rather than just one-mode ones, according to the matrices' correspondence of individuals, connected by common events. This happens in board interlocks when a director sits on two or more boards, connecting those firms, but at the same time connecting this director to other directors as well. In addition to this, Burt (1992) demonstrated that the absence of connectivity between nodes is also important. He called this phenomenon as the 'Structural Hole' and stated that its presence is related to non-redundant resources flowing through the network. However, Ahuja (2000) argued that increasing structural holes turn against firms' innovation outputs and constrain the development of trust. Hence, every economic activity is naturally embedded in social structures of

relationship networks (Granovetter, 1985) which are able to explain different organizational processes under a logic of exchanges within (Uzzi, 1997), for instance, having few ties among participants when they are seeking to exert power and influence on others, or presenting redundant ties when they feel the need of cooperate and develop trust in order to face a common external threat (Ahuja, 2000).

Finally, Newman (2002) showed how social network structures serve as reliable platforms for epidemic spreading processes. He demonstrated how diffusion processes can possibly occur through networks under a social contagion effect. In the same line of research, other studies demonstrated how this spreading effect of networks and inter-firm alliances have been delivering different outcomes for firms in areas such as knowledge transfer, strategic differentiation in the market, raw material for decision-making processes or higher levels of innovation (Mowery, Oxley, & Silvarmen, 1996; Hung, 2002; McDonald & Westphal, 2003; Schilling & Phelps, 2007). Later, Pfeffer (2010) argued that due to their attracting resources and social diffusion capabilities, social networks could turn into a reliable source of relational power that could make it possible for an organization to influence other participants' behavior in the network.

Social networks research has emphasized their operational capability for resources' distribution, structure's endurance, and diffusion properties; demonstrating also their performance as a mechanism to influence others through power and control patterns. However, social networks are constantly targeted by several context contingencies that could drive to changes on these networks' effects (Carnabuci & Diószegi, 2015). These characteristics of social networks are important for the development of the present study, which aims to understand the Peruvian corporate network structure of IDs, as an alternative instrument for corporate governance, in the hands of the business elite's participants.

1.2. Resource dependence theory

Wernerfelt (1984) highlighted the importance of identifying resources rather than just being aware of the products. Resources are on the frontline making production processes possible. Later, Barney (1991) explained that there are four types of resources as drivers to obtaining competitive advantages in the market: (a) valuable resources, (b) rare resources, (c) inimitable resources, and (d), resources that are difficult to replace. Resources can be developed or found inside the

organizations' structure (Wernerfelt, 1984; Barney, 1991); however, in other cases resources have to be found outside the organization's boundaries. Other firms' structures could be good places to look for them, because of the differences between firms' resource endowments (Wernerfelt, 1995).

Firms need resources for their survival and for economic growth. Moreover, specific resources such as reputation, trust or legitimation are considered as meta-resources, which have special importance for a firm's strategy due to their capacity to enable other resources in the organizations' structures (Aldrich & Fiol, 1994; Gao, Zuzul, Jones, & Khanna, 2017).

Resource dependency aims to reduce the uncertainty in the environment that firms have to deal with, but at the same time bring into a balance the firms' heterogeneity, allowing them to combine and share strategic resources (Carroll, 1993). Pffefer and Salancik (2003) focused on the Resource Dependence Theory, considering how firms are able to gain and manage valuable resources through the interaction with their business environments. According to Pfeffer and Salancik (2003), firms tend to depend on each other due to their resources' needs, and this forces them to establish several forms of organizational relationships that allow them cooptation processes within their contexts (Barringer & Harrison, 2000).

Firms hunt for valuable resources both inside as well as outside the organizations' boundaries, giving them access to an abundant new source of business advantages. The need for resources could shape organizational behavior when firms select others from different industries to connect with through IDs in order to take advantage of resources synergies derived from firms' diversity, and influence directors' decisions too when these executives decide on which other boards they want to sit. Both perspectives are convenient for this study in order to understand why Peruvian firms' boards are connected to others, and why some Peruvian directors have a presence in more than one board.

1.3. Institutional theory

Firms are outputs of society's molds. The values and customs of the society create a set of rules that organizations decide to follow, pursuing the required level of legitimacy to operate in that environment (Meyer & Rowan, 1977). Organizations tend to be a result of the expectations and norms of the surrounding society, which causes

them to fulfill requirements by deploying their economic activities in order to be accepted and recognized. Institutional Theory explains how firms are involved in this social experience, react to its influence, and look for its approval, in their natural search for better organizational outcomes (DiMaggio & Powell, 1983). Institutional pressures derive from many stakeholders' interests, forcing firms to adhere to them, and gaining legitimacy to deal with those forces (Henisz & Zelner, 2005). Even when firms could be aware of those institutional pressures, these are time contingent as well, which means institutional logics in an environment may change and evolve over time (Thornton & Ocasio, 1999), so historical events must be taken into consideration, as well as social structures and economic drivers. Hence, taking into consideration the context's characteristics, firms can perform better and follow their strategy, since it is not possible to extract a firm from its environment for research without dismissing relevant factors that mediate or moderate its decisions (Peng, Sun, Pinkham, & Chen, 2009). Moreover, institutional factors may promote or constrain organizational welfare according to the surrounding conditions when firms' decisions are made, including the strategic decision of creating IDs (Caiazza, Cannella Jr, Phan & Simoni, 2019). Consecuently, firms' IDs have to be analyzed under their own institutional context, such as the local corporate government rules (Caiazza & Simoni, 2015). Finally, Oliver (1997) emphasized that both institutional management and resource management are important for firms, where resources deliver capital as assests and knowledge, and the institutional perspective delivers capital as managerial practices and culture.

If the local context serves as a mold for firms, then exploring political, social and economic changes that take place in a country is extremely important to understanding how these organizations react to the pressure of the environment and what decisions they make with the aim to fit within it. Therefore, this study presents those important Peruvian events that could have driven firms' behavior between 2000 and 2015, possibly pushing them into the creation of IDs, as well as the formation of a corporate network of director interlocks in the country.

1.4. The corporate networks of interlocking directorates

Interlocking directorates (IDs) occur when a director sits on two or more boards, connecting them through the firms' board meetings (Dooley, 1969; Mizruchi, 1996), operating as an informal mechanism for corporate governance and serving as

conduits that allow the transmission of managerial practices and various resources from one firm to another (Burt, 1980). Directors who are connected through firms' boards are conceived as agents in charge of diffusion and distribution processes between firms inside the corporate network. A direct interlock is formed when two firms are connected through one director who sits on both boards, and an indirect interlock when two other firms are connected through a third company where there is a board on which two of their directors sit (Schoorman et al., 1981; Burt, 1983). In addition, directional interlocks arise when the director is affiliated with one of the interlocked firms, and non-directional interlocks appear when the director does not have affiliation with either of both firms involved (Palmer, 1983). Figure 1 can explain the IDs dynamics for a group of firms: B1, B2, B3 and B4. It exhibits a direct and non-directional interlock between firms B1 and B4, which are board interlocked by director B, who does not have any affiliation with B1 or with B4. An indirect interlock is created between companies B3 and B4, which are related through the board meeting of the firm B1, where directors B and C have the opportunity to interact. B1 and B2 are linked together by director A, who constitutes a directional interlock because he or she is affiliated with company B2, a relationship which can be indentified by following the arrow from B2 to B1, implying that B2 appointed director A to be on the board of B1 for its own reasons.

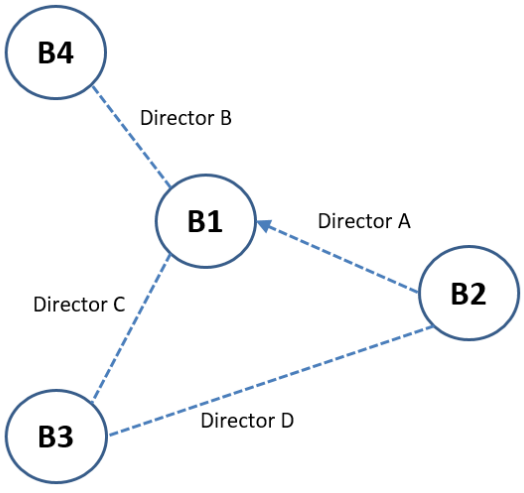

Figure 1. Interlocks network dynamics for firms B1, B2, B3 and B4.

Source: Own creation.

Another relevant characteristic of board interlocks are their duality. It means they function as a two-mode network (Breiger, 1974) where the presence of directors

in several boards creates a relationship among firms as well as a connection between the executives of those boards. Figure 2 explains how this duality effect creates two levels of corporate connectivity for interlocking directorates' networks, one between firms, and another between directors. Figure 2 shows how inside the board of company B1, directors A, B and C are connected, and shows another, director E, connected with them too. In addition, Figure 2 exhibits how directors B, E and C, who belong to B1's board, build a corporate network with directors D, F, and G, through their connection with director A, who acts as a relational agent in the corporate network of interlocked directors.

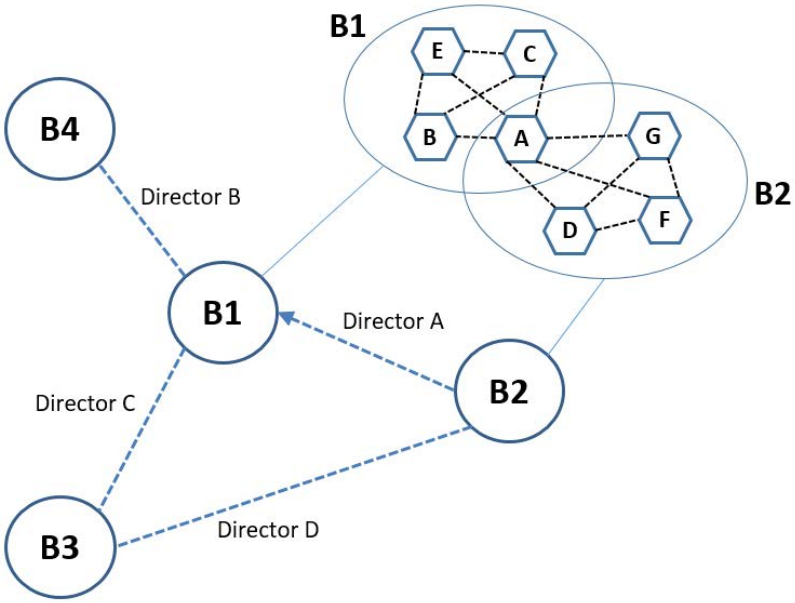

Figure 2. The duality of corporate networks of interlocking directorates.

Source: Own creation.

In addition, Dooley (1969) and Mizruchi (1996) explained that there are some specific reasons which could cause the creation of IDs, such as corporation size, managerial control interest, expected financial benefits, cooptation and monitoring, directors' individual interests, legitimacy and reputation, collusive behavior, and need for social cohesion. Later, David and Westerhuis (2014) specified that there are four main reasons for the existence of corporate networks: supplying for capital needs, being channels for communication and diffusion, attaining moral control, and gaining prestige in the business environment. Furthermore, board interlocked firms' outcomes may change according to the type and content of the interlock (Brennecke and Rank, 2017). According to Córdova (2018), IDs research could be categorized

under two main streams, in accordance with its principal findings: (a) Description of structures and (b) Organizational outcomes.

1.4.1. Description of structures

1.4.1.1. Boards composition and interests

Dooley (1969) highlighted the importance of the role of financial directors in influencing the corporate sphere and enhancing the connectivity between firms. Pfeffer (1972), who later explained how the composition of the board could serve the firm as a way to react and respond to conditions in the business environment, also noted this. In addition, Pfeffer (1972) emphasized that small deviations in board composition's decisions could lead the company to negative performance results. Moreover, the composition of the board and decisions related to whom to interlock with can be driven by powerful CEOs' individual interests to retain power (Zajac & Westphal, 1996). Different sectors in the economy could enhance the firm's awareness of the business environment. According to Moore, Sobieraj, Allen Whitt, Mayorova and Beaulieu (2002), the U.S.'s largest corporations share their directors with government agencies and some non-profit organizations. By the mid-90s, governmental and for-profit firms in the U.S. had major interlocks boards whereas non-profits had fewer interlocks, contrary to China, where there is evidence of a board interlock network of autonomous non-profit firms. Ma and Dedeo (2018) found this non-profit corporate network with no significant presence of government agents interesting due to the Chinese authoritarian regime. On the other hand, there are some specific boards' environmental characteristics that could enhance corporate ties presence. For instance, family ties in corporate networks and low voting rights structures in Chile facilitated the functions of interlocking directorates (Silva, Majluf, & Paredes, 2006). Conyon and Muldoon (2006) demonstrated another relevant discovery regarding the boards' composition and nature of interlocking. They found that directors who sit on many firms' boards tend to do this in companies where the other directors do the same, so well-connected directors prefer to join a board where other well-connected directors are sitting too. In addition, Khanna and Rivkin (2006) emphasized how the characteristics of the interlocks permit the defining of business group's boundaries, helping their identification inside the Chilean corporate network.

In this line of research, Useem (1980) identified board interlocks as a mechanism for cohesion utilized by the U.S. corporate elite through which they could

attain group power and control over the main economic decisions in the country as an upper society class. In addition, using large firms in the U.S., Zajac (1988) demonstrated that directors follow personal interests when they accept appointments in different companies' boards. Therefore, they use IDs as mechanisms for power, experience and individual career advancement, rather than just instruments to obtain information from the environment for the firms' objectives (Zajac and Westphal, 1996).

Individual interests can be part of group motives as well. A study of over 191 large firms in Singapore exhibited two types of board-interlocked directors. The first one tends to create board connections in the intra-industry sphere (firms in the same industry), leveraging their power and influence in the business community, but with neutral effect on the firms' performance. However, the second one creates IDs in the inter-industry landscape (firms in different industries), obtaining valuable and strategic resources for their firms and influencing positively on the firms' results (Phan, Lee and Lau, 2003). Hernández-Lara and Gonzales-Bustos (2019), in a study over 69 listed firms demonstrated a positive relation between innovation results and inter-industry board interlocks, confirming the latter. However, according to Simmons (2011), less than 3% of the firms would tend to establish interlocks with competitors (firms in the same industry), contradictory to Dooley's (1969) statements of nearly 13% of the firms doing this. Regarding the Latin American region, Cárdenas (2016) argued that there is no evidence of a common model for corporate governance through the establishment of IDs in Latin American countries. He found substantial differences among their IDs corporate networks, arguing that these differences are possibly due to specific group interests that firms could be after, as a business elite community (Useem, 1984), rather than management objectives, causing governments' inertia as there would been take as hostages by this corporate power (Durand, 2019). Similar findings were the result of the British corporate network study over the period 2003-2006. In this research, even when the interlocks network in Britain opened to the participation of new foreign executives, directors who belonged to the traditional ruling British class were still important in the network, staying related to the main actors through strong ties once they lost their centrality (Buck, 2018). A study of Chilean corporations revealed that even when the market has solved its institutional weaknesses, multinationals tend to maintain their corporate ties with

business groups, cohesing the market, rather than making it more competitive, and using their corporate connections to attain power and control (Bucheli, Salvaj, & Kim, 2019).

Considering the directionality of corporate ties, a network could confirm positions of power and influence for specific firm groups such as financial ones (Mizruchi & Bunting, 1981). Palmer (1983), in a sample of 1,131 American firms, found that just 8.9% of board ties were reconstituted once they were broken, revealing that formal coordination may not be a strong enough reason for firms to remain connected. He also stated that directional interlocks are more likely to act as enablers for formal coordination rather than other types of corporate ties. Because of that, directional interlocks are more likely to be reconstituted once interrupted (Palmer, Friedland, & Singh, 1986).

Despite what Mariolis and Jones (1982) argued regarding bank stability through time, a network structure can change over time as well as the role of its participants, but its connectivity properties remain steady. From 1982 to 1994, U.S. banks' centrality fell drastically. Banks were not central anymore, as non-financial firms appointed less bankers on their boards (Davis & Mizruchi, 1999). Marquis (2003) found the same from 1986 to 2000. Later, over a similar period of analysis, Davis, Yoo and Baker (2003) demonstrated how the U.S. corporate elite of large firms were resilient to the micro and macro changes in the corporate governance environment. They argued that even if you remove some central actors such as well-connected firms or well connected directors, the "Small World" properties of the network would endure. In another study of large firms in Spain, Salvaj and Ferraro (2005), found that banks in the Spanish corporate network changed their role over time, being first central at the beginning of 1990s, and then loosing their centrality by 2003, but not their importance. Firm centrality and firm prominence in the network do not always go hand in hand (Takes & Heemskerk, 2016). In addition, Spanish family firms are less central, and they were connected to the corporate network through few outside directors who decided to sit on both boards, non-family and family firms (Salvaj, Ferraro, & Tapies, 2008). The Spanish corporate network shows special connectivity properties known as "Small World" features, which mean it could act as a vehicle for the diffusion of managerial practices and information (Salvaj & Ferraro, 2005). This was similar to a previous finding of Kogut and Walker (2001), who

explained how a corporate network could be considered a “Small World”, due to its high-connectivity properties, even if it has a low-density level.

1.4.1.2. IDs network structural resilience

Later, Salvaj (2013) stated that the Chilean corporate network was resilient during 1969-2005 to the environmental changes such as new government regulations, the entry of multinational firms and the capital market development. Chilean firms played different roles across this period. Banks had a high degree of centrality and a high intermeditation centrality degree too. Then business groups and multinational occupied these positions in the Chilean corporate network. Kogut and Walker (2001) demonstrated the same, about how large German firms’ corporate networks resisted the effects of globalization and remain resilient to them. According to Salvaj (2013), it is possible to have a high centrality degree and low intermediation centrality (betweenness centrality) at the same time. In addition, by the early 1970s, the Argentinian corporate network had business groups instead of banks who were the central actors in the business community, establishing corporate ties with several firms, increasing the cohesiveness of the entire network structure. However, there were no businessmen who were the big linkers, but professionals, technicians or syndics were (Lluch, Salvaj, & Barbero, 2014). Hence, changes in the environment’s conditions or the natural evolution of the organizational fields could cause different responses from firms when they are dealing with corporate networks effects (Mizruchi, Brewster Stearns, & Marquis, 2006).

Another study of the Chilean IDs corporate network demonstrated its resilience to major political and economic changes in the country, where state-owned firms were central players in the network, facilitating board ties with several private business groups and making the network more cohesive (Salvaj & Couyoumdjian, 2015). The same happened in the Netherlands from 1903 to 2008, where the IDs network showed its resilience over time with banks in central positions (Westerhuis, 2014). The more recent research of Wilson, Buchnea and Tilba (2017) explained how banks changed their role inside the British IDs network and highlighted the emergence of a new type of financial institution, which was highly connected to several firms instead of traditional banks. After that, from 1976 to 2010, Buchnea, Tilba and Wilson (2018) identified a decrease in the participation of financial institutions in the British board interlock network, making it less dense as well. Something similar to this occurred in

Switzerland's IDs corporate network, which had high cohesiveness in 1910, with banks as central actors and bankers as big linkers, but then in 1980, the banks' centrality decreased, exhibiting a high rate for outside directors' participation in the network (Ginalski, David, & Mach, 2014).

IDs corporate networks can potentially have different structures due to the conditions of the business environment. Windolf (2009) found that the German IDs corporate network showed a higher density than the U.S. corporate network. The latter exhibited banks in a declining central position, while German banks increased their centrality and power. Windolf and Beyer (1996) identified German and British interlock networks working under a model of cooperative capitalism, both interlocked by personal and capital interests. Later, Windolf (2009) referred to the German network as a collaborative one, and to the U.S. as a competitive one, due to the effects that the antitrust law (U.S. Clayton act of 1914) had over the American corporate network configuration. Something similar happened to the British corporate network, which passed from coordinated capitalism in 1904 with strong ties among participants, to a competitive capitalism system in 2010 with a general decline of board interlocks (Schnyder & Wilson, 2014). Furthermore, Cárdenas (2015) tried to identify a new connected Latin American transnationality but he did not find the evidence for that, although these countries share what Schneider (2013) called a hierarchical capitalism. In fact, Cárdenas (2015) found that Latin American corporate networks were focused on national contexts rather than regional ones, concluding that they actually do business transactions together, but they are not integrated for management purposes. Not even big countries, such as Brazil, took the leadership on establishing a transnational IDs corporate network. These findings are contradict to Carroll and Fennema (2002) who posited a growing transnational business community connected through board interlocks, based on the growth of the national corporate networks as well.

On the other hand, sometimes IDs corporate network resilience may depend on several external factors. Carroll (2002) found that the Canadian board interlocks network exhibited major changes due to transnationalization of capital, changes in the regulation of the financial system and the introduction of reforms in the corporate governance rules. He demonstrated how the Canadian IDs network was a well-connected structure in 1976 and then progressively lost its connectivity to a

debilitated configuration in 1996, due to these three external phenomena. A similar study by Salvaj and Lluch (2014) exhibited an Argentinian corporate network of IDs under a progressive deconstruction process from 1923 to 2000, affected by several internal and external factors, where the corporate network never achieved proper levels of cohesiveness and by 2000 was almost uncapable of taking advantage of a business elite that was poorly connected. Moreover, since 1913 and until 1990, the Italian board interlocks network was more cohesive than the Argentinian one, with banks in a central position and syndics as key players due to their monitoring role over firms. To the contrary, Argentinian syndics have never been able to build a strong structure inside the corporate network because of the lack of trust in doing formal business transactions (Lluch, Rinaldi, Salvaj, & Vasta, 2019). Contrary to the general decreasing and destabilization of IDs corporate national networks, the Indian network is more cohesive over time, not due to a central position of financial institutions, but of business groups and big linkers, based on homophilic ties (Naudet & Dubost, 2017).

Finally, Kono, Palmer, Friedland and Zafonte (1998) argued that geographical proximity factors related to headquarters or production facilities are important to explain the formation of board interlocks, considering the presence of upper-class social institutions as fundamental players for this process. In addition to this, Baran and Wilson (2018) argued that firms which are geographically distant from dense-business cities could not take advantage of the benefits of being connected to the IDs corporate network if they did not appoint experienced directors from these dense-business cities. On the other hand, according to Marquis (2003), the board interlocks network structure could possibly change due to the effect of historical circumstances related to geographic influence. Those changes may influence a group or an individual inside the corporate network (Marquis, 2003). For instance, the financial global crisis of 2008 did not affect the stability of the transnational corporate network, nor even major flows through big financial firms (Van Veen, 2018). However, according to Van Veen (2018), at a micro level each firm could suffer different effects of a huge crisis, with marginal or isolated firms having to deal with internal board consequences, while better connected firms are able to transmit those effects to other firms and receive the same effects from others in the network. This finding supports Salvaj's (2013) previous statement about how the Chilean corporate network

maintained its structure after the economic crisis of 1982, but its participants changed their roles. Fattobene, Caiffa and Di Carlo (2018), who argued that the Italian IDs corporate network decreased its board connections, gave another point of view of the consequences of the 2008 crisis. The networks' diameter decreased, and peripheral firms lost their few ties. However, the cumulation ratio was high due to a small number of big linkers, which were the directors sited on several boards (Fattobene et al., 2018). In addition, Bennett (2013) explained how firms could establish IDs with several types of organizations over time according to their specific needs in different moments.

To summarize the literature review so far, IDs corporate networks are likely to change their internal structures over time as well as the role of their participants inside the network. These changes may be due to business environment factors or new regulations from the local government. However, despite the changes that external factors could lead to, the connectivity of board interlocks networks could keep their main characteristics. There are exceptions to this where some corporate communities were extremely susceptible to the effects of antitrust laws or major changes in the business context. In spite of these exceptions, most corporate networks reflect resilience to those effects, even when their players change their roles many times, such as financial firms, business groups, family firms, multinational companies or governmental institutions. Organizations' need for resources, the monitoring action over the market, personal or group interests, and so forth, derive in different appointments to boards in order to conduce firms' boards to a specific composition. Moreover, well-connected directors or boards tend to seek relationships with other well-connected directors or boards, facilitating an upper-class business cohesion through the establishment of IDs that sometimes create an overlap of the requirements for firms' coordination, purposely selecting the ties that will be reconstituted or not broken afterwards. In addition to this, geographic proximity (of headquarters, main distribution centers and plants) and historical events (global scale crisis, legislature actions, and so on) are also related to the formation of IDs among firms, affecting appointments to boards and changing the structures of corporate networks over time. Finally, network structural changes and the roles that participants need to play across different moments lead to several results for firms. These

intended outcomes and the unintended ones too aim to acquire benefits for firms and for the individuals who are involved in corporate business relationships.

1.4.2. Organizational outcomes

IDs networks result in several possible outcomes for firms such as collusive behavior, cooptation for resources, and legitimacy, among others; and on the other hand, they embedded firms in a corporate control structure ruled by social networks standards (Mizruchi, 1996). Those outcomes are also affected by the institutional context where firms take the decision of IDs formation (Caiazza et al, 2019). Even when firms have intended purposes for establishing interlocks, they cannot escape from the collateral consequences of having them, which turn into unintended outcomes, generated by the social experience inside the corporate network and institutional local factors.

1.4.2.1. Dealing with uncertainty

IDs were considered informal mechanisms for corporate governance that are capable of assisting firms which have to deal with uncertainty in the business environment (Schoorman et al., 1981), increasing their corporate connectivity in order to acquire several resources that organizations may need (Pfeffer, 1972; Boyd, 1990) to enhance their performance and overcome local institutional weakness (Musacchio & Read, 2007). Martin et al. (2015) demonstrated, using a sample of large manufacturing U.S firms, that interlocks could improve firms' performance if they operate under environments with high levels of uncertainty. In addition, Geletkanycz, Boyd and Finkelstein (2001), showed how 460 highly diversied firms in the U.S. tend to place a higher value on their executives who maintain more external directorate connections, being capable of bringing non-redundant information in order to tackle a business environment's constraints. Another study using 300 large U.S. companies found that firms tend to increase their board interlocks when they are facing market-specific uncertainty, rather than firm-specific uncertainty (Beckman, Haunschild, & Phillips, 2004). Furthermore, Musacchio and Read (2007) found that in 1909 Mexican firms relied on IDs to create a strong corporate network in order to overcome institutional constraints, while in Brazil firms do not need to do so because institutions created a stable business environment in the country. In addition, a study of Chilean firms from 1970, 1988, 1999 and 2010 argued that business groups tend to create IDs among themselves in order to face together the institutional voids in the business

environment (Bucheli et al., 2019). Moreover, environmental conditions such as marketization level or investment oportunities could push firms to take advantage of their central position and their already established IDs, in order to involve themselves in more risk-taking decisions (Su & Liu, 2018).

Board interlocks may matter more or less to a firm according to its size, its centrality in the network or whom they are connected to. Haunschild and Beckman (1998) found that large and central firms care less about establishing interlocks. In addition to this, they also found that interlocks with similar firms are more important than those with dissimilar companies. Board interlocked firms that are similar could drive collusory practices. However, according to Davis (1996), there were no U.S. firms interlocked with competitors in 1994. In addition to this, a study by Buch-Hansen (2014) including large companies in Europe found that there are few cases of collusion through direct or indirect interlocks, due to the regulatory environment and local trade conditions.

1.4.2.2. Sharing more than resources

IDs play as reliable bridges through which different resources flow from one firm to another, enabling conduits for information's circulation and transfer of practices (Rao & Sivakumar, 1999; Shropshire, 2010). However, firms and directors have different characteristics that facilitate or impede these diffusion processes through the corporate network (Shropshire, 2010). Through IDs formation, firms are able to coopt for resources, sharing them inside an informal structure of corporate relationships (Mizruchi, 1996), being more likely to establish alliances such as joint ventures (Gulati & Westphal, 1999), and reinforcing their social capital as a business community of interrelated firms (Davis, 1996; Nam & An, 2018), such as happens with family-controlled firms (Lester & Cannella, 2006).

Information is one of those resources that firms obtain through the presence of board interlocks, and it becomes feasible to improve firms' decision-making processes by including it. Interlocks can positively influence acquisitions decisions (Haunschild & Beckman, 1998), as well as the presence of independent directors on the board, but these acquisitions tend to destroy firms' value and undermine the monitoring role of the board (Fracassi & Tate, 2012). To the contrary, Fuad and Sinah (2017) argued that the presence of IDs makes it less likely for business groups to make an early entry into M&A (Mergers and Acquisitions) transactions. The number

of IDs may result in a major load of information from external sources that result in the improvement of firms' key processes such as new product development (Mazzola, Perrone, & Kamuriwo, 2016) or private equity placements (Fonseka et al., 2018). Moreover, Cai and Sevilir (2012) conducted a study using a sample of 1,664 acquisition processes in the United States, arguing that direct interlocks favor the acquirer in M&A operations, creating information asymmetries that allow bargains and lower costs. Meanwhile, indirect interlocks tend to favor both acquirer and the target firm in M&A transactions, due to the involved firms' intention to enhance value from the financial operation. Firms' high corporate reporting quality is also achieved due to the information flow through IDs (Ginesti et al., 2017). In addition, private equity transactions are 42% more likely to be choosen if the firm has the presence of an interlocked director who already gained previous experience in this type of operation (Stuart & Yim, 2010), reinforcing the idea that a small group of well-connected directors decide most of the firms' important decisions. The same happens in auditor choices: using interlocked directors' previous experience, firms select audit firms more rapidly and with better fees (Johansen & Pettersson, 2013).

IDs represent channels for the imitation of managerial and institutional practices, facilitating the adoption process through an organization to another (Shipilov et al., 2010) and the legitimation of some controversial practices as well (Davis, 1996). Khanna and Thomas (2009) found strong correlation among firms' stock price synchronicity, due to easy coordination through IDs. Similar finance policies such as capital investments, research and development strategies, cash reserve, and interest coverage ratio were found also between board interlocked firms (Fracassi, 2016). Furthermore, Chiu et al. (2013), using a sample of 118 U.S. firms, stated that a three-year period of exposure to a shared director is enough to increase the likelihood that a firm begins an earnings management practice. To the contrary, corporate links with non-manipulator firms reduces the probability of earnings management contagion. Another study found that corporate disclosure policies such as a quarterly earnings guidance process could be stopped due to the spread of the practice through IDs (Cai, Dhaliwal, Kim, & Pan, 2014). IDs are diffusion instruments for bad practices related to financial reporting and financial frauds, and these turn worse when directors have equity stakes in their firms (Godigbe, Chui, & Liu, 2018) or firms are interlocked with companies that experienced financial fraud accusations

(Fich & Shivdasani, 2007; Kang, 2008). In addition, Bizjak, Lemmon and Whitby (2009) argued that option backdating practice is also transmitted through IDs corporate network, explaining almost one-third of the probability for its emergence.

Regarding owners' interests, social contagion through corporate networks involves negative practices too, such as poison pills or golden parachutes. Davis (1991) utilized a sample of 440 U.S. industrial firms to find that poison pill practice spreads through interlocks from one firm to another but is less likely in huge firms because their size already represents a strong barrier to dealing with possible hostile takeovers. Moreover, Davis and Greve (1997), using a similar sample, found that poison pills spread rapidly through IDs, while golden parachute practice diffuse rapidly through proximity factors such as neighborhood or social clubs, but in both cases firms do not blindly imitate these practices, instead choosing which fits best into their strategy and objectives. Regarding the latter, further research with findings against blind imitation procedure is the study of Westphal, Seidel and Stewart (2001), who found that using the spread capability of IDs firms tends to imitate the underlying propensity and internal processes, rather than just the strategy or policy, what they called second-order imitation.

1.4.2.3. Providing financial benefits

IDs play as useful monitoring devices too. Mizruchi and Brewster Stearns (1988), using a sample of large firms in the U.S., argued that non-financial firms tend to appoint financial directors when they are struggling for capital, and financial firms obtain benefits by appointing their executives into non-financial boards because they can take part of the most important decision-making processes in the company. Later, Mizruchi and Brewster Stearns (1994) stated that firms that include financial directors on their boards are more likely to apply for debts and credits from the financial system, because they have more information on how to use different financial intruments in the market to enhance their operations. In the end, according to Mizruchi et al. (2006), firms' financing decisions are historically contingent; hence, they can obtain different financial resources depending on the ongoing corporate network structure.

In this same line of research, Burt (1980) stated that firms tend to use a cooptive strategy that involved direct interlocks, indirect interlocks, ownership representatives and financial interlocked directors as well, which will result in better protection from unexepected market fluctuations. Richardson (1987) used a sample

of Canadian corporations to demonstrate that non-financial firms obtain major profits by establishing director ties with financial ones. The study of Kaiser (1998) has similar findings, where IDs between Chinese firms that belong to the same business group result in a positive relation with the firms' financial performance and major productivity levels. Andrikopoulos, Georgakopoulos, Merika, and Merikas (2019) found a positive effect of IDs on shipping companies' profitability as well as negative one on their agency costs. In addition, having a balanced number of outside directors (Pombo & Gutiérrez, 2011; Barroso-Castro, Villegas-Periñan & Casillas-Bueno, 2016; Bhuiyan & Roudaki, 2018) and a high degree of board interlocks (Pombo & Gutiérrez, 2011) increases firms' financial performance, while Rossoni et al. (2017) explained that is not the size of the corporate network nor even centrality degree, but how valuable the information and resources flowing through IDs are, in order to boost the Brazilian firms' market value. According to Silva, Majluf and Paredes (2006), firms' financial performance would increase by the presence of family ties and if the voting rights are low, due to a faster decision-making process. In addition, Larcker, So and Wang (2013) did research using 115,411 directors in the United States and they found that high future excess returns are positively related to the number of interlocks with well-connected boards. In the opposite way, firms connected through IDs with worse connected boards do not show high-expected returns. Takes and Heemskerk (2016), using a global sample of firms, found a positive correlation between prominence in the network and firms' revenue. Furthermore, return on assets performance is better for resource-constraint firms, which establish IDs with resources-rich firms. To the contrary, return on assets performance decreases for resource-rich firms that create board interlocks with resource-constrained ones (Zona, Gomez-Mejia, & Withers, 2018). These findings are contrary to what was found for Korean listed firms, where Nam and An (2018) showed that IDs network have a negative correlation with market value and financial performance.

Organizational relationships through IDs could result in several conflicts of interest, where negative practices such as collusion, price fixing, oligopoly structures and antitrust violations represent a missuse of the potential of board interlocks. Corporations joining non-profit or state-own firms could lead to financial and political interests, rather than social ones (Szalacha, 2011). Moreover, Bennett (2013) argued that IDs between different types of organizations, such as provincial banks and

chambers of commerce in the British Isles are giving additional non-declared services such as lobbying opportunities, networking events, commercial arbitrations and so on, that are specific and valuable resources for bank directors. Meanwhile, Ruigrok, Peck and Keller (2006) found that Swiss companies' high IDs centrality levels result in less directors' involvement in decision-making processes, even more so when they have interlocks with banks and firms in the same industry. Organizations may need to be close to the political faction, whether they strengthen government's perception about them, or they decide to embrace an overall monitoring role of the institutional environment. Same political decision-making processes between two firms tend to be driven by a board interlock between them (Mizruchi & Koening, 1991), supporting both the same candidates as well. In addition to this, Burris (2005) found that direct and indirect interlocks could be driven by an intended effort to achieve political cohesion, supporting specific presidential candidates in order to obtain resources that come from periods of political campaigns. In fact, social and political adherence is capable of delivering unusual resources for interlocked firms (Kaiser, 1998). In addition to this, Durand (2019) argued how IDs provide cohesion to the Latin American corporate elites, which used it to deploy several group initiatives oriented to achieve or retain power. Some of these initiatives include donations to political parties as a mechanism to ensure farming favors through regulations and political decisions over time, increasing the assymetries with local groups whom are not able to obtain these kind of advantages. Contrary to this, the Chinese non-profits' IDs network exhibited its autonomy by showing minor intervention from government institutions (Ma & DeDeo, 2018). Moreover, Fonseka et al. (2018) explained that directors interlocked with political connections could be detrimental to the expected monitoring function of their role. On the other hand, IDs could facilitate or constrain the adoption processes for environmental strategies. A study using 90 energy firms in the U.S. demonstrated that financial firms and fossil fuel ones are not likely to adopt environmental practices due to the presence of board interlocks (Ortiz de Mandojana, Aragón-Correa, Delgado-Ceballos, & Ferrón-Vílchez, 2012). Furthermore, Carroll, Graham, Lang, Yunker and McCartney (2018) found that large fossil fuel Canadian firms are board interlocked with different types of organizations from civil society such as universities, research institutions, government institutions, and so on, obtaining influence and information asymmetries that could be risky for the adoption of pro-environmental initiatives.

Finally, IDs literature related to organizational outcomes highlights how these corporate ties are capable of delivering several benefits for firms, including financial advantages, better monitoring landscape, process improvements, non-redundant information, and many other valuable resources that could assist organizations to deal with the business environment contraints and its market uncertainty, even more so in turbulent contexts such as Latin American economies. Even when IDs seem to be more important for some firms than for others (big ones, for instance), there is little evidence of collusory activities between them, emphasizing the proper working of antitrust laws in each market that they were implemented in. Furthermore, board interlocks serve as reliable conduits for the diffusion of information, knowledge, managerial practices, and many other strategic resources. These resources could lead companies to improve their internal decision-making processes, risk-taking management, and so forth. IDs are susceptible to becoming conduits for positive and negative managerial practices as well, such as financial fraud, information asymmetries, option backdates, among others. In order to attain power and influence in the business environment, firms utilize IDs corporate networks, which reinforce the group interests of an upper-class business elite and support it to increase its cohesion over time. In addition to this, the presence of IDs is positively related to firms' financial performance. Considering IDs could include many types of organizations such as state-owned firms, non-profit and companies from the private sector, outcomes could be related as well to several different decisions, from political interests or socially responsible actions to pro environmental strategies.

Regarding the theoretical framework developed, this study presents the following propositions:

- **Proposition 1.** This study expects to find the existence of a collaborative corporate network of interlocking directorates in Peru as a unique configuration of IDs, shaped by the characteristics and the evolution of the Peruvian business environment, and cohesive in order to coopt for different valuable resources and to face the constraints that the context's institutional voids cause.
- **Proposition 2.** This study expects to find changes at macro and micro levels in the structure of the Peruvian corporate network of IDs across the four periods of analysis, due to its adaptative behavior over time. Expected

changes at the macro level include fragmentation or cohesiveness of the entire Peruvian corporate network of IDs because of the economic and political crises during the period of analysis, and at the micro level the expected changes are related to participants' roles and how they are connected over time within the Peruvian corporate networks of IDs, explained by grouped firms into economic sectors such as financial, construction, insurances, agrarian, among others.

Chapter 2. The case of Peru 2000-2015

2.1. Institutional background

Through the years, rather than an absence of intervention, Peruvian government efforts were inefficient as well as insufficient to equally reach all provinces and regions of the country (Grompone & Tanaka, 2009), which was reflected in several social movements and protests from 1995 to 2006 (Degregori, 2004; Grompone & Tanaka, 2009). These claims find their roots in the growing gap between economic wealth and social content perceived by the population. According to Ganoza and Stiglich (2015), external reasons for the economic growth such as raw materials prices, international interest rates, the well-being of developed countries, among others, had no direct effect on what they call economic development. The latter consists in setting the institutional basis for long-term growth, opening the markets, but at the same time taking care of national productivity levels as well as the enforcement of political parties and their intervention in the Peruvian economic landscape (Degregori, 2004; Ganoza & Stiglich, 2015). However, the Peruvian business elite's attitudes toward economic development seemed mean or even careless, focusing their selffish efforts only on their economic growth expectations (Ganoza & Stiglich, 2015; Durand, 2018). Furthermore, this institutional weakness set the proper context for large organizations, the only actors capable to take advantage of the benefits generated by it, who tend to wield high levels of influence on the business environment because of their several social connections (Durand, 2018). This follows what Matos et al. (1969) stated many years ago, referring to Peruvian society as a result of a minority who held decisions, resources and power, and who lives together with a large isolated population who expects to receive what the elite procures for them.

Ganoza and Stiglich (2015) identified four different problems related to the institutional situation in the country. First, they developed an explanation about how informal entrepreneurship is conceived as an activity that the State has to assist, creating proper conditions for their survival and motivating them to formality adherence. Hence, informality subsists, as the Peruvian government is unable to create those conditions, even when several studies demonstrated that many informal entrepreneurs do not want to be formal. Second, several new political parties with passing behavior almost took control of the Peruvian political landscape in many

regions of the country, which followed their leaders' individual interests, rather than long-term oriented national goals. These makeshift political parties filled up government institutions with workers who did not fit the country's objectives, nor even shared its values. Third, national insecurity continuously drowns the population into a context of high uncertainty and fear, where the State took a role of spectator rather than the active player that it should be. Crime and insecurity are negative factors for private investors' expectations, while put under evidence the lack of power of the State too. Finally, there is a lack of trust towards the legistative political arm and the justice system, both of which usually have to manage the most important institutions that give the population a sense of equality, democracy, social well-being, and shared community.

The Peruvian decision to enhance economic growth regardless of the institutional situation in the country (Vergara, 2018) acted under the influence of external economies (Matos et al., 1969), importing a neo-liberal system for an unprepared context. By 1980, leader countries such as the United States and the United Kingdom diffused these economic systems around the world and regions such as Latin America adopted them, believing they would benefit the majority of the population (Durand, 2019). However, this economic model strengthened the local business elite composed by a few, what was actually the same as happened in those world's leaders (Useem, 1984), but for Latin America things got worse, resulting in wider inaqualities due to its lack of institutional readiness, and the asymmetry of economic power among local groups (Durand, 2019). Hence, the new century has presented two different periods for the Peruvian economy, a decade of high economic expansion and a four-year period with a slow rate of growth and several institutional problems to solve. Moreover, these issues are embedded in a global context characterized by advanced economies with aging populations, a deceleration in worldwide commerce, and a globally scaled progressive detriment of the educational level (Consejo Privado de Competitividad - Perú, 2019).

2.2. Institutional environment

Between 2002 and 2013, Peru appeared as one of the regional leaders, developing a high standard of economic growth with a GDP of nearly 6.1% per year. By the 2000s Peru came out of a previous ten-year period of the government of Alberto Fujimori, who embraced a strong privatization policy for the State in his first

presidential years, and by the end of them (2001) he was destituted by the parliament due to moral incapacity while he was already in Japan looking for political asylum, causing a huge political and social turmoil in the country and tentatively beginning the transitional presidency of Valetín Paniagua. The Peruvian economy had come from a period of high inflation rates, after the Asian and Brazilian 1997s economic crises that had affected firms, individuals, and the complete Peruvian financial system (Consejo Privado de Competitividad - Perú, 2019). However, the wave of privatization that started in the 1990s represented huge changes over how some MNCs and foreign BGs, as well as local ones, played different roles in the Peruvian economy. According to Instituto de Estudios Sindicales (2018), the most important BGs according to their number of workers in 2016 and their economic sectors of operation were: Intercorp (Rodríguez-Pastor Peruvian family), focused on finance, insurance, services, and education; Romero (Romero Peruvian family), focused on finance, insurance, foods and beverages, agrarian, textiles, fishing, energy, and transport and logistics; Falabella (Chile) focused on retail, houses and cleaning, shopping malls, and finance. Telefonica (Spain) focused on telecommunications; Breca (Brescia-Cafferata Peruvian Family) focused on mining, insurance, health, fishing, and finance; Matta-Exalmar (Matta Peruvian family) focused on fishing and agrarian; D&C (Dyer and Coriat Peruvian families) focused on agrarian, fishing, and construction; Cencosud (Chile) focused on retail and finance; Gloria (Rodríguez-Banda Peruvian family) focused on food and beverages, agrarian, construction, and transport and logistics; and GYM (Graña and Montero Peruvian families) focused on construction and services. Other important BGs such as Ikeda, Quicorp, Cervesur, AB Inveb, Unacem, Michell, and AJE, are focused on agrarian, health, textiles, foods and beverages, construction, textiles, and foods and beverages respectively. In adition to this, Durand (2017) emphasized the differences within Peruvian BGs, arguing how upper class membership and place of origin may set some relevant factors related to social distances between capital city BGs (Benavides: Buenaventura / Yanacocha, GYM, Breca, Ferreyros: Ferreycorp, Intercorp, and Romero) and BGs from emerging provinces (Gloria, AJE, D&C, Acuña: Universidad César Vallejo, Huancaruna: Altomayo, and Flores: Topitop). Not only was the beginning of this privatization process that enhanced Peruvian high growth, but an open market policy and a healthy macro-economic structure as well (Consejo Privado de Competitividad - Perú, 2019).

Even when Paniagua's government lasted only 8 months, he was the only president since the 2000s who included an institutional perspective into his purpose and mandate (Vergara, 2018). According to Vergara (2018), Paniagua embraced republican patterns such as democracy, institutions enforcement, constitution loyalty, government, citizens, and so on; meanwhile, other presidents emphasized neoliberal characteristics regarding economic growth, private investment, firms, open markets, and so forth. Hence, institutional weakness in Peru comes from the commitment to the neoliberal system but also from the abandonment of the republican perspective as well (Vergara, 2018). As a plant, which needs sun and water to grow healthy, a country needs strong institutions and economic growth; having one of them without the other results in a progressive detriment of the State and its citizens, and as a plant, finally it could dies. Despite this, the Peruvian State forged a path to development mostly focused on economic growth (Vergara, 2018).

The impact of those state alignments, a convenient worldwide environment and economic policies that created a stable low inflation scenario characterized this period. The poverty rate fell from 49.9% in 2004 to 26.1% in 2013, as well as the extreme poverty index in the same period descended from 28.4% to 11.4% (World Bank, 2018). A prior important milestone was the inclusion of Peru in the Asia-Pacific Economic Cooperation (APEC) group in 1998, whose main goal is to support sustainable growth and prosperity for countries of the Asia-Pacific region (2019a). APEC was founded in 1989 and by 1998, it included 21 new members such as Australia, Canada, Japan, the United States, China, Mexico, and Chile, among others (2019b). Before that, Peru joined the World Trade Organization (WTO) in 1995, and later became a member of the United Nations Security Council in 2006-2007 (Foreign Relationships Ministry of Peru, 2018), the latter as a meaningful representation for global peace under democratic processes (EFE, 1 de enero de 2018). Another main international initiative during this period was the establishment in 2011 of the Pacific Alliance economic group that includes four Latin American countries: Mexico, Chile, Colombia and Peru, whom together represent in the region almost 40% of the GDP, 52% of total commerce and 45% of direct foreign investment. Presently, the commercial activity of this group per year is about US$ 245,808 million (Alianza del Pacífico, 2018). Hence, the participation of Peru in these important and large economic groups represented an effort to insert the country's commercial activities

into a global scenario, providing new opportunities for growth through an international collaborative strategy.

Furthermore, Peru was the host for important global meetings such as the APEC and EU-LAC (European Union-Latin American and the Caribbean) in 2008, and ASPA (in English, South American and Arab Countries) in 2012. In 2013 it was host for the World Economic Forum on Latin America. Finally, Peru was also the host country of the COP 20 global summit on climate change in 2014 and for the International Monetary Fund and World Bank meeting (Foreign Relationships Ministry of Peru, 2018). Consequently, being the host for these globally relevant integration and economic forums allowed Peru to show itself as a strategic player for international business transactions and as a reliable partner for foreign investment interests.

The second phase came from 2014 to 2018 and was a period affected by an economic growth contraction due to generalized low commodity prices around the world. The one which specifically pushed Peru into a difficult economic performance was copper, the main product exported by the country, due to the drastic reduction in its international price. Therefore, during this four-year period Peruvian GDP growth was about 3.1% (World Bank, 2018). Another reason for the contraction of the economy was the hike of interest rates in 2013 by the Federal Reserve System on emerging markets, which tried to update these rates after the 2008-2009 crisis in the United States (Los Andes, 2015, December 3). According to Van Veen (2018), the international corporate elite structure remained resilient against this global crisis, just exhibiting internal changes at a firm level. Hence, it would be interesting to observe if Peruvian corporate networks followed the same resilient behavior. Despite the contraction in economic growth, Peru remains a country with a good performance in the region. One of the reasons for this is a stable currency, which has demonstrated having one of the lowest levels of volatility in Latin America from 2005 to 2017 (Foreign Relationships Ministry of Peru, 2018). Another reason is the continuous good performance exhibited by the mining sector, which by 2017 represented 30% of the direct foreign investment and 40% of total exports (Consejo Privado de Competitividad - Perú, 2019). However, according to the World Bank (2016a), the mining sector in Peru is constantly threatened by social conflicts with communities and environmental associations, which could put under risk some important mining projects and permanently challenge government negotiation skills.

According to the World Bank (2018), the Peruvian economy is very sensitive to external phenomena like commodity prices, especially those required by China, the main worldwide importer of Peruvian minerals. Since the main drivers for Peruvian productivity are associated with export industries, such as mining or agriculture, the economic performance would depend mostly on the world's performance (Consejo Privado de Competitividad - Perú, 2019). According to the Peruvian Ministry of Foreign Affairs (2018), the year 2015 was characterized by GDP growth headed by fishery, mining, electricity and gas, commerce, and agriculture. Its overall performance has also been negatively influenced by the impact of some natural disasters like the "El Niño Costero" climate phenomenon at the beginning of 2017, which severely affected the agriculture sector and caused the interruption of logistic services in the country's northern area (BBC Mundo, 2017, March 14). Another disaster was the 8.0 Richter scale earthquake of 2007 that caused huge damage to important logistic infrastructure like roads and transport terminals in the south of Peru, much of this still pending reconstruction, due to the corruption in the government and procedural inefficiency (RPP Noticias, 2017, August 17).

2.3. Institutional arrangements

At the beginning of the 1990s, after Alan García's first presidential period, the government had a presence in almost every economic sector and exerted control over the main industries, such as public services or energy for instance. From September 1990, Alberto Fujimori's government tried to boost privatization processes across any institution or organization that was being controlled inefficiently by the State. By means of the publication of legislative decree Nº 674, which permitted private investment in state-owned firms, and establishing a special commission for private investment promotion called COPRI (Comisión de Promoción de la Inversión Privada), which was in charge of designing and managing privatization processes, the private sector was able to participate in those economic sectors. The first big privatization process was the national telephone company sold to the Telefónica de España business group for about US$ 2 million. In 1998, COPRI was able also to promote concessions for public services and logistics infrastructure. Finally, in 2002 the government created Proinversión, which was an agency for private investment promotion, the same that was pointed out as favoring corporate individual interests later (Durand, 2018, p.240). Since 2006, this institution has been in charge of the

most relevant public-state associations of the country, focused mainly on the transport, electricity and water industries (World Bank, 2016b). Table 1 summarizes the privatization and concession processes from 1990 to 2015 (Gestión, 2015, April 8), period in which each subsequent government was conservative-democratic, providing an ideal business environment in the country to encourage the exponential growing of large firms' corporate power and influence (Durand, 2018).

Table 1

Privatization and concession processes made per presidential period 1990-2015

Period	Government	Quantity of projects	Total (US$ millions)
1990-2000	Alberto Fujimori	15	3,192.2
2000-2001	Valentin Paniagua	2	75.7
2001-2006	Alejandro Toledo	10	2,512.3
2006-2011	Alan García (2nd period)	38	7,855.2
2011-2015	Ollanta Humala	28	19,821.4
Total		93	33,457.4

Source: Adapted from diario Gestión (2015, April 8).

The World Bank (2016b) explained that the US$ 30 billion was oriented mainly towards projects related to transportation, energy and water. These public-state associations were facilitated after a new set of institutional proposals in the 1990s. Nevertheless, many of those infrastructure projects resulted in major benefit of just a few corporate actors, which held a multidimensional influence capacity over society's groups, such were the cases of Lima Metro Line, South Interoceanic Highway, and Olmos project, the three leaded by Odebrecht multinational company, currently under investigation due to practices of collusion and corruption (Durand, 2018).

According to the Consejo Privado de Competitividad - Perú (2019) among the most important institutional-oriented changes at the beginning of the 1990s were:

- Autonomy and independence of the Central Reserve Bank as well as the Intendancy of Bank Insurance and Fund Pension Administrators.
- Legislation focused on the protection of local and foreign investment.
- Tax benefits on investment.
- Tax reform oriented to make it simple and less expensive.
- Creation of pension and mutual funds systems.

- Legislation focused on facilitating advantages and proper conditions for public-state associations.

However, the World Bank (2016b) explained how many public-state associations were managed negatively from the government's perspective due to the high risk and high costs that need to be absorbed by the State, currently signifying an approximate 4.2% of the country's GDP in guarantees and contingent liabilities, favoring the private sector.

Moreover, another group of reforms oriented to achieve macro-economic stable conditions came at the end of 1990s (Consejo Privado de Competitividad - Perú, 2019):

- Implementation of an inflation control system as well as a new policy for stable currency.
- A new Responsible and Transparency Fiscal law.
- Regulation for banks' operational risk, based on global standards.

Furthermore, by the end of 2000 a specific legislation (legislative decree Nº 27360) was enacted to promote the agrarian economic sector (Asociación de Gremios Agrarios del Perú, 2018; Consejo Privado de Competitividad Perú, 2019), which was very important for the development of agro-export processes and giving labour benefits to workers in the fields. Nevertheless, Durand (2018) argued that some laws in Peru were enacted just to benefit a specific business elite composed by large firms who attain enough power to influence on the legislation procedures, such as the case of Odebrecht multinational company and other firms that belong to the construction sector.

On the other hand, in 2002 the official document regarding the Principles of Good Governance for Peruvian Societies was promulgated, based on the Principles for Societies' Governance issued by the OECD (Organisation for Economic Co-operation and Development) in 1999. This first Peruvian declaration for good practices of corporate governance considered shareholders rights, the role of interested groups, communication and information transparency and the board of director's responsibilities. Finally, in 2013 this official document updated its content and was turned into a Code of Good Corporate Governance for Peruvian Societies,

focused on five pillars: (a) Shareholders Rights, (b) Shareholders General Meeting, (c) Board of Directors and Top Management Team, (d) Risk and compliance, and (e) Information transparency (SMV, 2013). According to Rossoni et al. (2017), firms that take the decision to follow corporative governance practices could help to improve the corporate governance system in a country. Peruvian firms are structured into four different types of associations: (a) Anonymous Society, (b) Closed Anonymous Society, (c) Open Anonymous Society, and (d) Commercial Societies with Limited Responsibility; but having a board of directors is only an obligation for the first one. However, the main differences between them are about the number of owners allowed and whether they can participate in the stock market or not (Peruvian Ministry of Foreign Affairs, 2018). Due to this, many firms in Peru hold top positions in the market according to their gross sales, without having a board of directors.

An open market strategy was fundamental in order to commercially connect the country with its neighbors and the rest of the world too. According to the Peruvian Ministry of Foreign Affairs (2018), Peru has 45 international agreements, of which 26 are oriented towards foreign investment and 19 are aiming to facilitate free trade among countries. The free trade agreement signed with the United States in 2006 was the beginning of an accelerated process to other free trade agreements with China, Mexico, Canada, Chile, Japan, Panama, and Thailand, among others—a process that involved Peru in commercial commitments with countries that together represent more than 70% of global GDP (Consejo Privado de Competitividad Perú, 2019). Because of this international connection strategy and the investment factors explained before in this chapter, the Peruvian Ministry of Foreign Affairs (2018) identifies mining, finance, energy, construction, agrarian, fishing, transport and logistics, foods and beverages, and hospitality services as the primary economic sectors in the country, which had shown good performance over time.

Peru has set, as a goal for 2021, becoming part of the OECD. Together with Peruvian multinational firms and the main economic sectors in the country, it has to follow the agenda of: (a) identify barriers for growing and the country's development, (b) government and institutional improvement, (c) antitrust and transparency processes of the State, (d) human capital and productivity enhancement, and (e) sustainability improvements. According to the Peruvian Ministry of Foreign Affairs

(2018), the main gaps that Peru have to solve in order to be part of the OECD are institutions, infrastructure, higher education, technology, and innovation.

Chapter 3. Methods and data

3.1. Data description

The dataset for this research includes 5,591 registers of mandates (or board sits), held by 2,689 directors, in 298 firms' boards through four periods of analysis: 2000, 2005, 2010 and 2015, for the Peruvian corporate network of large firms. The period from 2000 to 2015 is interesting because it includes the potential to explain the reaction and consequences of the corporate network structure related to specific important events for Peru such as: (a) after the 1990s privatization strategy, (b) Asian and Brazilian 1997 economic crisis, (c) 2008 global financial crisis, (d) a period of increased and another of decreased GDP, and (e) the Pacific Alliance establishment (2011).

The present study follows a quantitative approach, based on data analysis composed by large firms in Peru. Firms were selected using data obtained from the Lima Stock Exchange (Bolsa de Valores de Lima-BVL), Superintendencia del Mercado de Valores (SMV) and Fondo Nacional de Financiamiento de la Actividad Empresarial del Estado (FONAFE) official websites. Available official annual reports from firms which are listed within the top 100 firms by gross sales in The TOP 10,000 Companies report were also used for periods 2010 and 2015. This 5-year period is relevant since in 2013 the current official document for societies was updated into the Code of Good Corporate Governance Practices for Peruvian Societies, including specifically a statement of risk and compliance. Hence, a larger sample would assist the study to have a better overview on how the Peruvian corporate network of IDs reacted towards this. Table 2 exhibits the composition of the sample by the number of firms included per period of analysis. As the study faces a two-mode network (Breiger, 1974), Table 3 shows the sample's composition by the number of directors included in the corporate network per each period. Considering that a director could occupy a mandate in a board holding a position (e.g. president) and also a mandate in another board holding a different one (e.g. vicepresident), Table 4 exhibits the total mandates available in the sample of firms.

Table 2

Firms in the sample per each period of analysis

Year	2000	2005	2010	2015
Firms	128	153	230	265

Source: Own elaboration.

Table 3

Directors in the sample per each period of analysis

Year	2000	2005	2010	2015
Directors	749	870	1157	1250

Source: Own elaboration.

Table 4

Mandates in the sample per each period of analysis

Year	2000	2005	2010	2015
Mandates	1016	1169	1638	1768

Source: Own elaboration.

A final database was organized and codified by year (period of analysis), director name, director gender, director board position, company name, company founding year, company owner, nationality of the controller and economic sector. According to this, the sample presents some specific characteristics that are explained as follows.

Table 5 shows the economic sector that each firm of the sample is related to. To identify this information the study followed the economic sectors proposed by Bolsa de Valores de Lima's (BVL) official web site and/or firms' official reports.

Table 5

Firms in the sample, by economic sector

Economic Sector	2000	2005	2010	2015
Agrarian	12	14	18	14
Automobile Parts	3	3	4	3
Construction	15	16	21	28
Energy	9	16	32	39
Financial	8	13	22	23
Financial Services	16	16	29	36
Fishing	1	2	5	4
Food and Beverages	5	6	6	7
Holding	1	1	1	1
House and Cleaning	4	4	4	4
Infrastructure, Transport and Logistics	4	8	12	13
Insurance	9	11	13	20
Mining	17	18	25	25
Packaging	1	1	1	2
Pension Fund Manager	2	3	3	4
Pharmaceutical and Health	1	1	1	3
Poultry Farming			1	1
Retail	1	3	8	11
Services	4	6	8	12
Technology	1	1	2	1
Telecommunications	4	1	3	3
Textile	7	6	6	5
Tourism	3	3	4	5
Weaponry			1	1
Total	128	153	230	265

Source: Own elaboration.

According to Table 5, most representative economic sectors in the sample are Mining (13.3%), Financial Services (12.5%), and Construction (11.7%) for 2000; Mining (11.7%), Energy (10.5%), Construction (10.5%), and Financial Services (10.5%) for 2005; Energy (13.9%), Financial Services (12.6%), and Mining (10.8%) for 2010; and finally Energy (14.7%), Financial Services (13.6%), and Construction (10.6%) for 2015. For this study, financial firms are just banks, while financial services firms are companies which provide some finance related services such as loans, financial assessment, financial consultancy, investment assessment, and so on. In addition, the only firm categorized as a Holding is Intergroup, which includes different economic activities such as Retail, Construction, Financial, Financial Services, Services, etc.

Table 6

Firms in the sample by nationality of the controller

Nationality of the controller	2000	2005	2010	2015
Bahamas	1	1	2	2
Belgium		1	1	1
Bermuda				1
Bolivia			1	1
Brazil	1		2	3
Canada			1	2
Cayman Islands		2	3	3
Chile	4	4	5	14
China				1
Colombia	1	1	6	5
Ecuador	1	1	1	2
France				1
Germany	1	1	2	4
Italy	1			
Japan	2	2	2	2
Mexico			1	2
Netherlands	1	2	2	1
Norway			1	
Panama	5	8	9	10
Peru	101	120	173	193
South Korea				1
Spain	2	2	4	4
Switzerland	2	2	3	2
United Kingdom	2	2	1	1
Uruguay		1	1	1
USA	3	2	7	6
Virgin Islands		1	2	2
TOTAL	128	153	230	265

Source: Own elaboration.

According to Table 6, the majority of the firms in the sample are controlled by Peruvian capital, representing more than 70% per each period of analysis. The nationality of the controller was obtained using the ownership structure included in the firms' official annual reports; who the major shareholder is determines the nationality of the company.

Table 7

Firms in the sample by type of ownership

Owner	2000	2005	2010	2015
Public	120	135	198	230
State	4	12	29	34
Mixed	4	6	3	1
TOTAL	128	153	230	265

Source: Own elaboration.

Table 7 exhibits the composition of the sample according to the type of ownership. Major ownership belongs to the private sector, representing more than 86% of the firms for each period. However, the presence of state-owned and mixed firms in the sample will allow the study to identify the possible relationship at board level between these types of ownership with the private sector, and also understand the role that these kinds of organizations play (Kaiser, 1998; Moore et al., 2002; Salvaj & Couyoumdjian, 2015; Carroll et al., 2018) within the Peruvian corporate network.

Table 8

Directors in the sample by gender

Director gender	2000	2005	2010	2015
Male	717	816	1065	1133
Female	32	54	92	117
Total	749	870	1157	1250

Source: Own elaboration.

Table 8 details the distribution of the directors in the sample by gender. This information will assist the study to understand the role of men and women directors in the Peruvian corporate network, relating their participation to the main network measures used in Social Network Analysis (SNA).

Table 9

Mandates in the sample by gender

Mandates	2000	2005	2010	2015
Male	983	1104	1525	1617
President	121	148	215	245
Vicepresident	80	82	104	114
Director	782	874	1206	1258
Female	33	65	113	151
President	1	1	5	12

Vicepresident	1	2	8	7
Director	31	62	100	132
Total	1016	1169	1638	1768

Source: Own elaboration.

Table 9 shows the distribution of the sample according to the type of mandate that is held by male or female directors per each period of analysis. This data will allow discussion of the mandate, even when participation of women in Peruvian boards is growing across time, as this increasing participation could be within the boards of less prominent firms or less important board positions from a corporate network perspective.

3.2. Analysis procedure

Using the data's characteristics, Social Network Analysis (SNA) proposed by De Nooy, Mrvar and Batagelj (2006), and UCINET 6.0 (Borgatti, Everett, & Freeman, 2002) software, this research obtained measures from the network structure such as network diameter, average distance, degree centrality, eigenvector centrality, betweenness centrality and density. Centrality patterns mean an impact on firms' behavior (Wasserman & Faust, 1994), as well as a position of power within the corporate network (Bonacich, 1972; Freeman, 1979). These measures were important to identify the main features of the Peruvian corporate network in each period of analysis and understand the corporate behavior of the interlocked firms. They were applied to the overall corporate network and to its main component as well.

First; the study separated financial and non-financial firms. Identifying the presence of financial firms is important due to the amount of literature focused on highlighting the organizations' need for financial resources and the motoring action expected from financial firms (Mizruchi & Brewster Stearns, 1988; 1994; Davis & Mizruchi, 1999; Salvaj & Ferraro, 2005; Windolf, 2009; Salvaj, 2013). In addition to this, the study determined the average size of the board (average number of directors per board) for each period. This information was summarized in Table 10 (see the Appendix A).

Second; Table 11 (see the Appendix B) exhibits the structural features of the Peruvian corporate network, looking at the resilience of the remaining firms from one period to the next, and calculating the marginal firms (firms with one connection) and

isolated firms (firms with no connection at all). Furthermore, it includes the number of firms inside the main component that is the largest group of connected firms through interlocks, and the number of total components in the network that refers to the number of subgroups linked by interlocks. Identifying and analyzing a network's main component and its subgroups reveals important aspects about its structure's cohesiveness or fragmentation (Salvaj & Lluch, 2014; Cárdenas, 2015; Naudet & Dubost, 2017).

Third; a number of lines or links were found in the overall corporate network structure, its main component and in its main component dichotomized also. The dichotomization process turns the main component into a structure represented as a binary combination of one and zero, where one means the existence of a connection and zero means it does not exist. In addition to this, the density of the overall network and its main component was found as well, which supports the study in exploring how much of the potential connections in the network actually exist as real connections. Density measures show how the network is taking advantage of the flow of resources that the participants could generate, and it is a measure of the level of connectedness between firms too (Kogut & Walker, 2001; Windolf, 2009; Wilson, Buchnea, & Tilba, 2017). Table 12 (see the Appendix C) shows the information about corporate ties and networks' density.

Fourth; Table 13 (see the Appendix D) shows the information related to networks' centrality measures that include diameter, distance, and degree, eigenvector and betweenness centralities. These measures aim to describe the main component, dichotomized; however, the study also explains in detail the measures of degree centrality, eigenvector centrality, and betweenness centrality for firms that exhibited the highest results in each period. Centrality measures assist network analysis in order to realize which firms occupy central positions of connectedness, influence, and central positions of intermediation, which also permit understanding of how resources are flowing within the network structure (Salvaj, Ferraro, & Tapies, 2008; Schnyder & Wilson, 2014; Westerhuis, 2014).

Finally, as a fifth step, the study describes the directors' presence in corporate networks, calculating the number of interlockers that include directors who have presence in two or more boards; and the number of big linkers, that is directors who held three or more mandates in the network. In addition to this, the study has

calculated the number of mandates that were held by both interlockers and big linkers for each period, in order to identify the evolution of director connectedness and how some specific actors played a different role inside the corporate structure (Conyon & Muldon, 2006; Salvaj & Lluch, 2012; Ginalski, David & Mach, 2014).

3.3. Describing SNA measures

Degree centrality measure aims to identify how many nodes could be linked to a focal node. For this study, as a two-mode network (Breiger, 1974), a firm or a director are nodes. Degree centrality is mathematically represented as follows:

$$d_i = \sum_j a_{ij}$$

In this representation, ‘a’ means a corporate tie between nodes (firms or directors) ‘i’ and ‘j’.

Eigenvector centrality measure captures the power and influence of a node (firm or director) over the network (Mintz & Schwartz, 1981). It calculates the score based on which other nodes (firms or directors) are connected to one focal node. This means that if a node is tied to other well-connected nodes, it will show a high score. On the contrary, if it is connected to marginal or isolated firms only, its score will decrease. Therefore, an eigenvector centrality will be proportional to the centralities of the nodes that it is directly related to. According to Bonacich (1987), eigenvector centrality could be represented as follows:

$$e_i = \lambda^{-1} \sum_j a_{ij} e_j$$

Where ‘a’ represents a corporate connection between nodes (firms or directors) ‘i’ and’j’, and ‘ei’ represents the eigenvector centrality of the node ‘i’. The ‘lambda’ symbol is a constant.

Betweenness centrality measure aims to calculate in how many of the shortest paths a node (firm or director) is present, as an intermediary through which communication and resources are flowing. The shortest path between two nodes is recognized as a geodesic path (Wasserman & Faust, 1994). Betweenness centrality then counts the number of these geodesic paths that include a specific focal node (firm or director in this case). Betweenness centrality is mathematically represented as follows:

$$b_k = \sum_{ij} g_{ikj} / g_{ij}$$

In this representation ‘gij’ is the counting for shortest paths from a node ‘i’ to a node ‘j’, and ‘gikj’ refers to the counting of shortest paths that include the ‘k’ node.

UCINET 6.0 (Borgatti et al., 2002) and NetDraw (Borgatti, 2002) softwares were used to represent interlock networks as graphs, including nodes (directors or firms) and ties (relationship created with the presence of a director in two or more boards) (Wasserman & Faust, 1994). The size of the nodes reflects the size of the board, and the thickness of the ties is related to the number of directors that two firms are sharing. Using graphs will enhance the understanding of the relationships’ patterns (Conyon & Muldon, 2006) as well as provide a useful overview of the Peruvian corporate network of IDs in each period, facilitating the comparison between the four periods under study.

Chapter 4. Discussion of the results

4.1. Peruvian corporate network evolution: 2000-2015

UCINET graphs exhibit how Peruvian IDs corporate network transit from 2000 to 2015, increasing the number of its isolated firms as well as the presence of big linkers, having a cohesive and resilient main component over time, and exhibiting a progressive higher number of elements (secondary components). Period 2005 shows slightly differences regarding this, presenting a pike on isolated firms (30%), and a decrease on firms within the main component (54.2%) and big linkers presence (5.8%) (see Table 11, and Table 14 on Appendix E). Furthermore, since 2010 it seems that a secondary component formed by seven firms (below in the 2010 and 2015 network graphs) is working independently from the main component of the corporate network, and intensively shared directors between these companies (see Figure 3). According to the comparison among the overall structure of the Peruvian corporate network of the four periods of analysis in Figure 3, this overall structure keeps its cohesion over time, exhibiting some particularities, but in the end, the main component gained size and cohesion from 2000 to 2015. This reflects how large firms were encouraged to participate in the IDs corporate network because of the creation of the institutions COPRI and Proinversión that promoted foreign investment and enhanced private-state associations as was explained before, prefering to collaborate and share resources between them, rather than work alone, reinforcing Musacchio and Read's (2007) statements about how firms tend to collaborate between themselves through board interlocks in order to confront the institutional weakness in the country (Consejo Privado de Competitividad - Perú, 2019). The latter results in the expansion and the progressive strengthen of the large firm in Peru, increasing their power and influence in the business environment as well as in other areas of society, supporting Durand (2019) statements. Period 2005 showed an exception to this, because the main component slightly decreased in this period while later, in 2010, it recovered its size. This reduction exhibited in 2005 was maybe due to the huge political turmoil after 2001 when Fujimori's presidential period ended with a big citizen mobilization demanding a change in government and consequent high levels of political uncertainty, which could mean that firms were less able to plan ahead how those changes would affect the rules of the business environment.

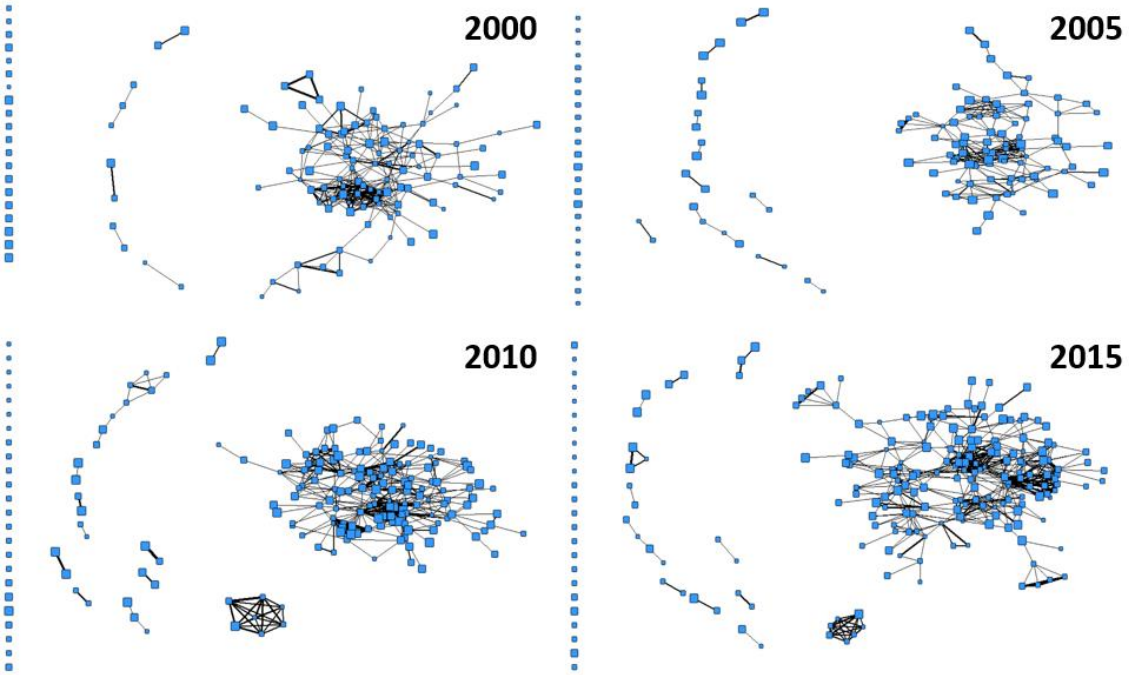

Figure 3. The structure of the Peruvian overall corporate network from 2000 to 2015

Source: Own elaboration.

The endurance of the overall structure of the Peruvian corporate network of IDs over time reflects factors that are more sensitive to political rather than economic motives. After the Asian and Brazilian crisis of 1997 that highly affected the Peruvian economy (Consejo Privado de Competitividad - Perú, 2019), the study had reasons to expect a fragmented board interlock corporate network (Marquis, 2003; Fattobene et al., 2018), but instead found a robust structure in 2000. The same could be expected for 2010, considering the global financial crisis of 2008 originated through the increased interest rates in the United States (Los Andes, 2015, December 3), yet the Peruvian corporate network structure remained cohesive. This discovery of the structure's resilience supports previous studies from Salvaj (2013) and Van Veen (2018).

According to Table 10, more firms remained resilient inside the Peruvian corporate network in 2005 (80.7%) than in 2010 (65.8%). A possible explanation for this lack of permanence in 2010 could be a renewal process of the participants in the network due to the globally higher interest rates of the financial crisis in the United States by 2008 and 2009 (Los Andes, 2015, December 3). However, in the next period of analysis, the percentage of firms that remain from 2010 to 2015 in the network seems to increase (76.0%). These findings are in accordance with Davis and

Mizruchi (1999), Marquis (2003), and Salvaj and Ferraro (2005), who demonstrated how corporate networks' participants could change, and at the same time maintain the networks' connectivity. Despite the globalization effects over countries' economic systems, or other external factors, corporate networks are capable of enduring, exhibiting their resilient feature over time (Kogut & Walker, 2001; Davis, Yoo, & Baker, 2003; Salvaj & Couyoumdjian, 2015).

Table 10 also exhibits how the total number of directors naturally increased through the four periods under analysis, due to the higher firms in the sample. Nevertheless, the average size of the board (number of directors appointed in a board) fell from 7.9 in 2000, to 6.7 in 2015. This finding means that even when the total number of directors increased over time, positively related to the sample size each year, the size of the boards actually reduced from 2000 to 2015. According to Table 11, the marginal and isolated firms' percentage (2005-2015) reduces while the percentage of firms inside the main component increases (2005-2015). Therefore, as a result, the Peruvian corporate network increased its cohesion from 2000 to 2015: it did this not by increasing the size of the boards, but by using a smaller number of mandates per firm and increasing the connectivity of the directors, which included more firms into the main component of the Peruvian corporate network. Table 14 emphasizes this finding, exhibiting how interlockers are almost the same by the end of 2015, but big linkers (directors who held more than three positions in the network) increased their presence over time.

In addition, Table 10 exhibits a decreasing board size for non-financial and financial firms as well. Non-financial firms had an average of 5.8 directors on their boards in 2000, and this number fell in 2015 to 4.7. The same happened for financial firms, which had an average of 11.7 in 2000 before the boards' average size decreased to 7.6 directors in 2015. However, financial firms were characterized by having a higher number of directors on their boards than non-financial ones, providing support to Mizruchi and Brewster Stearns (1994) regarding the importance of financial resources derived from directors sited on banks' boards. Table 11 shows that 53.8% of financial firms were present in 2005's main component, 40.9% were present in 2010's and 60.8% were present in 2015's, what implies that besides larger boards, financial firms had a relevant participation in the corporate network's main component over time. This finding follows the statements of Mizruchi and Brewster Stearns

(1988), Mizruchi and Brewster Stearns (1994), and Mizruchi et al. (2006), who explained how firms could obtain several benefits of information, monitoring activity, availability of financial instruments, and so on. Even more in 2000, 100% of the sample's financial firms were inside the main component.

According to Table 11, marginal firms tend to decrease over time. In 2000, 21.8% of the sample's firms were marginal, and in 2015 marginal firms were 13.2% of the sample. A similar decrease had the percentage of isolated firms from 30% in 2005 to 26.4% in 2015; however, 2000 shows only 15.6% of isolated firms, and at the same time, 75.8% of the firms were inside the main component that year. These findings support the decrease of connectivity that the Peruvian corporate network of IDs has suffered in 2005 due to political crisis in the country in 2001. Later on, from 2010 and 2015, the number of isolated firms slightly decreased and the number of firms in the main component recovered from 54.2% in 2005 to 61.1% in 2015.

Data exhibited in Table 11 remarks how the number of components increased from 6 components in 2000 to 13 components in 2015. This represents that progressively more firms tend to establish board interlocks even if those corporate ties do not connect them to the main component of the Peruvian IDs corporate network.

According to Table 12, the total number of lines (connections or ties) in the main component dichotomized, main component, and entire network for 2005 is also lower than 2000, 2010 and 2015. The total number of lines for the main component dichotomized exhibits how many connections are non-redundant between one node and another. In addition to this, a decrease of the Peruvian corporate network density over time means that the inclusion of new firms into the main component are more frequent than the formation of multiple IDs among them. In other words, most firms are connected to the main component through the presence of a small number of interlockers or big linkers, who provide cohesiveness to the network. These findings support Conyon and Muldoon (2006), Salvaj et al. (2008), Ginalski et al. (2014), and Naudet and Dubost (2017), who found several connections in the hands of a few well-connected directors.

The diameter of the Peruvian corporate network of interlocking directorates remains stable from 2000 to 2015 (see Table 13). This means that the shortest path between the two most distant nodes includes an average of 10 ties between them.

The average distance and the average degree measured also demonstrates the stability of the network's connectivity over time. These findings follow similar contributions of Davis and Mizruchi (1999), Kogut and Walker (2001), Marquis (2003), Davis et al. (2003), and Salvaj and Ferraro (2005). Nevertheless, degree centrality, eigenvector centrality and betweenness centrality measures show higher results for 2005, which was the period that was affected from the consequences of 2001's political turbulence in the country (see Table 13). These results mean that Peruvian firms, which remained as participants in the corporate network of IDs after the crisis, increased their number of interlocks (centrality degree), boosted their influence over the entire corporate network (eigenvector centrality), and finally increased their intermediation power (betweenness centrality) in a period of higher uncertainty in the business environment, even when the number of firms within the main component fell and the number of isolated firms in the overall corporate network increased. This cohesive behavior of the business elite ahead of environmental uncertainty supports the statements of Pfeffer (1972), Useem (1980), Boyd (1990), Beckman et al. (2004), and Bucheli et al. (2019).

According to Table 14, the number of interlockers increased from 19.7% in 2000 to 21.6% in 2015. In addition to this, the number of big linkers increased as well from 6.9% in 2000 to 8.7% in 2015. Both measures emphasize that the control and influence between large firms in the Peruvian corporate network lies with an increasingly small group of directors, which behaves cohesively against the context's uncertainty (DiMaggio & Powell, 1983; Henisz & Zelner, 2005), opens external channels to acquiere resources (Pfeffer & Salancik, 2003), and attains a strong influence over several factions in the society (Durand, 2019).

The percentage of mandates held by interlockers and big linkers increased over time as well. By 2015, mandates held by interlockers represented 44.6% of the total of available mandates in the corporate network. Furthermore, the number of mandates held by big linkers increased from 21.9% in 2000 to 26.4% in 2015. The interesting finding here is that by 2015, 21.6% of the directors occupied 44.6% of the total available mandates in the network (interlockers), and just 8.7% of the total directors held 26.4% of the total mandates (big linkers). Hence, a few people concentrated most of the flow of resources and power over the entire Peruvian

corporate network, supporting the findings of Zajac (1988), Conyon and Muldoon (2006), Stuart and Yim (2010), Ginalski et al. (2014), and Naudet and Dubost (2017).

4.2. Analysis of corporate network structure per period

4.2.1. Discussion for period 2000

The Peruvian overall corporate network in 2000 includes 128 firms for this study and according to Figure 4, it presents five elements (or groups of board connected firms) and one main component. It also has isolated firms (on the left column of Figure 4), which are firms with no connection at all with any other one inside the corporate network.

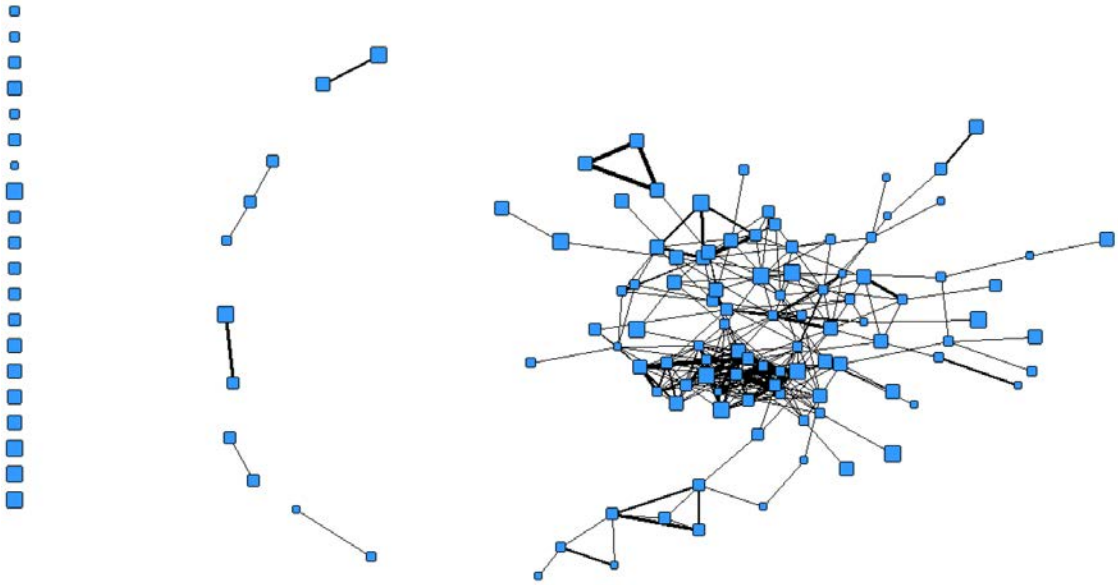

Figure 4. Peruvian corporate network in 2000 without company names

Source: Own elaboration.

Marginal firms in the network's periphery appear connected but have few directors between them and some of them remain connected to the main component due to the presence of an interlocker director (see Figure 4).

According to Figure 5, mining sector companies such as Santa Luisa, Perubar, Corona, and Southern are isolated firms. In addition, three firms that belong to the automobile economic sector are also isolated nodes (Goodyear, Etna and Lima Caucho). Five firms that belong to the financial services sector are isolated too, such as Cofide, Financiera Coordillera, Leasing Total, Mitsui-Masa Leasing, and Volvo Finance (see Figure 5).

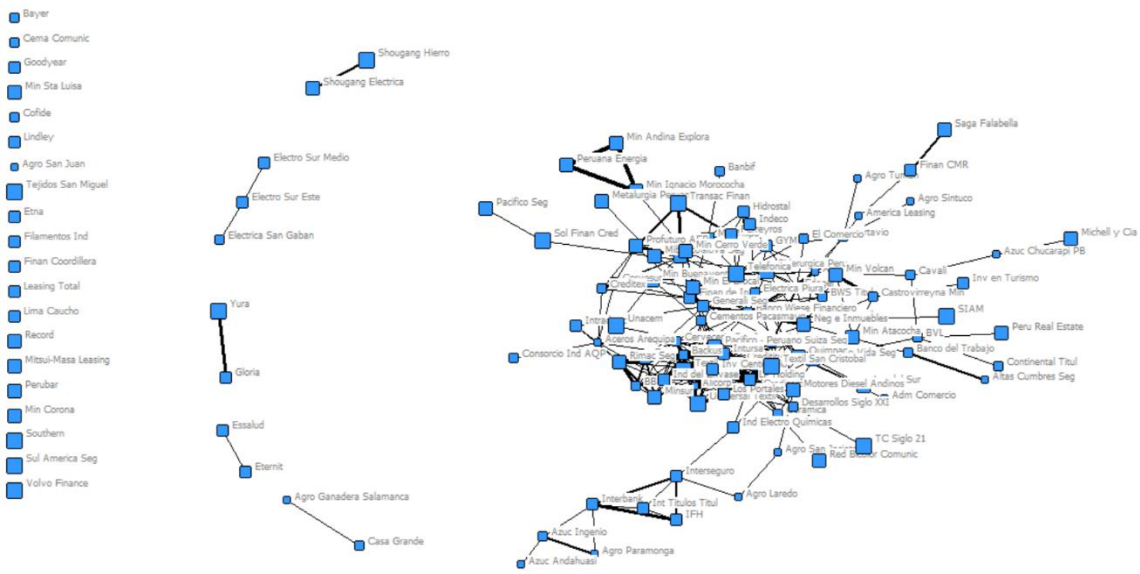

Figure 5. Peruvian corporate network in 2000 including company names

Source: Own elaboration.

Companies related to the energy sector (Electro Sur Medio, Electro Sur Este, Electrica San Gaban) appear as marginal firms, connected among themselves (see Figure 5). The same is true for Shougang Hierro with Shougang Electrica, Yura and Gloria, Essalud (state-owned firm) and Eternit, and Agro Ganadera Salamanca and Casa Grande (both agrarian). Financial firms (banks) are not isolated nor marginal in Peru's 2000 corporate network; they are all included in its main component.

Figure 6 exhibits the Peruvian corporate network's main component for 2000, where several marginal firms stayed connected to this main component through direct or indirect interlocks, due to the presence of few directors acting as interlockers. Furthermore, peripheral firms also used other companies as intermediaries to remain connected to the main component.

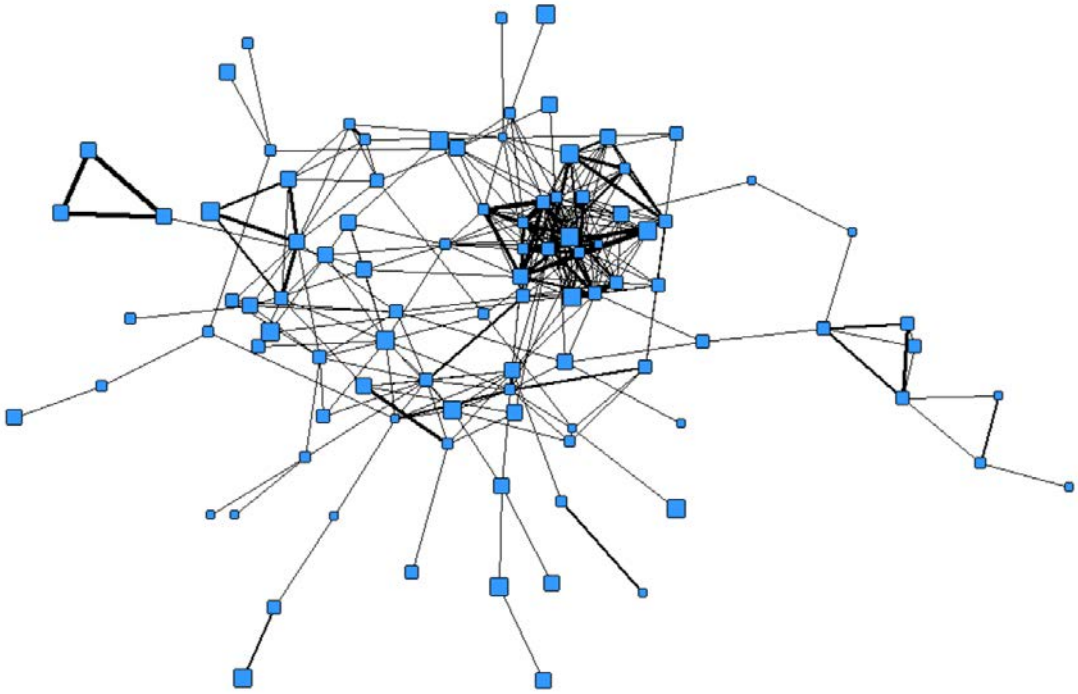

Figure 6. Peruvian main component in 2000 without company names

Source: Own elaboration.

Figure 7 shows company names in order to identify some patterns for connectedness. The main component's periphery includes agrarian firms such as Andahuasi, Ingenio, Paramonga, Tuman, Sintuco, Chucarapi, San Jacinto, and Laredo. Another characteristic of this periphery is the presence of mining firms (Castrovirreyna, Andina Exploraciones, and Ignacio Morococha), and the presence of banks (Banco del Trabajo, Mibanco, and Banbif).

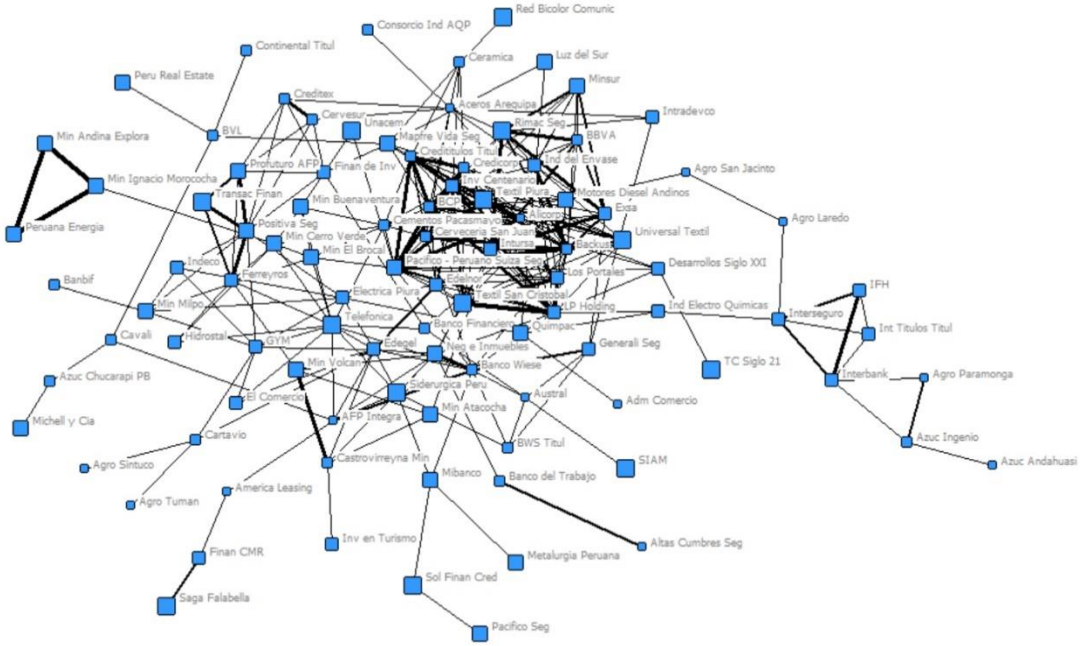

Figure 7. Peruvian main component in 2000 including company names

Source: Own elaboration.

On the other hand, following Figure 7, 2000's main component includes well-connected firms such as banks (BCP, and BBVA), food and beverages companies (Backus, Alicorp, and Cerveceria San Juan), insurance companies (Rimac, Mapfre Vida, and Pacifico - Peruano Suiza), construction firms (Cementos Pacasmayo, Aceros Arequipa, and Inversiones Centenario), textile firms (Textil Piura, Universal Textil, and Textil San Cristobal), and finally mining companies (Exsa, and Minsur).

Table 15 (see the Appendix F) shows the top 30 firms by their degree of centrality, which means the quantity of interlocks (connections) that a firm has. Inversiones Centenario (construction sector) was the firm with the highest degree of centrality in 2000's main component, with 54 connections or corporate ties. Financial firms represent 10% and the mining sector includes 13.3% of the firms, being the most representative of the economic sectors listed in Table 15. Most of the firms included in this list have Peruvian capital ownership (93.3%), just one of the thirty firms are partially state-owned, while all the rest are public ones, and the most recent firm (to the end of 2000) has three years of foundation (Credititulos Sociedad Titulizadora SA).

Table 16 (see the Appendix G) shows the top 30 firms by their centrality degree but using the main component dichotomized, which means that even when a firm has

multiple ties with another specific firm, these ties count as one. Inversiones Centenario was again the firm with the highest centrality degree in 2000's main component dichotomized, with connections to 23 firms. Financial firms again represent 10% and the construction sector has 16.6% of the firms, being the most representative of the economic sectors listed in Table 16. This finding demonstrated that even when there are more mining firms inside the top 30 by the main component's centrality degree in Table 15 (due to their number of board interlocks), there are more construction firms that have non-redundant corporate ties in Table 16. Burt (1992) discussed the same, when he proposed that connections with different nodes create "structural holes", which in turn generate non-redundant information availability, a highly valued outcome of corporate networks (Geletkanycz et al., 2001). Most of the firms included in this list have Peruvian capital ownership (96.6%), just two of the thirty firms are partially state-owned, while all the rest are public ones, and the three most recent firms (to the end of 2000) have two years of foundation (Cementos Pacasmayo, Motores Diesel Andinos, and Mapfre Peru Vida Seguros).

Table 17 (see the Appendix H) shows the top 30 firms by eigenvector centrality in 2000's main component of the Peruvian corporate network. Eigenvector centrality is a measure of the power and influence that a firm has over other firms in the network. Inversiones Centenario, which belongs to the construction sector, presents the highest eigenvector of 2000's main component. There are two financial firms on this list (6.6%), and there are six construction firms (20%) in it, which means construction is the sector that has more firms with high levels of power and influence in the main component. This finding corresponds to the use of social networks as realible mechanisms to attain relational power, which was studied by Pfeffer (2010). All but one firm belong to Peruvian capital ownership (96.6%), two firms have mixed capital between public and the state, and finally the three most recent firms (to the end of 2000) have two years of foundation (Cementos Pacasmayo, Motores Diesel Andinos, and Mapfre Peru Vida Seguros).

Table 18 (see the Appendix I) shows the top 30 firms by eigenvector centrality in 2000's main component dichotomized. Results could be different from Table 17 because when a firm is connected to other firms that hold many board interlocks, even repeating the nodes which they are tied to, it is able to exert power and influence repeatedly over the same firms (eigenvector in main component); while if the firm is

connected to another firm that holds many board interlocks, without repeating the nodes, then it is able to exert power and influence over different firms (eigenvector in main component dichotomized). Inversiones Centenario presents again the highest eigenvector for 2000's main component dichotomized. There are three financial firms on this list (10%), and there are six construction firms (20%) in it, and this positions construction as number one in the sector with more firms holding high levels of power and influence over many different firms in the main component. All but one firm belong to Peruvian capital ownership (96.6%), two firms have mixed capital between public and the state, and finally the three most recent founded firms (to the end of 2000) have two years of foundation (Cementos Pacasmayo, Motores Diesel Andinos, and Mapfre Peru Vida Seguros).

Table 19 (see the Appendix J) exhibits the top 30 companies by their betweenness centrality in the 2000's Peruvian corporate network of IDs. The betweenness centrality measure aims to identify the intermediation power holding by firms, using relational influence (Pfeffer, 2010), which represents how much a company serves as a way for others to connect among them. Banco Wiese Sudameris (bank) holds the first position in 2000's top 30 list, being the firm with the highest betweenness centrality. There are four financial firms (13.3%) and five construction companies (16.6%). All firms but two belong to Peruvian capital ownership, three have mixed ownership between public and the state, and the five most recent founded firms (to the end of 2000) have two years of foundation (Interseguro, Mibanco, Cementos Pacasmayo, Motores Diesel Andinos, and Mapfre Peru Vida Seguros).

Table 20 (see the Appendix K) exhibits the list of the top 30 directors by their centrality degree and betweenness centrality in 2000's main component. Both measures together aim to show how many connected directors are among them. Gonzalo de la Puente Wiese is the better-connected director for the 2000's main component, being in the first place in both measures. There is only one woman on the list, Susana de la Puente Wiese, who holds the position number 22 by centrality degree and a better position (number 7) by betweenness centrality (see Table 20). These findings are related to the statements of Conyon and Muldoon (2006), who explained how well-connected directors prefer to sit on boards among other well-connected directors. However, Zajac (1988) found that directors who accept several

board positions are looking out for individual interests rather than organizational ones. In addition to this, according to Useem (1980), directors use their relational power as a mechanism for cohesion of the business elite.

Table 21 (see the Appendix L) exhibits the list of the top 30 directors by their eigenvector centrality and the number of boards they belong to, in 2000's main component. Both measures together aim to show how much power and influence they have over other directors. Juan Francisco Raffo Novelli is the most powerful and influential director for 2000's main component, being in the first place by both measures. There is no evidence of women's presence for any of the two measures of 2000's list (see Table 21). According to certain authors, relational power gives directors the capacity to boost their social capital (Davis, 1996; Nam & An, 2018) influence in firms' decisions (Haunschild & Beckman, 1998; Fracassi & Tate, 2012; Fuad & Sinah, 2017), or assist in organizational improvements (Mazzola et al., 2016; Fonseka et al., 2018).

Finally, the prominent participation of agrarian firms in the Peruvian corporate network of IDs in 2000 would be probably due to the promotion of the agrarian activity through the legislative decree Nº 27360 by the end of 2000, as it was explained before. This finding supports Durand (2018), who explained how powerful corporate actors are capable to influence "about the fit" legislations for specific economic sectors, serving individual interests. It supports also what Bennett (2013) argued on how firms tend to create IDs with different types of organizations over time, according to their specific needs at different moments. In addition, in 2000 construction firms were the most powerful and influential, having the most of non-redundant ties, while banks exhibited the higher intermediation power. Moreover, Gonzalo de la Puente Wiese and Juan Francisco Novelli Raffo were the directors who had most of the connections and influence power respectively, both members of family BGs (Wiese Group and Raffo Group).

4.2.2. Discussion for period 2005

The study has 153 firms in the sample for 2005. Figure 8 shows that the number of elements grew to 12 (compared to 2000), including the main component of the network that remains cohesive. However, the connectivity properties of the entire corporate network suffered a decrease of big linkers' percentage (see Table 14), average degree (see Table 13) and percentage of firms in the main component

(see Table 11), and at the same time, the number of isolated firms increased (see Table 11), exhibiting the highest number of this type of firms among the four periods of analysis, resulting in a smaller and less connected corporate network in 2005 than in 2000.

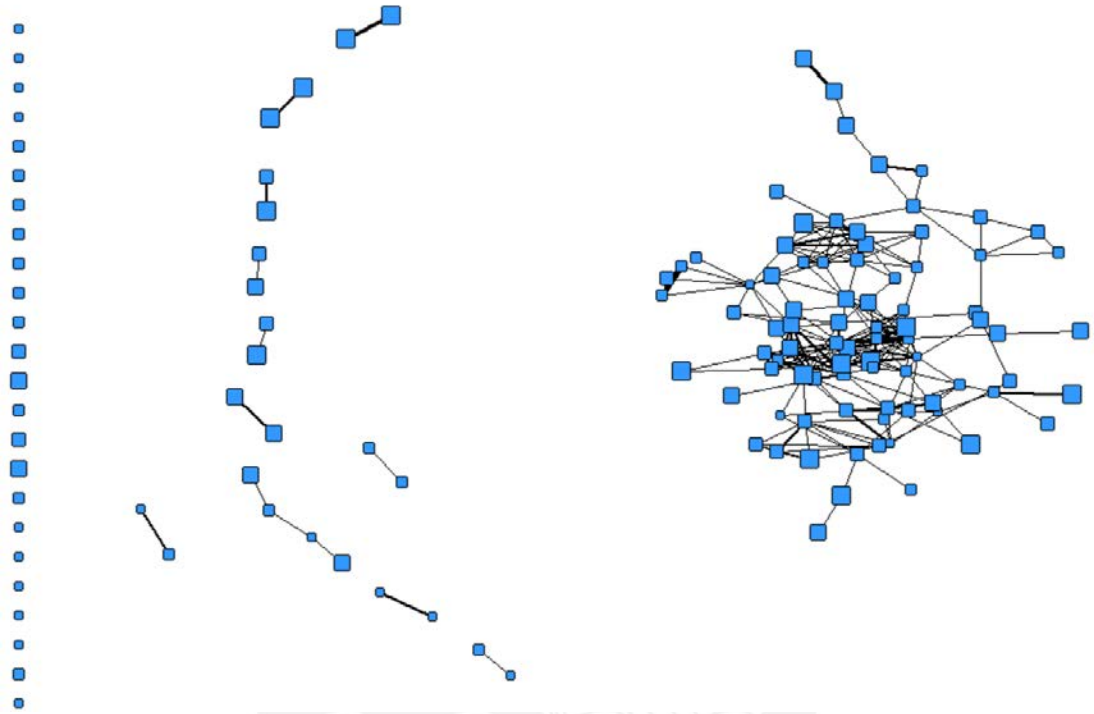

Figure 8. Peruvian corporate network in 2005 without company names

Source: Own elaboration.

Most of the elements besides the main component present groups of two firms. Furthermore, some other marginal firms latched on to the main component because of the presence of an interlocker director or one of the few big linkers left (see Figure 8).

Table 11 show that 2005's Peruvian IDs corporate network exhibits the highest percentage of isolated firms (30%) among the four periods of analysis. Following Figure 9, these isolated firms include seven agrarian companies (Laredo, San Jacinto, Andahuasi, Salamanca, Cayalti, Pomalca, and Tuman), five banks (Agropecuario, de Comercio, de la Nacion, Banbif and Citibank), three energy firms (Electro Sur Este, Ucayali, and Administracion Infraestructura Electrica), and one mining firm (Santa Luisa).

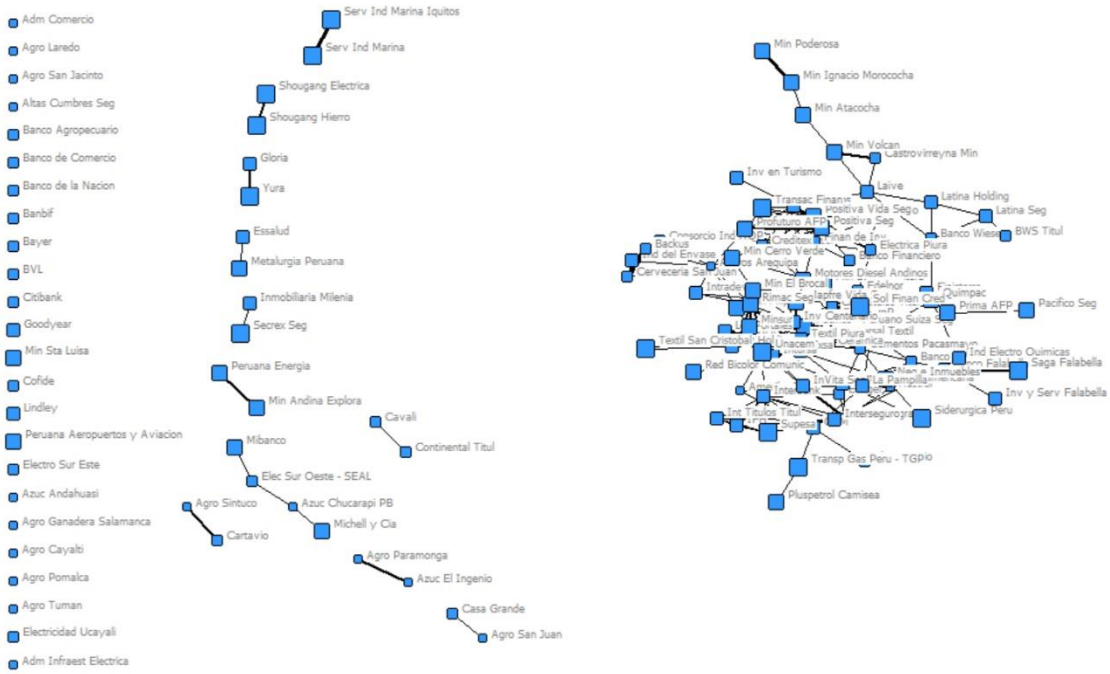

Figure 9. Peruvian corporate network in 2005 including company names

Source: Own elaboration.

Figure 9 shows that marginal firms outside the 2005's corporate network main component include seven agrarian firms (Sintuco, Cartavio, Chucarapi, Paramonga, El Ingenio, Casa Grande, and San Juan), three energy companies (Shougang, Peruana Energia, and SEAL), one bank (Mibanco), and one mining company (Andina Exploraciones). According to Figure 9, agrarian firms left the main component and banks lose their centrality in 2005 compared to 2000, exhibiting 14 agrarian firms and six banks as isolated or marginal firms. These banks represented 46% of the total of financial firms for 2005 (see Table 10).

Figure 10 shows 2005's main component as less concentrated than in 2000. The core of the main component appears to have split into two different parts which remain tied due to the interlocking behavior of nine directors, similar as in 2000's main component, there are firms who act as intermediaries to keep marginal firms connected (see Figure 10).

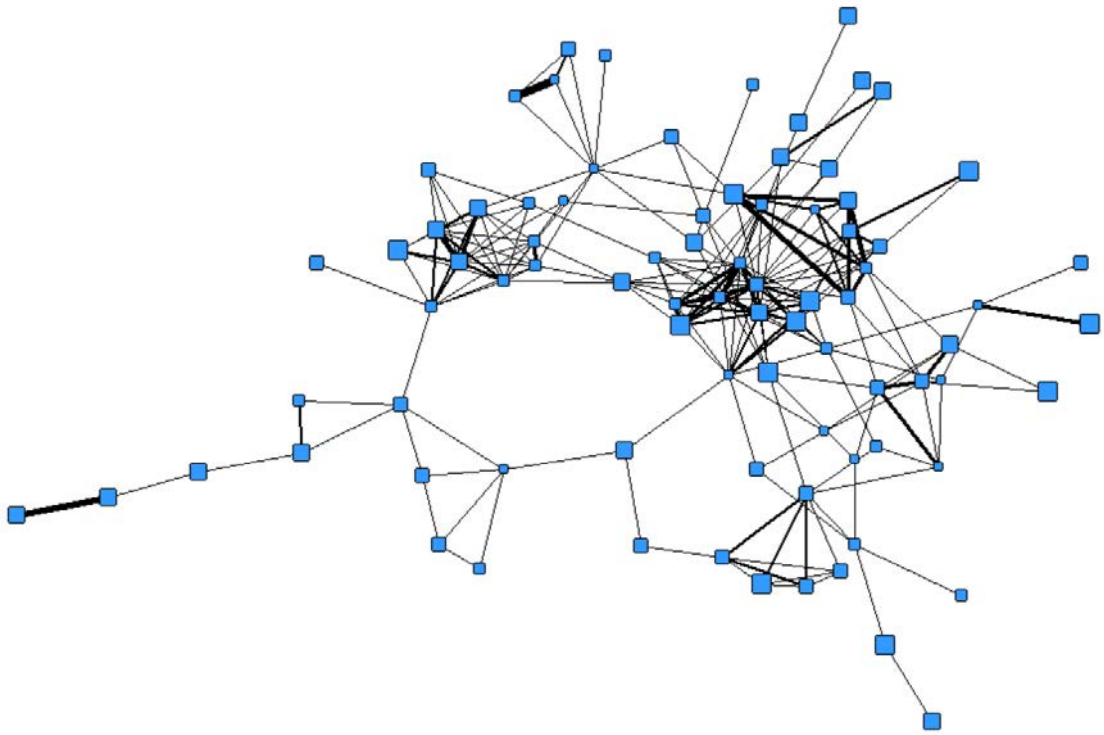

Figure 10. Peruvian main component in 2005 without company names

Source: Own elaboration.

According to Figure 11, the boundaries of the corporate network's main component for 2005 includes mining firms (Poderosa, Ignacio Morococha, Atacocha, Volcan, Castrovirreyna, and Cerro Verde), and energy companies (TGP, and Pluspetrol Camisea). Agrarian firms, which were in the main component's periphery in 2000, loose their already low centrality, leaving 2005's main component and turning into isolated firms (see Figure 9).

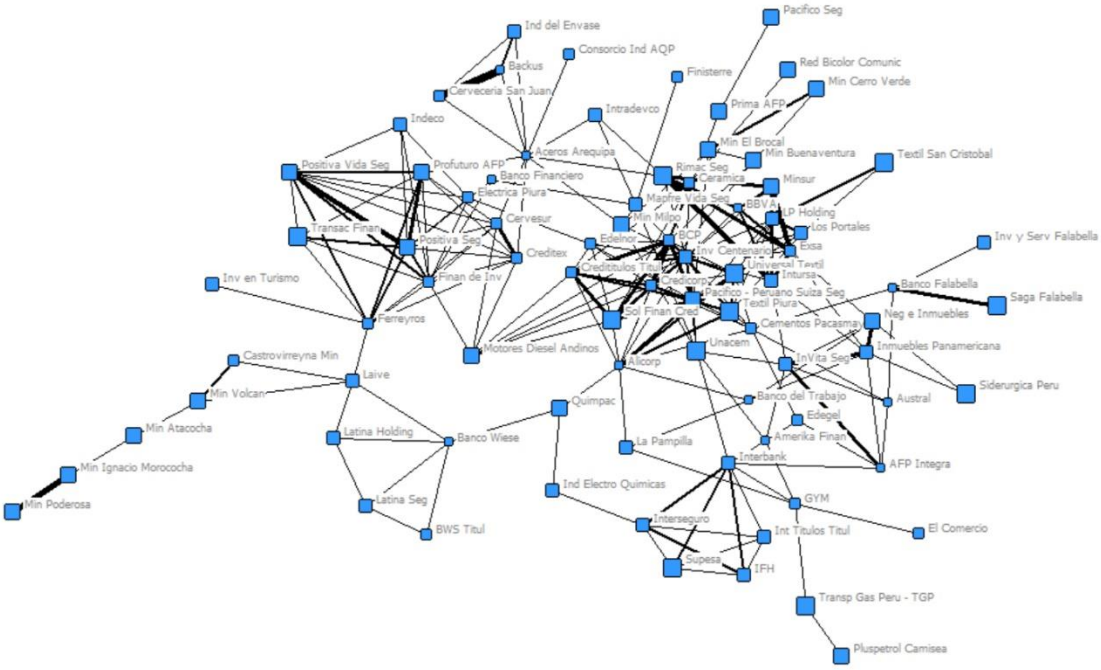

Figure 11. Peruvian main component in 2005 including company names

Source: Own elaboration.

In addition to this, Figure 11 shows that 2005's main component keeps in its core high-connected banks the BCP and BBVA. Regarding food and beverages firms, Alicorp remains close to the core; however, Backus lose their board interlocks (compared to 2000). The main component core for 2005 maintained the previous period's insurance firms (Rimac, Mapfre Vida, and Pacifico – Peruano Suiza), and showed new ones (Invita, Positiva, and Positiva Vida). Construction companies remain in a well-connected position in the main component (Cementos Pacasmayo, Aceros Arequipa, Inversiones Centenario, Cervesur, Unacem, and Ceramica). There are also textile firms in the core of the main component such as Textil Piura, Universal Textil, and Creditex. Finally, there are mining firms too that seems well connected in 2005's main component (Minsur, El Brocal, Exsa, and Milpo), see Figure 11.

Table 22 (see the Appendix M) shows the top 30 firms by their centrality degree for 2005's main component. Inversiones Centenario was the firm with the highest centrality degree in 2005 (same firm from 2000), with 42 interlocks (12 corporate ties less than in 2000). Financial firms represent 10% and the construction sector has 23.3% of the firms, being the most representative of the economic sectors listed in Table 22. Most of the firms included in this list have Peruvian capital ownership

(96.6%), there is no presence of any state-owned firm, and the most recent firm (to the end of 2005) has less than a year of foundation (La Positiva Vida Seguros).

Table 23 (see the Appendix N) shows the top 30 firms by their centrality degree but using the main component dichotomized of 2005. Inversiones Centenario was again the firm with the highest centrality degree in 2005's main component dichotomized, with connections to 22 different firms (just one less than the connections this firm had in 2000's main component). Financial firms represent 6.6% and the construction sector has 30% of the firms, being the most representative of the economic sectors listed in Table 23. This discovery explains how Peruvian firms preferred to establish board connections with construction firms rather than any other economic sector in this period. Most of the firms included in this list have Peruvian capital ownership (96.6%), just one of the thirty firms is partially state-owned, all the rest are public ones, and the most recent firm (to the end of 2005) has less than a year of foundation (La Positiva Vida Seguros).

Table 24 (see the Appendix O) shows the top 30 firms by eigenvector centrality in 2005's main component of the Peruvian corporate network. Banco de Credito del Peru (BCP), which belongs to the financial sector (banking), presents the highest eigenvector for 2005's main component. Inversiones Centenario (top performer for the same measure in 2000) holds the second place in 2005. There are three financial firms on this list (10%), and there are six construction firms (20%) in it, the same as in 2000's main component. All firms but two have Peruvian capital ownership (93.3%), one firm has mixed capital between public and the state, and finally the most recent firm (to the end of 2005) has less than a year of foundation (Prima AFP).

Table 25 (see the Appendix P) shows the top 30 firms by eigenvector centrality in 2005's main component dichotomized. Inversiones Centenario presents again the highest eigenvector for 2005's main component dichotomized, the same as in 2000. There are three financial firms on this list (10%), and there are again six construction firms (20%), meaning the construction sector has more firms with high levels of power and influence over many other different firms. All but three firms have Peruvian capital ownership (90%), one firm has mixed capital between public and the state, and finally the most recent firm (to the end of 2005 end) has less than a year of foundation (Prima AFP).

Table 26 (see the Appendix Q) exhibits the top 30 companies by their betweenness centrality in 2005's Peruvian corporate network. Inversiones Centenario (construction firm) holds the first position in 2005's top 30 list, being the firm with the highest betweenness centrality. Banco Wiese Sudameris, a top performer in 2000, fell to seventh position in 2005. There are four financial firms (13.3%), and eight firms that belong to the construction sector (26.6%). All firms but five have Peruvian capital ownership, just one has mixed ownership between public and the state, and the most recent firm (to the end of 2005) has five years of foundation (InVita Seguros).

Table 27 (see the Appendix R) exhibits the list of the top 30 directors by their centrality degree and betweenness centrality in 2005's main component. Dionisio Romero Paoletti is the director with the highest centrality degree, and Jesus Antonio Zamora Leon is the director with the highest intermediation centrality for 2005's main component. Susana de la Puente Wiese, the only woman that was in 2000's list, does not appear in 2005. Moreover, there is no evidence of women's presence in 2005's list (see Table 27).

Table 28 (see the Appendix S) exhibits the list of the top 30 directors by their eigenvector centrality and number of boards they belong to, in 2005's main component. Dionisio Romero Paoletti is the most powerful and influential director for 2005's main component, being in the first place by both measures. As with the previous period of analysis, there is no evidence of women's presence for any of the two measures of 2005's list (see Table 28).

Finally, agrarian companies lose their centrality from 2000 to 2005, as well as banks. In addition, Inversiones Centenario (construction sector), which was the top performer of 2000 regarding centrality degree, lose ties in 2005, but remained as the most central firm for the period. A possible reason for this reconfiguration of participants within the Peruvian corporate network of IDs could be the political crisis that the country faced by the beginning of 2001. This finding would support the role changing of the participants in the corporate network (Mariolis & Jones, 1982; Davis & Mizruchi, 1999; Marquis, 2003; Salvaj & Ferraro, 2005; Bennett, 2013) and time contingent interlocking with banks (Mizruchi et al, 2006) according to the conditions in the local context. BCP (bank) was the most influential (eigenvector centrality) firm according to the number of total ties, but Inversiones Centenario was the most

influential firm regarding non-redundant ties, as well as the the firm with the higher intermediation power. Moreover, Dionisio Romero Paoletti, the leader of the Romero Group (family BG), was the director who had the higher number of connections as well as the higher influential power. In addition, Jesus Antonio Zamora Leon, a business professional who holds an MBA from Columbia University, was the director who had the prominent intermeditation power in 2005.

4.2.3. Discussion for period 2010

In 2010, the Peruvian overall corporate network includes 230 large firms and shows more isolated firms than 2005. In addition to this, it exhibits 11 elements and a cohesive main component with more firms than previous years (see Figure 12). Those elements increased their shared directors among them (the connection line tends to be thicker) and one of them appears to work alone, sharing many directors within a group of seven firms (see below the main component in Figure 12).

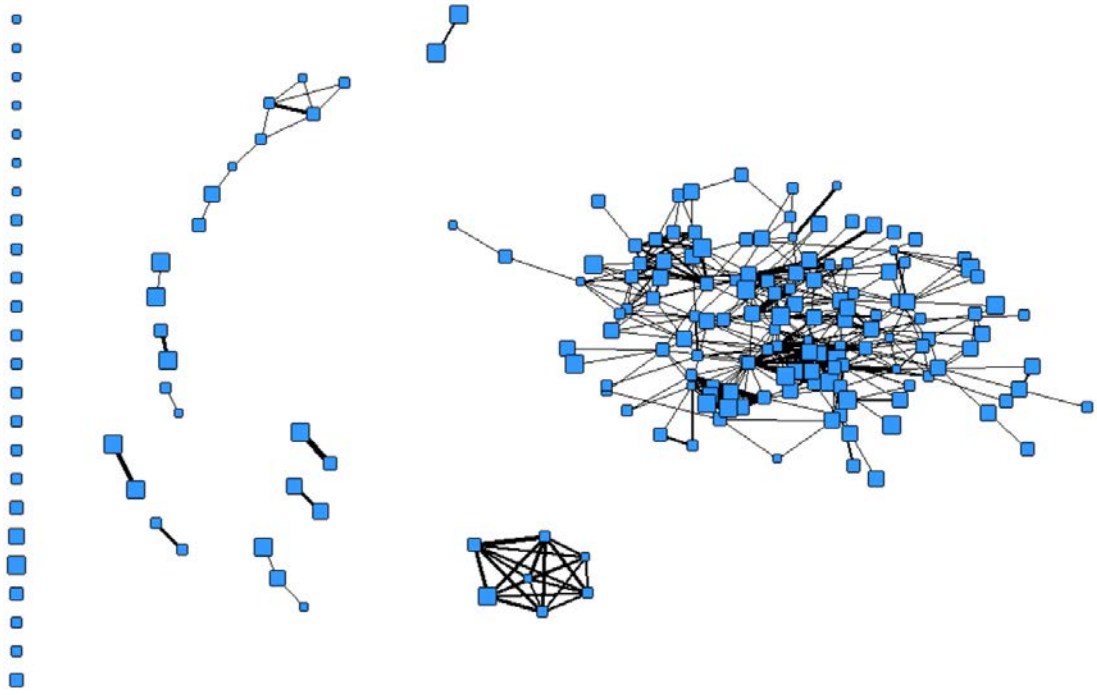

Figure 12. Peruvian corporate network in 2010 without company names

Source: Own elaboration.

Many marginal firms in the 2010 Peruvian corporate network are tighly connected by more than one director. Besides the presence of a highly connected group of seven firms, there is another group formed by eight firms, proposing more connectivity outside the main component of the corporate network (see Figure 12).

Figure 13 exhibits 2010's Peruvian corporate network with a group of isolated firms that includes ten financial firms (Azteca, Banco de Comercio, GNB, Ripley, Santander, Caja Sullana, Caja Arequipa, Caja Piura, Caja Trujillo, and Citibank), three financial services firms (BNB Agente Bolsa, Continental Agente Bolsa, and Continental Titulizadora), two mining companies (Activos Mineros, and Santa Luisa), and one agrarian firm (Laredo).

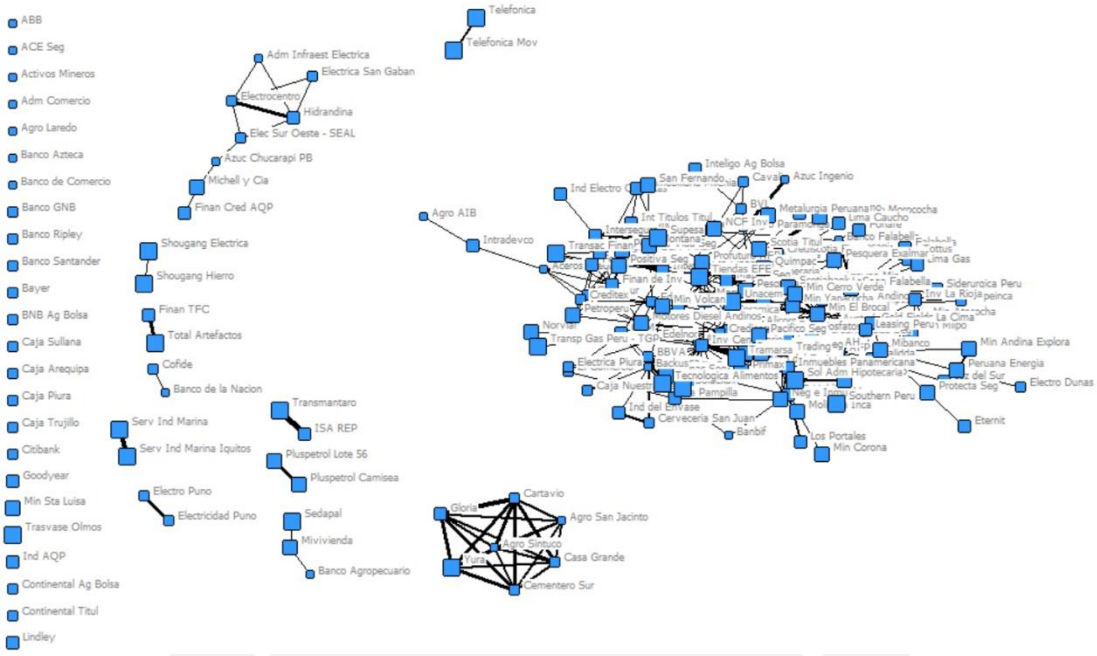

Figure 13. Peruvian corporate network in 2010 including company names

Source: Own elaboration.

According to Figure 13, some marginal firms outside the main component include twelve energy firms (Administracion Infraestructura Electrica, San Gaban, Electrocentro, Hidrandina, SEAL, Shougang, Electro Puno, Electricidad Puno, Transmantaro, ISA REP, Pluspetrol Lote 56, and Pluspetrol Camisea), four financial services companies (Financiera Credito AQP, Financiera TFC, Cofide, and Mivivienda), two banks (Banco de la Nacion, and Agropecuario), and one agrarian firm (Chucarapi). Peruvian banks did not recover all their centrality in 2010 because there are twelve banks outside the main component, which are isolated or marginal firms (according to Table 10 they represent 54% of the total number of financial firms in 2010). Nevertheless, the overall Peruvian corporate network in 2010 increased its connectivity and its number of big linkers, and also decreased its percentage of marginal and isolated firms. It therefore appears that the Peruvian political crisis in

2001 had an effect on the connectivity properties of the corporate network in 2005, while the global financial crisis in 2008 did not impede the strengthening of the Peruvian corporate network of IDs in 2010, though it could be a strong constraint for the recovery of banks' centrality. These findings support the studies about how the corporate network of interlocking directorates increases its cohesiveness while its participants change their roles over time (Davis & Mizruchi, 1999; Marquis, 2003; Davis et al., 2003; Salvaj & Ferraro, 2005; Salvaj, 2013; Westerhuis, 2014; Wilson et al., 2017; Buchnea et al. 2018).

The seven-firm group shown in the low part of Figure 13 belongs to a family business group, known as the Grupo Gloria. This business group is property of the Rodriguez-Banda family, and Figure 13 shows seven of its firms connected through board interlocks (Gloria, Cartavio, San Jacinto, Casa Grande, Sintuco, Cementero Sur, and Yura). While these firms are not isolated nor marginal because they have more than one interlock each, they have high centrality measures due to their multiple interlocks among the seven of them. In addition to this, these firms are outside the main component of the corporate network, which results in less possibilities of obtaining benefits through board interlocks dynamics. This finding supports Takes and Heemskerk (2016), and Salvaj (2013), who argued that it is possible for firms with low intermediation centrality (betweenness) to have a high centrality degree (number of board interlocks). Thicker lines also demonstrate that these seven firms of Grupo Gloria share more than one director between them. Furthermore, the separation of this BG from the main component is probably due to the origin of the Grupo Gloria, who founders come from a non-capital city, supporting the arguments of Durand (2017) that there is a social fragmentation within the Peruvian business elite. In addition, this finding would support Naudet and Dubost (2017), who argued that are the homophilic ties which keep the cohesion of the corporate network over time.

Figure 14 shows how 2010's main component recovered its cohesiveness (compared to 2005) and exhibited even more cohesion than 2000's. Contrary to the main component of 2000 and 2005, 2010 shows two cores and three other groups of firms that are well connected outside them.

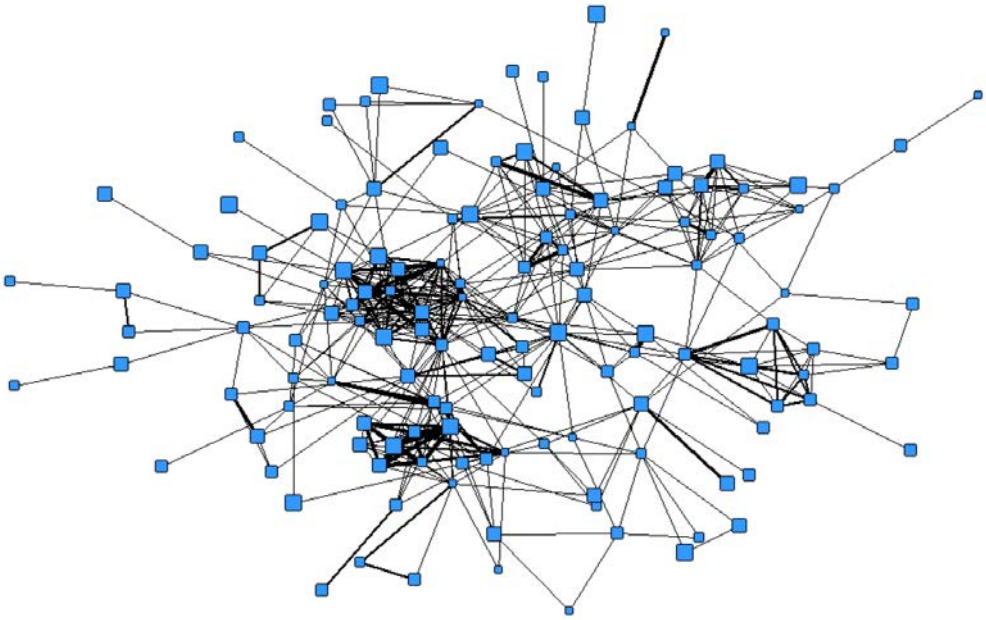

Figure 14. Peruvian main component in 2010 without company names

Source: Own elaboration.

According to Figure 15, the periphery of 2010's main component includes mining companies (Southern, Corona, Andina Exploraciones, and Ignacio Morococha), and agrarian firms (Ingenio, and AIB). The rest of the marginal firms belong to different economic sectors.

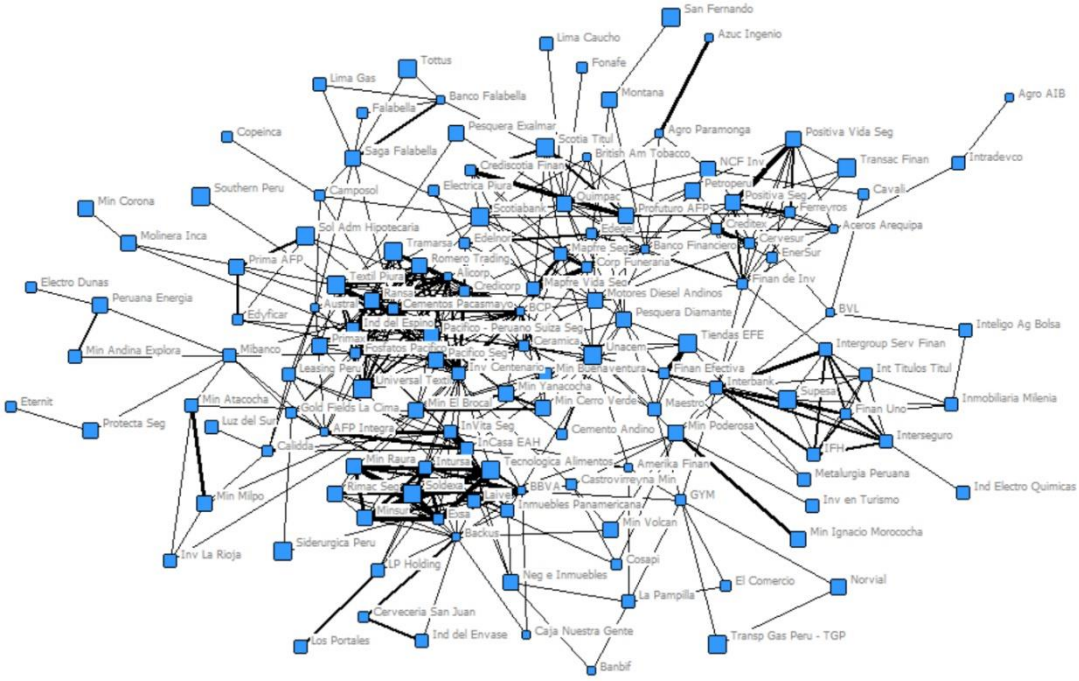

Figure 15. Peruvian main component in 2010 including company names

Source: Own elaboration.

Figure 15 exhibits the large 2010 main component that includes two principal cores, and several other well-connected nodes inside it. This group of highly connected firms includes financial companies (BCP, BBVA, Scotiabank, Interbank, and Banco Financiero), insurance firms (Pacifico, Rimac, InVita, Positiva, Positiva Vida, Mapfre, and Mapfre Vida), mining companies (Minsur, Raura, El Brocal, Yanacocha, Cerro Verde, Exsa, and Poderosa), fund pension management firms (Integra, and Profuturo), textile firms (Textil Piura, Universal Textil, and Creditex), financial services firms (InCasa EAH, Credicorp, Financiera Efectiva, Intergroup Servicios Financieros, and Financiera Uno), food and beverages companies (Backus, Alicorp, and Laive), and construction firms (Inversiones Centenario, Ceramica, Soldexa, Cementos Pacasmayo, Cervesur, Aceros Arequipa, Ferreyros, and Unacem).

Compared to 2005's main component (see Figure 11), 2010's still includes insurance companies, mining, and more construction companies as well-connected firms. However, it also includes an increased presence of economic sectors such as financial firms (BCP, BBVA, Scotiabank, Interbank, and Banco Financiero), infrastructure, transport and logistics firms (Ransa, Tramarsa, and Motores Diesel Andinos), and fishing companies (Pesquera Diamante, Austral, and Tecnologica Alimentos). The main component of 2010's corporate network is more cohesive than 2005's and 2000's.

Table 29 (see the Appendix T) shows the top 30 firms by their centrality degree for the 2010 main component. Banco de Credito del Peru (BCP) was the firm with the highest centrality degree in 2010, a financial firm rather than a construction one, as was the case in 2005 (Inversiones Centenario). BCP has 55 interlocks (one more corporate tie than Inversiones Centenario in 2000). Financial firms represent 10%, and the insurance sector as well as the construction sector have five firms each in this list (16.6% of the firms each), being the two most representative sectors listed in Table 29. Most of the firms included in this list have Peruvian capital ownership (93.3%), there is no presence of any state-owned firm, and the most recent firm (to the end of 2010) is a financial services firm (InCasa EAH) with two years of foundation.

Table 30 (see the Appendix U) shows the top 30 firms by their centrality degree but using the main component dichotomized of 2010. Inversiones Centenario is the firm with the highest centrality degree in 2010's main component dichotomized, with connections to 27 different firms (five more connections than it had in 2005's main component). For 2010's main component the BCP (a financial company) was the firm with the highest number of board interlocks, however Inversiones Centenario (a construction company) was the firm with the most board interlocks connecting different firms. Financial firms represent 16.6% and the construction, financial services and insurance sectors each had 10%, being the most representative of the economic sectors, beside financial firms, listed in Table 30. Contrary to the data of 2005 where Peruvian firms tend to establish IDs with the construction sector, this finding could explain how Peruvian firms do not exhibit any specific preference for a sector to establish board connections in 2010. Most of the firms included in this list have Peruvian capital ownership (96.6%), there is no evidence for any state-owned firm, and the most recent firm (to the end of 2010) has one year of foundation (Fosfatos del Pacifico).

Table 31 (see the Appendix V) shows the top 30 firms by eigenvector centrality in 2010's main component of the Peruvian corporate network. Soldexa, which belongs to the construction sector, presents the highest eigenvector for 2010's main component. Banco de Credito del Peru (BCP), which was a top performer in 2005 for this same centrality measurement, is now in tenth place. Inversiones Centenario, the second-best performer in 2005, stands in eighth place. There is one financial firm (3.3%), and there are five construction firms (16.6%) in this list, one firm less than in 2005, giving way to a greater diversity of firms. All firms but one have Peruvian capital ownership (96.6%), there is no evidence for any state-owned firm, and the most recent firm (to the end of 2010) has one year of foundation (Fosfatos del Pacifico).

Table 32 (see the Appendix W) shows the top 30 firms by eigenvector centrality in 2010's main component dichotomized. The Banco de Credito del Peru (BCP) has the highest eigenvector for 2010's main component dichotomized. Comparing the results of Table 31 and Table 32, Soldexa is board connected to other firms who hold many corporate ties but with the same firms, while BCP is board connected to other firms who hold many corporate ties with different companies. There are two financial firms on this list (6.6%), and there are five construction and five mining firms (20% for

each economic sector), which means the construction and mining sectors contain more firms with high levels of power and influence over many other different firms. All but two firms have Peruvian capital ownership (93.3%), there is no presence of any state-owned firm, and finally the most recent firm (to the end of 2010) has one year of foundation (Fosfatos del Pacifico).

Table 33 (see the Appendix X) shows the top 30 companies classified by their betweenness centrality in 2010's Peruvian corporate network of IDs. Unacem (construction firm) holds the first position in 2010's top 30 list, being the firm with the highest betweenness centrality. Inversiones Centenario, who was a top performer in 2005, drops down to second position in 2010. Scotiabank bought Banco Wiese Sudameris at the beginning of 2006, that is why does not appear in the 2010 list, and Scotiabank holds position number fourteen in Table 33. There are six financial firms (20%), and six firms belong to the construction sector (20%). All firms but two have Peruvian capital ownership, there is no presence of state-owned firms, and the most recent firm (to the end of 2010) has two years of foundation (InCasa EAH).

Table 34 (see the Appendix Y) shows the list of the top 30 directors classified by their centrality degree and betweenness centrality in the 2010's main component. Dionisio Romero Paoletti is the director with the highest centrality degree (same as in 2005), and Alfredo Gastañeta Alayza is the director with the highest intermediation centrality for 2005's main component (the previous leader for this measurement in 2005, Jesus Antonio Zamora Leon, fell to eighth position). There is only one woman in 2010's list, Maria Jesus Hume Hurtado, who holds the eighth position for centrality degree and the tenth place for betweenness centrality (see Table 34).

Table 35 (see the Appendix Z) shows the list of the top 30 directors by their eigenvector centrality and number of boards they belong to, in 2010's main component. Alex Fort Brescia is the director with the highest power and influence over other directors in the Peruvian corporate network of 2010, and Dionisio Romero Paoletti is the director who holds more mandates (number of boards) for 2010's main component. Contrary to the previous period of analysis (2005), there is evidence of women's presence in 2010's list, where Rosa Brescia Cafferata holds the seventh position by eigenvector centrality, and Maria Jesus Hume Hurtado holds place 19 by number of boards (see Table 35).

Finally, the Peruvian corporate network of IDs in 2010 exhibited a recovery on the size and connectedness of its main component. BCP (bank) was the firm that presented the higher centrality degree in the main component, and the higher eigenvector centrality in the main component dichotomized. However, financial firms are not fully recovered yet regarding their participation in the 2000's corporate network. Construction firms are still prominent in this period, having a firm with the higher centrality in the main component dichotomized and another one with the higher eigenvector centrality in the main component. In addition, there is no explicit preference to interlock with a specific economic sector, such as happened with construction firms in 2005. Conversely, there are other participants that rised its connectivity, such as mining firms. Apparentely, 2008's financial crisis did not impede the strenghthening of the corporate network in 2010, but constrained in some way the recovery of banks' centrality. Hence, the network kept its cohesion, but participants change their roles within again. Moreover, Dionisio Romero Paoletti, the leader of the Romero Group (family BG), was the director who had the higher number of connections as well as who held more mandates. Alfredo Gastañeta Alayza, a lawyer from Pontificia Universidad Católica del Perú (PUCP), had the prominent intermeditation power in 2010. In addition, Alex Fort Brescia, member of the Brescia family (Breca BG), was the top performer director regarding influential power (eigenvector).

4.2.4. Discussion for period 2015

In the 2015 Peruvian overall corporate network, Figure 16 suggests more firms taking part (according to the sample) and 13 elements (one more than the previous period of analysis), where the seven-firm business group (Grupo Gloria) observed below in Figure 16 remains thoroughly connected. The main component also shows cohesiveness and more connected firms.

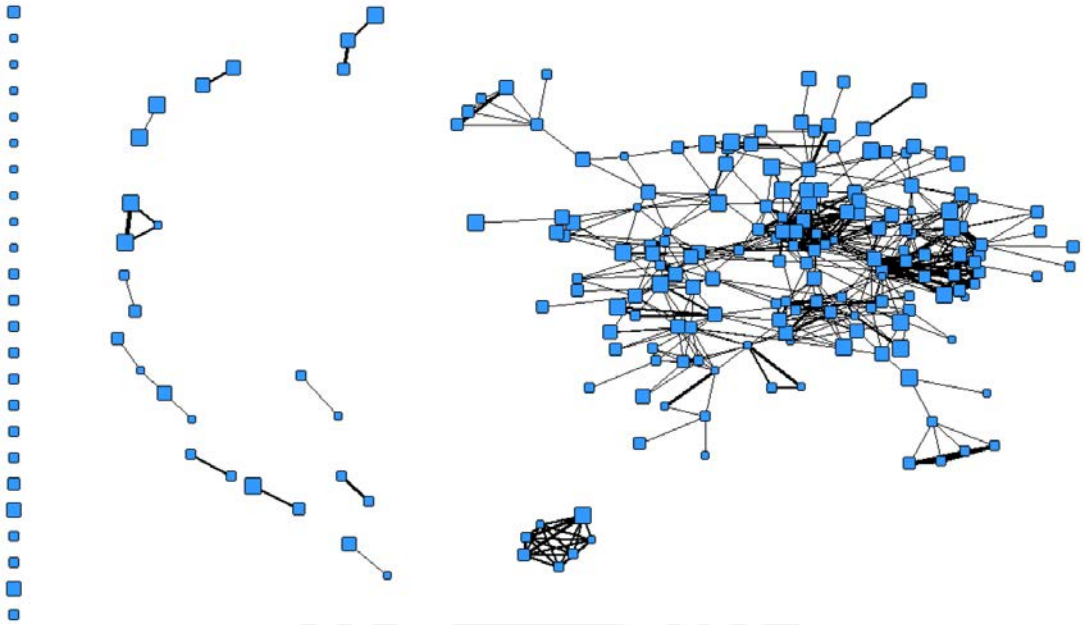

Figure 16. Peruvian corporate network in 2015 without company names

Source: Own elaboration.

Two firms compose most of the elements besides the main component. Nevertheless, there are two groups of three firms, and one group of four firms. In addition, there appears to be an increased number of isolated firms as well (see Figure 16).

According to Figure 17, 2015's Peruvian corporate network exhibits several isolated firms similar to previous periods, which include seven financial firms (Agropecuario, Azteca, de la Nación, GNB, Ripley, Caja Arequipa, and Citibank), four financial services companies (BNB Agente Bolsa, Compartamos Financiera, Cofide, and Credicorp Capital Agente Bolsa), three mining firms (Activos Mineros, Castrovirreyna, and Santa Luisa), and two agrarian ones (Chavin Huantar, and Laredo). It is important to highlight in this period that four of the financial isolated firms are subsidiary companies in Peru (Azteca, GNB, Ripley, and Citibank), and these banks were also isolated in 2010 (Citibank was an isolated firm even in 2005). This finding is contradictory to Bucheli et al. (2019), who found that multinational firms rely on board interlocks with national firms in order to facilitate their local business conditions.

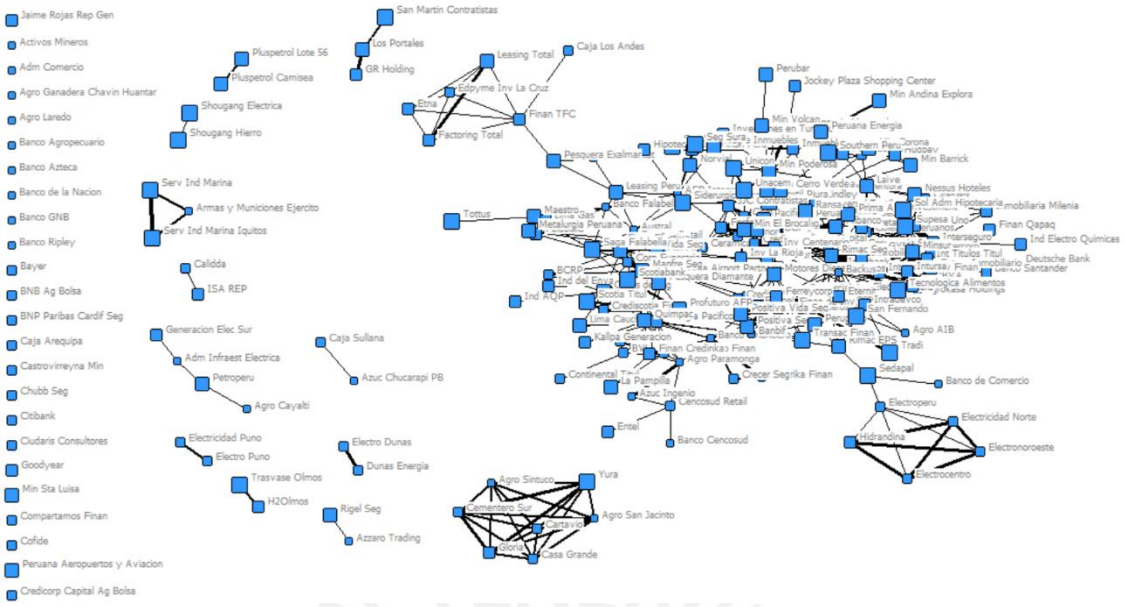

Figure 17. Peruvian corporate network in 2015 including company names

Source: Own elaboration.

In 2015's corporate network, it is possible to observe more elements besides the main component. Marginal firms, outside the main component, include twelve energy firms (Pluspetrol Lote 56, Pluspetrol Camisea, Shougang, Calidda, ISA REP, Generacion Electrica Sur, Administracion Infraestructura Electrica, Petroperu, Electricidad Puno, Electro Puno, Electro Dumas, and Dunas Energia), five construction companies (San Martin Contratistas, GR Holding, Shougang Hierro, Trasvase Olmos, and H2Olmos), and two agrarian ones (Cayalti, and Chucarapi). The Grupo Gloria business group remains working separately from the rest of the corporate network, intensively sharing directors between its seven companies, which belong to three different economic sectors: agrarian, construction, and food and beverages.

According to Figure 18, 2015's main component looks quite similar to 2010's. It seems that from 2010 to 2015 there are few changes in the overall corporate network, besides the inclusion of new firms into the network (2010's main component included 52.8% of firms, and 2015's main component included 61.1% of the sample). Nevertheless, both sides of the main component structure reveal a risk for two groups of firms being disconnected from this main component, due to the presence of only one director who tied them.

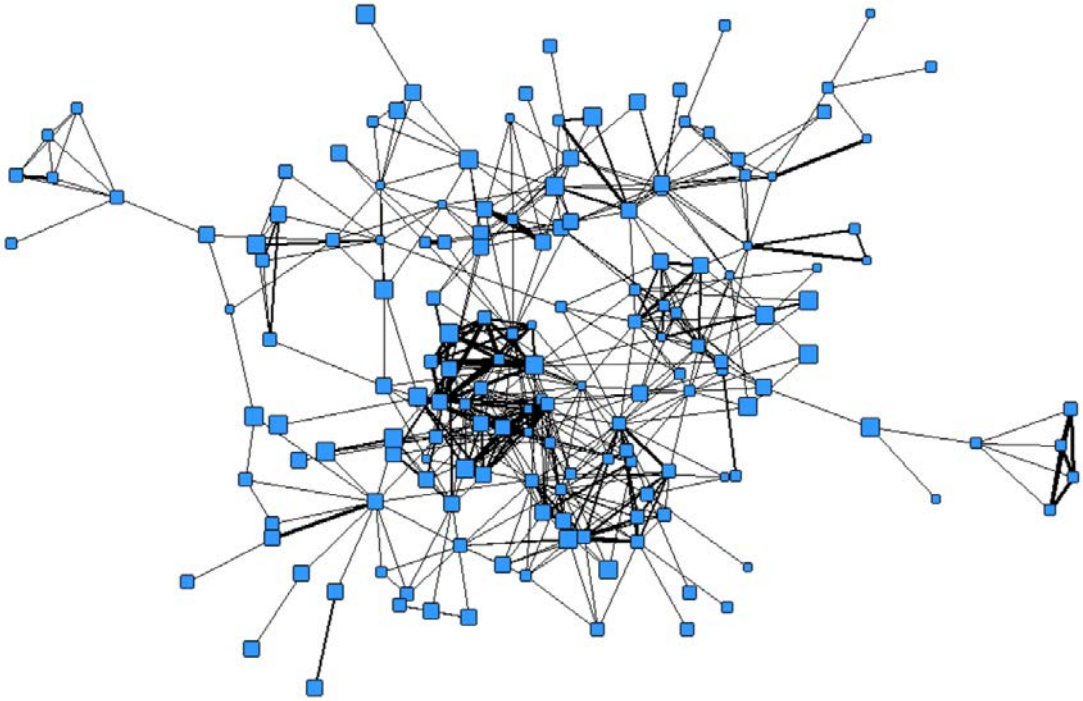

Figure 18. Peruvian main component in 2015 without company names

Source: Own elaboration.

Figure 19 exhibits how new financial firms (which were not in 2010's main component) started to connect themselves to the main component, such as Deustche Bank, Caja Los Andes, Banco Santander (an isolated firm in 2010), Banco Cencosud, and Banco de Comercio (also an isolated firm in 2010). In addition to this, on the right side of Figure 19 there is a group of state-own firms form the energy sector, which is only connected to the main component through the presence of a board interlock with Perupetro (another state-owned firm that is tied to private companies). On the left side of Figure 19, another group of firms (four financial services firms, one financial firm, and one automobile sector firm) are connected to the main component through a single interlock with Pesquera Exalmar.

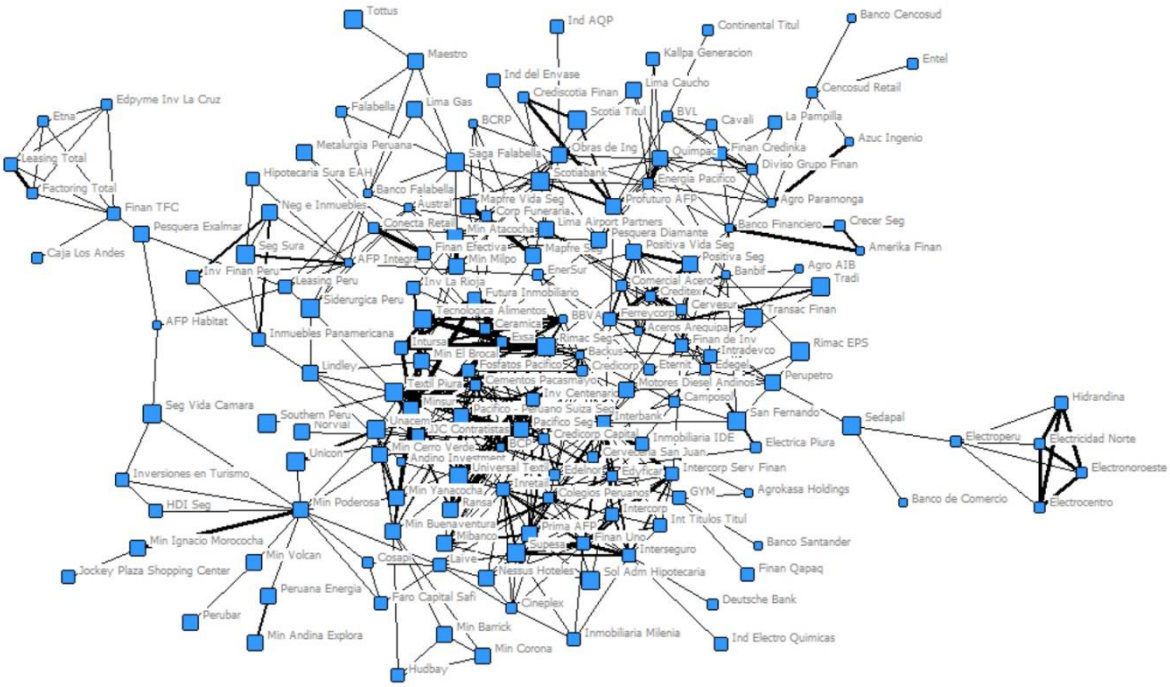

Figure 19. Peruvian main component in 2015 including company names

Source: Own elaboration.

Finally, Figure 19 shows strongly connected firms through interlocks in the core of the main component, which includes financial firms (BCP, BBVA, Mibanco, Interbank, Banbif, and Scotibank), a consolidated group of very well-connected mining firms (Poderosa, Buenaventura, Yanacocha, Cerro Verde, Milpo, El Brocal, Exsa, Minsur, and Atacocha), insurance firms (Pacifico - Peruano Suiza, Mapfre, Mapfre Vida, Rimac, Positiva, and Positiva Vida), and construction firms (Cementos Pacasmayo, Inversiones Centenario, JJC Contratistas, Aceros Arequipa, Ferreycorp, GYM, and Ceramica). Regarding mining firms, the results of this study observed their endurance over time, increasing their participation in the main component from 2000 to 2015. 2000's main component included 12 mining firms that represent 12.3% of the main component. Mining companies (11 firms) in 2005's main component represent 13.2%, while they represent 14.1% for 2010 (19 firms). Finally, 19 mining companies were found in 2015's main component, representing 11.7%.

Regarding the participation of financial firms from 2000 to 2015, there were eight banks in 2000's main component (8.2%), seven banks in 2005's (8.4%), nine financial firms in 2010's main component (6.7%), and finally 14 banks in 2015's (8.6%). Banks increased their presence in the main component of the Peruvian corporate network from 2000 to 2015. They resisted the political crisis of 2001 (see

their results for 2005) but decreased their participation due to the global financial crisis of 2008 (see their results for 2010). This finding supports the statements of Fattobene et al. (2018) who argued that financial firms' centrality inside the corporate network are affected by economic crises. This is also in line with the results of Salvaj (2013) and Van Veen (2018) who explained how the overall structure of IDs network stands its ground in front of an economic crisis, but generated changes at the micro level regarding the role of its participants.

Table 36 (see the Appendix AA) shows the top 30 firms by their centrality degree for the 2015 main component. Banco de Credito del Peru (BCP) was the firm with the highest centrality degree in 2015 (the same firm in 2010's main component by this measurement). BCP has 48 interlocks which is seven less corporate ties than it had in 2010. Financial firms represent 10%, and the insurance sector has five firms in this list (16.6% of the firms), being the most representative sector listed in Table 36. Most of the firms included in this list have Peruvian capital ownership (93.3%), there is no presence of any state-owned firm, and the most recent firm (to the end of 2015) is a financial services firm (Credicorp Capital Peru) that has three years of foundation.

Table 37 (see the Appendix BB) shows the top 30 firms by their centrality degree but using the main component dichotomized of 2015. Banco de Credito del Peru (BCP) is the firm with the highest centrality degree in 2015's main component dichotomized, exhibiting connections with 23 different firms (four less connections than the top performer of 2010's main component by this measurement). This finding explains how BCP tended to diversify where its board interlocks come from during the period of 2010 to 2015. Financial firms represent 10% and the construction sector 20% of the firms, being the most representative of the economic sectors listed in Table 37. 2015's findings reveal how firms again establish more board interlocks with construction companies. Most of the firms included in this list have Peruvian capital ownership (90%), there is no evidence for any state-owned firm, and the most recent firm (to 2015 end) has less than a year of foundation (Colegios Peruanos).

Table 38 (see the Appendix CC) shows the top 30 firms by eigenvector centrality in 2015's main component. Rimac Seguros (insurance sector) presents the highest eigenvector for 2015. Soldexa, a top performer in 2010, does not appear in 2015's list. BCP fell to eleventh position and Inversiones Centenario dropped down

to ninth. There are three financial firms listed in 2015 (10%), and there are five construction firms included (16.6%), the economic sector having more firms in the top 30 firms' list by eigenvector centrality in 2015's main component. All firms but two have Peruvian capital ownership (93.3%), there is no evidence for any state-owned firm, and the most recent firm (to the end of 2015) has less than a year of foundation (Colegios Peruanos).

Table 39 (see the Appendix DD) shows the top 30 firms by eigenvector centrality in the 2015's main component dichotomized. Banco de Credito del Peru (BCP) presents again the highest eigenvector for 2015's main component dichotomized, the same as in 2010's. It is important to observe that the BCP, though it is not connected to other highly-connected firms (eigenvector centrality in main component), is indeed connected to other firms that are connected as well to a diversity of firms (eigenvector centrality in main component dichotomized), increasing the power and influence over a larger landscape of companies. There are three financial firms on this list (10%), and there are six construction companies (10%) while five mining firms remain, the same as in 2010's main component. All but two firms belong to Peruvian capital ownership (93.3%), there is no presence of any state-owned firm, and the most recent firm (to the end of 2015) has less than one year of foundation (Colegios Peruanos).

Table 40 (see the Appendix EE) shows the top 30 companies by their betweenness centrality in 2015's Peruvian corporate network. Compañia Minera Poderosa (mining firm) holds the first position in 2015's top 30 list, being the firm with the highest betweenness centrality. Niether Unacem, which was in first place in 2010, nor Inversiones Centenario, which was the top performer in 2005, appear in the list anymore (both construction firms). Scotiabank climbs two positions from fourteenth in 2010 to twelfth in 2015. There are four financial firms (13.3%), and another four firms belong to the construction sector (13.3%), which means there are two construction companies less than in 2010. All but seven firms have Peruvian capital ownership, there are two state-owned firms in the list (Perupetro and Electroperu), and the most recent firm (to the end of 2015) has four years of foundation (Inretail Peru).

Table 41 (see the Appendix FF) shows the list of the top 30 directors by their centrality degree and betweenness centrality in the 2015's main component. Jose

Raimundo Morales Dasso is the director with the highest centrality degree (the previous leader of this measurement in 2010, Dionisio Romero Paoletti, descended to second position), and Luis Baba Nakao is the director with the highest intermediation centrality for 2015's main component (the previous leader of this measurement in 2010, Alfredo Gastañeta Alayza, fell to eighth position). There is only one woman on 2015's list, Carmen Rosa Graham Ayllon, who is number 21 on the centrality degree. Women's positions were better for 2015's betweenness centrality, with Maria Jesus Hume Hurtado in third position, Maria Cecilia Blume Cilloniz in ninth position, and Carmen Rosa Graham Ayllon in position number 19. These results show evidence of the increasing role of women as intermediators in 2015's Peruvian corporate network of IDs (see Table 41).

Table 42 (see the Appendix GG) shows the list of the top 30 directors by their eigenvector centrality and number of boards they belong to, in 2015's main component. Alex Fort Brescia is again the director with the highest power and influence over other directors in the Peruvian corporate network of 2015 (as in 2010), and Dionisio Romero Paoletti is once again the director who holds more mandates for 2015's main component (as in 2010). Rosa Brescia Cafferata remains in seventh position in eigenvector centrality, while Ana Maria Brescia Cafferata appears in 2015's list in eigenvector centrality holding position number 14, as well as Carmen Rosa Graham Ayllon in position number 26. In addition, Maria Jesus Hume Hurtado decreased her number of boards to five, falling from position 19 in 2010 to position number 30 in 2015 (see Table 35). According to these results, women in 2015 increased their power and influence over other directors in the corporate network and at the same time reduced the number of boards they belonged to.

Finally, compared to 2010, the Peruvian corporate network of IDs in 2015 increased the number of firms inside its main component. Despite the updated Code of Good Practices of Corporate Governance for Peruvian Societies in 2013, according to the results this research has reasons to think that the network would continue growing in the future due to the lack of proper legislation, supporting Windolf (2009). Overall, financial firms improve their connectedness, increasing their participation in the main component; mining firms turn more central inside the main component; and construction firms remained as relevant players. BCP arises as the leader regarding centrality degree, learning how to diversify its IDs from 2010 to 2015. Rimac Seguros

(insurance sector) was the firm with the higher eigenvector centrality in the main component, but BCP had the higher one within the main component dichotomized. Compañía Minera Poderosa (mining firm) had the higher betweenness centrality (intermediation power) in 2015. It is relevant to highlight that construction companies disappeared from this list in 2015, contrary to what happened in 2005 and 2010 periods. Moreover, Jose Raimundo Morales Dasso, a business professrional who holds an MBA from The Wharton School of the University of Pennsylvania, had the higher centrality degree, while Luis Baba Nakao, a business professional who holds an undergraduate degree from Universidad Nacional de Ingeniería (UNI), was the top performer regarding intermediation power (betweenness centrality). Dionisio Romero Paoletti, the leader of the Romero Group (family BG), was the director who held more mandates, and Alex Fort Brescia, member of the Brescia family (Breca BG), was again the top performer director regarding influential power (eigenvector), same as 2010.

Conclusions

The findings of this research permit an understanding of how the Peruvian privatization process that began in 1990 (Consejo Privado de Competitividad - Perú, 2019), an international connectivity (Peruvian Ministry of Foreign Affairs, 2018), alongside a local behavioral patterns of the organizations (Ganoza & Stiglich, 2015), and a weak institutional context (Vergara, 2018; Durand, 2019) has resulted in a progressive reinforcement of the IDs Peruvian corporate network of large firms from 2000 to 2015. As Useem (1980) explained before, local business elites could achieve cohesion by utilizing IDs, regardless of whether institutional weaknesses exist or not (Bucheli et al., 2019). Moreover, Durand (2019) emphasized how the organizational size as well as its networks extension could potentially set the basis for a scenario where corporate elites would exert big influence on States, widering inaqualities and receiving informal benefits from regulatory systems, under a phenomenon called “the capture of the State”. Henceforth, the strong influence that business elites can jointly mobilize linked by their IDs could add an additional force that facilitates this phenomenon, together with the economic power, institucional weakness, and civil society detriment (Durand, 2019). In this case, the Peruvian corporate network of IDs would be following the same of path of countries such as India, which according to the literature, has a progressively increasing interlocks network cohesiveness, converse to what is happening in other countries (Naudet & Dubost, 2017). Hence, contrary to Rossoni et al. (2017), size and centrality matters in Peru, besides the information and resurces that could be flowing through the corporate network. The period 2005 seems as an exception to this conclusion, probably due to the political crisis that affected the country in 2001, which will be discussed next. In addition, despite the privatization wave in the country, the results exhibited that major ownership of the large firms included in the sample remains Peruvian in each period.

The study found evidence for the resilience of the Peruvian corporate network of interlocking directorates ahead of a financial crisis, due to minor changes generated from 2005 to 2010, with the global financial crises of 2008-2009 in between. This finding regarding corporate network’s structure resilience follows the results of Kogut and Walker (2001), Salvaj (2013), Westerhuis (2014), and Salvaj and Couyoumdjian (2015). Specifically, these results follow Salvaj (2013) and Van Veen (2018), who explained this resilience in the face of a financial crisis. On the other

hand, Fattobene et al. (2018) found the opposite for the Italian corporate network of IDs, which was overall reduced after 2008's financial crisis. Nevertheless, micro changes took place within the structure of the corporate network, where banks decreased their centrality and their level of participation in it. Van Veen (2018), who found effects of the financial crisis at the micro level, where isolated firms could possibly be the most affected, corroborated. In addition to this, contrary to what Carroll (2002), and Salvaj and Lluch (2014) found about major changes ocurring in the network due to external factors, the Peruvian corporate network resisted the drop in global commodities' prices and its impact on the Peruvian GDP since 2013. The study does not have information for a period of analysis prior to 2000 in order to do a complete evaluation of the possible effects of the Asian and Brazilian economic crisis of 1997 (Consejo Privado de Competitividad - Perú, 2019). However, the results could infer, following Van Veen (2018), that its impact could be minor on the Peruvian corporate network of IDs because of the much less cohesive structure found in 2005, and the recovery of the network's structure after that in 2010 and 2015. Contrary to this, there is evidence to think that the Peruvian corporate network of IDs could be more sensitive facing a political crisis. Some changes in the Peruvian corporate network of IDs from 2000 to 2005 suggest the latter, considering the huge political turmoil at the end of 2001 (Consejo Privado de Competitividad - Perú, 2019). Regarding this, future studies could expect to find similar results over the IDs networks in the face of a new political crisis in the country.

The Peruvian corporate network of IDs, having no specific antitrust law that regulates boards' composition, may present a collaborative network (Windolf, 2009). This research found strong evidence to support the idea that Peruvian large firms tend to establish board interlocks over time, from 2000 to 2015, in order to connect themselves, building a Peruvian corporate network of interlocking directorates. Furthermore, reviewing the available literature, there are several possible reasons for them to have done this. According to this study, these large firms would connect among themselves through board interlocks in order to (a) acquire resources (Pfeffer, 1972; Boyd, 1990; Rao & Sivakumar, 1999; Shropshire, 2010), (b) overcome the institutional voids in the country's business environment (Schoorman et al., 1981; Beckman et al., 2004; Musacchio & Read, 2007; Vergara, 2018; Bucheli et al., 2019), (c) protect the group's interests of an upper-class business elite, mostly composed of

Peruvian family firms (Useem, 1980, 1984; Zajac & Westphal, 1996; Durand, 2018; Bucheli et al., 2019; Durand, 2019), and (d) provide endurance to the main structure of the Peruvian corporate network, even in front of financial global crises (Salvaj, 2013; Van Veen, 2018). However, without any strict regulation besides the Code of Good Practices of Corporate Governance for Peruvian Societies updated in 2013, the presence of strong family ties in great power positions (Gonzalo de la Puente Wiese, Dionisio Romero Paoletti, Juan Francisco Raffo Novelli, and Alex Fort Brescia), the separation of Grupo Gloria (family BG that come from a non-capital city) from the main component, the “about the fit” regulations enacted by the government, and the hierarchical capitalism previously identified by Schneider (2013), this study have strong reasons to argue that Peruvian business elites are developing a coordinated capitalism instead of a collaborative one. Due to the institutional weakness in the country, this coordinated capitalism may threat the balance of power as well as the fair rules in the market, while Peruvian large firms are reinforcing their integration for management purposes through the establishment of IDs that result boosted due to the particularities of the described institucional context (Caiazza & Simoni, 2015; Caiazza et al. 2019). Hence, Proposition 1 is accepted, Peruvian firms have built and maintained a corporate network of IDs through the period of 2000-2015, which represented a structure with unique patterns, responding to the changes in the business environment as well as to resources’ needs. Moreover, the outcomes of this corporate network of IDs do not seem to be just obtaining valuable resources for the companies, but for many other additional reasons too.

During the 15-year period of analysis, participants in the Peruvian corporate network of IDs changed their roles. For instance, most of the agrarian firms, which seemed moderately connected to 2000’s main component, in 2005 and after, appeared as marginal or isolated firms. Furthermore, financial firms (banks) centrality exhibited a decrease during periods of financial crises, such as the 2008 global financial crisis (Los Andes, 2015, December 3). This changing role of banks inside the IDs corporate network is contrary to Mariolis and Jones (1982), but in line with Davis and Mizruchi (1999), Marquis (2003), Salvaj and Ferraro (2005), Salvaj (2013), and Wilson et al. (2017). Furthermore, Buchnea et al. (2018), and Ginalski et al. (2014) respectively also studied the decreasing of banks’ centrality inside the corporate network in the United Kingdom and Switzerland, highlighting a more active

involvement of other participants in the corporate network structure, in order to keep its connectedness. The same happened in the Peruvian corporate network of IDs, when key participants in some periods change their roles in the next ones, decreasing their centrality or leaving the corporate network, while others assumed the role to keep the network cohesive. On the other hand, mining companies kept almost the same level of participation in the main component over time. In addition to this, regarding this study's results, the Peruvian corporate network seems to diversify through time, and there is no evidence for a strong leader industry which other firms prefer to connect with. The top 30 lists for the four periods of analysis exhibit different economic sectors taking part in the connectedness of the board interlocks network through centrality degree, eigenvector centrality and betweenness centrality. This diversity of connectedness supports the idea that firms obtain valuable and non-redundant resources through the presence of IDs, as Phan et al. (2003) stated before, as well as the Resource Dependence Theory did too. In addition, despite the changing roles of the participants, there is no evidence that a crisis, neither political nor financial, could generate a considerable fragmentation of the Peruvian corporate network of IDs. This reinforces the results for proposition 1, regarding the strong motives that Peruvian large firms have to keep the network well-connected. Hence, Proposition 2 is partially accepted, having evidence for micro changes within the Peruvian corporate network of IDs as it presents changes in its inner structure for the four different periods of analysis, as a part of its adaptability, while few evidence to argue that macro changes are feasible to occur.

The construction and mining sectors had more firms than any other economic sectors in the top 30 list by centrality degree of the 2000 and 2005 Peruvian network's main component. Regarding the betweenness centrality measure, it is important to note that the intermediation power over time goes from a bank (Banco Wiese Sudameris) in 2000, to two construction firms in 2005 and 2010 (Inversiones Centenario and Unacem), and then finally to a mining company in 2015 (Compañia Minera Poderosa). It is relevant also to highlight that both leaders in 2005 and 2010 are construction firms that disappeared from 2015's list, as well as the number of construction firms in the top 30 of the main component. This finding means that Peruvian firms do not need any more construction companies as a way through which to connect or reach other firms in the network in 2015. Moreover, the eigenvector

centrality analysis of the main component dichotomized show that construction, foods and beverages, and insurance industries held the top positions in 2000, contrary to the 2015 top positions for the same measure, which was dominated by finance, financial services and insurance companies. Hence, the power to influence others' decisions change from construction to financial firms from 2000 to 2015. Following the statements of Davis et al. (2003), the Peruvian corporate network of IDs maintained its main structure despite the multiple changes of its participants within. Agrarian firms, banks, constructions companies, and others may enter and exit from the board interlocks network; however, the network's connectivity properties such as density, diameter, etc. remain the same.

Along the study there were discussed its contributions to the positioning literature used in the research. However, it is important to additionally highlight that it contributes to the Resource Dependence Theory mainly supporting the importance of the diversity from which resources need to flow in order to attract different valuable ones into firms. In addition to this, its primary contribution to the Institutional Theory lies on how informal mechanisms for corporate governance such as IDs could be extremely boosted by the institutional context, generating a new landscape of inequal conditions of power and influence, where other firms would have to learn how to manage their opportunities without having the same benefits of the ones who belong to the business elite.

Considering additional research's results, after establishing the Pacific Alliance in 2011 (Alianza del Pacífico, 2018), there were more Chilean firms who took advantage of it and increased their participation through interlocks, from five companies in 2010 to 14 companies in 2015. However, Colombian and Mexican firms maintained the same participation in the Peruvian corporate network. This moderate increasing of transnational participation responds to Cárdenas (2015) findings, who explained how Latin American countries might do transactions together, even if they do not have a strong presence of transnational IDs. Contrary to this, Carroll and Fennema (2002) stated that the transnational connectivity is growing, so firms will be able to do business as well as taking part in managerial strategies together too. Besides, many other variables could be involved in the Chilean participation, so further research is needed on this topic.

According to the years of foundation of firms with the highest centrality degree included in 2000, 2005 and 2010's main component, this study found evidence that young firms or even firms with less than a year of formal operations did not had major problems establishing board interlocks to participate in the Peruvian corporate network. Moreover, this research also found interesting insights about different strategies for market-entry of multinationals companies, with some firms that established and relied on IDs for this and others that did not. This finding supports Bucheli et al. (2019), who explained how multinational firms tend to establish IDs in order to facilitate their entrance conditions as well as their business opportunities in the new markets. However, further research is needed in order to shed additional light on these topics.

In addition to this, many top performer firms within the Peruvian corporate network of IDs belong to family business groups such as Brescia-Cafferata (Rimac, BBVA, Exsa), or Romero (BCP, Mibanco, Prima AFP), as do directors such as Alex Fort Brescia (Brescia-Cafferata Group), Dionisio Romero Paoletti (Romero Group), Gonzalo de la Puente Wiese (Wiese Group), and Juan Francisco Raffo Novelli (Raffo Group). These findings support what Matos et al. (1969) stated many years ago regarding a Peruvian minority who hold power and influence in the country, which was also discussed later by Ganoza and Stiglich (2015), Vergara (2018), and Durand (2019), reinforcing the idea of a business elite who managed the helm of the vessel towards a model for economic growth, rather than a proposal that includes social well-being. Moreover, the findings support what Naím (2015) identified as a global phenomenon of concentration of power in the hands of a few actors, and support also the statements of Naudet and Dubost (2017) and Durand (2017) about how homophilic ties (in this case, family and upper-class) could maintain the corporate network cohesiveness over time. As this research does not include further analysis of business groups or family firms, it seems necessary for future studies to collect data related to these, in order to shed more light on this topic. Moreover, women's participation in the Peruvian corporate network of IDs had evolved by 2015, increasing their relational power, being mediators in this network. However, the study also needs additional research in order to make a conclusion regarding the gender issue.

Limitations and future research

One of the limitations of the present study is the availability of data. Official web sites of the Bolsa de Valores de Lima (BVL), Superintendencia del Mercado de Valores (SMV) and Fondo Nacional de Financiamiento de la Actividad Empresarial del Estado (FONAFE) have open data from the year 2000 and forward, with some data missing within this period. Even Peruvian large firms' official websites are limited to a number of reports for specific periods. Moreover, official reports differ in their content between firms. Some firms present their reports as Sustainability Reports, and others present them as Annual Memories, but in both cases, their structures show differences that represented a challenge for data collection. In addition, according to firms' constitution legislation in Peru, it is possible for some large firms not to have a board of directors, so the study found a large number of Peruvian top sales firms that do not use this mechanism of corporate governance.

Another limitation of the study is related to women's presence in the Peruvian corporate network structure and its influence on firms' performance. According to the data collected, women's presence in the board of directors is increasing over time (Figure 20) as is their participation in higher positions (board presidencies exhibited continuous growth) in the board structure (Figure 21). However, further quantitative research is required regarding the influence of this growth on firms' performance, as well as identify the patterns to explain why women's presence on boards may differ between countries.

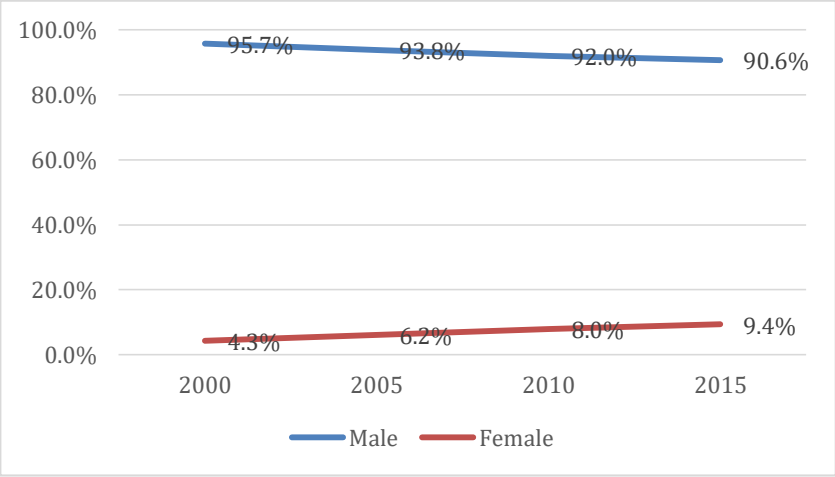

Figure 20. Directors by gender in the Peruvian corporate network: 2000-2015

Source: Own elaboration.

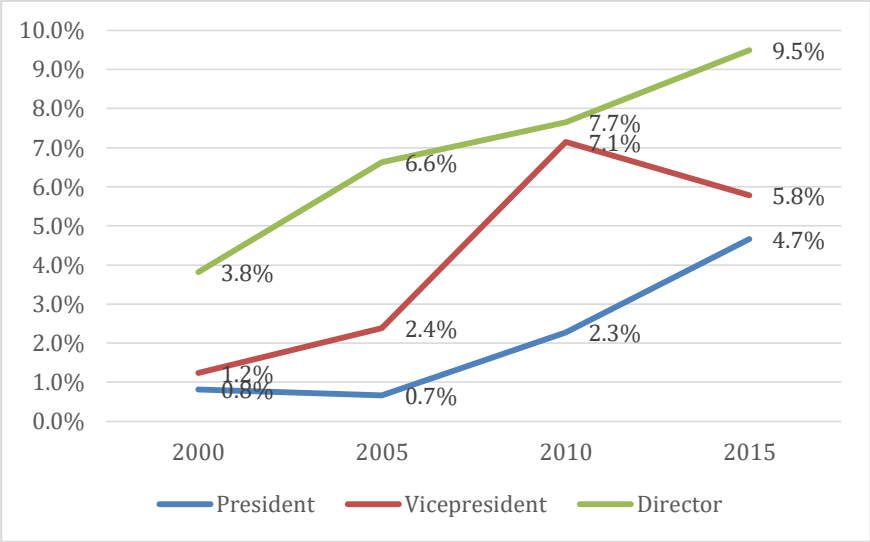

Figure 21. Women's participation by positions in the board

Source: Own elaboration.

A geographical study is also needed which allows the identification of remotely located firms, according to the location of their headquarters or main infrastructure, and how they are participating in this IDs corporate network. As Baran and Wilson (2018) stated, firms located geographically distant from business-dense cities may benefit less from these network structures, if they do not appoint high-experienced directors that could come from these business-dense areas. Hence, data sets of this research could be complemented in the future by collecting data related to firms' addresses in order to shed additional light on this matter.

The study collected data about the following financial information: (a) total deposits, (b) annual gross sales, (c) annual net profits, (d) total liabilities, and (e) total assets. However, further quantitative research using correlational anylisis could be needed in order to find patterns related to the influence of centrality measures on firms' performance. According to Figure 22, Banco de Credito del Peru (BCP), which was the top performer by centrality degree in 2015, exhibits a stable level of this measure through the four periods of analysis. Additionally, Figure 23 shows the evolution through 2000-2015 of these five financial metrics of the Banco de Credito del Peru, demonstrating their good performance over time. Hence, maintaining a high centrality in the corporate network of IDs could have an impact on firms' performance (Richardson, 1987; Pombo & Gutierrez, 2011; Larcker et al., 2013; Takes & Heemskerk, 2016; Bhuiyan & Roudaki, 2018). However, further research is needed

that permits a better understanding of these correlations and which other variables may be involved, depending on what firms' behavior researchers aim for in future studies, such as firms' capital flexibility (deposits), firms' size (gross sales and profits), firms' debt necessity (liabilities), or firms' retaliation capacity (assets).

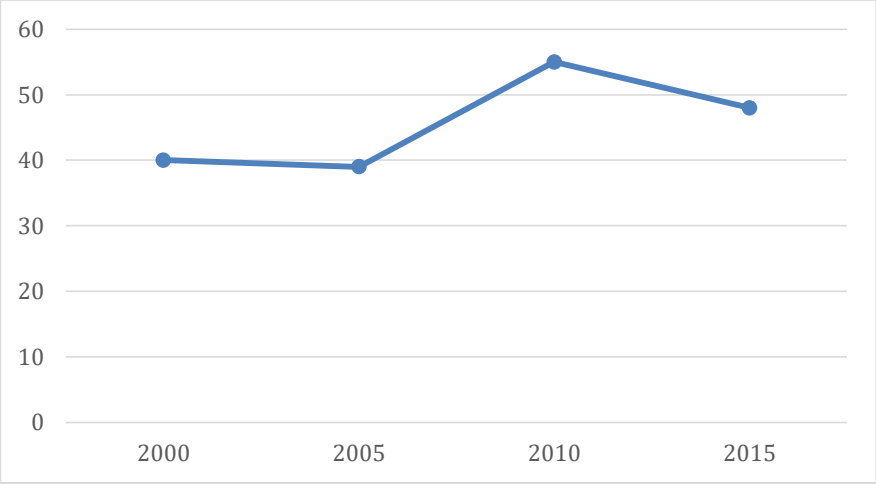

Figure 22. Centrality degree of the Banco de Credito del Peru (BCP) in the main component of 2000, 2005, 2010 and 2015

Source: Own elaboration.

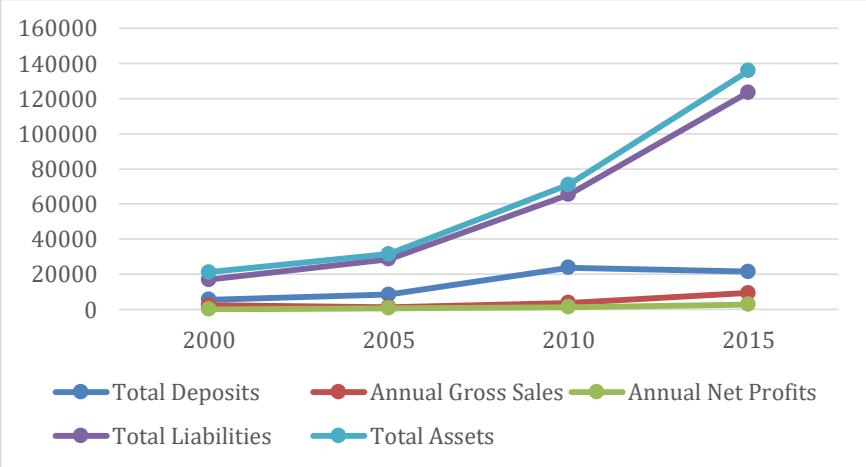

Figure 23. Total Deposits, Annual Gross Sales, Annual Net Profits, Total Liabilities, and Total Assets of the Banco de Credito del Peru (BCP), in 2000, 2005, 2010 and 2015 (millions of soles)

Source: Own elaboration.

The literature review process carried out for this study revealed that no previous board interlock research had focused on identifying how firms' network centrality measures (centrality degree, eigenvector centrality or betweenness

centrality) are related to how long ago they were founded. Bucheli et al. (2019) demonstrated how multinational firms tend to establish board interlock when venturing into new markets; however, data collected for this research in Tables 15-19, 22-26, 29-33, and 36-40 could shed additional light on this path for future research. It would be important to observe how much time firms take to insert themselves into the power and influence dynamics of the corporate network of IDs, through a quantitative methodological approach with correlational analysis.

According to the conclusions of this research, 2001's political turmoil in Peru increased uncertainty in the business environment and consequently fragmented the Peruvian corporate network, reducing its connectivity, and changing the role of its participants. The same could be expected to be found when analyzing another coming period (for instance 2020), due to the 2018-2019 political crises in Peru, related to issues of corruption and public treasury fraud, which involved large construction firms as well as politicians and ex-presidents of this country. A new data collection for the 2020 period will be needed in order to extend the research in this field.

Additional research about how Peru's main industries connect between them might shed light on how they take their intra and inter industry decisions, as well as how the corporate industry network evolves across time. Graphic analysis using NetDraw (Borgatti, 2002) could assist this new research. Following the study of Phan et al. (2003), the results of intra and inter industry connectedness are different, and both change in their resources attraction capacity.

Finally, another limitation was the data related to executives' background in order to understand where they come from and find patterns in their professional experience that could explain their decisions as directors (Hambrick, 2007). As it was stated before, firms' annual reports or other official documents do not follow the same structure of reporting, which make the process difficult. However, a larger research project could use interviews, surveys or other open access documents to fill in this gap. Collecting these additional data will permit future studies to find empirical evidence correlating background variables of the directors with their centrality measures in the corporate network.

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Appendices

Appendix A

Table 10

Main characteristics of the sample

Sample characteristics	2000	2005	2010	2015
Sample size	128	153	230	265
A: Number of non-financial firms	120	140	208	242
Percentage of non-financial firms also in sample previous year		80.7%	65.8%	76.0%
Total number of persons (directors in non-financial firms)	697	795	1027	1133
Size if the board (non-financial firms)	5.8	5.7	4.9	4.7
B: Number of financial firms	8	13	22	23
Percentage of financial firms also in sample previous year		61.5%	54.5%	82.6%
Total number of persons (directors in financial firms)	94	114	179	176
Size of the board (financial firms)	11.7	8.8	8.1	7.6
Size of the board (total sample)	7.9	7.6	7.1	6.7

Source: Own elaboration.

Appendix B

Table 11

Structure data of Peruvian corporate network

Structure	2000	2005	2010	2015
Total number of firms (A+B)	128	153	230	265
Percentage of firms in sample previous year		79.1%	64.8%	76.6%
Number of marginal firms (M)	28	25	36	35
M as percentage of total number of firms	21.8%	16.3%	15.6%	13.2%
Isolated firms (I)	20	46	62	70
I as percentage of total number of firms	15.6%	30.0%	26.9%	26.4%
I and M as percentage of total number of firms	37.5%	46.4%	42.6%	39.6%
Firms in main component	97	83	134	162
Percentage of firms in main component	75.8%	54.2%	58.2%	61.1%
Financial firms in main component	8	7	9	14
Percentage of financial firms in main component	100%	53.8%	40.9%	60.8%
Non financial firms in main component	89	76	125	148
Percentage of non financial firms in main component	74.2%	54.3%	60.1%	61.2%
Number of components (2m)	6	12	12	13

Source: Own elaboration.

Appendix C

Table 12

Ties' characteristics in Peruvian corporate network

Ties	2000	2005	2010	2015
Total number of lines	1058	992	2034	2136
Total number of lines (main component)	1036	910	1738	1898
Total number of lines (main component dichotomized)	598	440	934	1046
Density (main component)	0.111	0.134	0.098	0.073
Density (main component dichotomized)	0.064	0.065	0.052	0.040

Source: Own elaboration.

Appendix D

Table 13

Centrality measures in Peruvian corporate network

Centrality	2000	2005	2010	2015
Diameter	10	11	9	10
Average distance	3.679	3.817	3.386	4.037
Average degree	4.766	3.046	4.417	4.226
Average degree (main component dichotomized)	6.165	5.301	6.970	6.457
Degree centrality (main component dichotomized)	0.179	0.209	0.153	0.104
Eigenvector centrality (main component dichotomized)	0.055	0.061	0.045	0.036
Betweenness centrality (nbet main component dichotomized)	2.824	3.493	1.817	1.904

Source: Own elaboration.

Appendix E

Table 14

Directors features in Peruvian corporate network

Directors	2000	2005	2010	2015
Number of directors	749	870	1157	1250
Number of interlockers	148	195	261	270
Number of big linkers	52	51	91	109
Interlockers as percentage of directors	19.7%	22.4%	22.5%	21.6%
Big linkers as percentage of directors	6.9%	5.8%	7.8%	8.7%
Number of mandates	1016	1169	1638	1768
Number of mandates held by interlockers	415	494	742	788
Percentage of mandates held by interlockers (number of mandates)	40.8%	42.3%	45.3%	44.6%
Number of mandates held by big linkers	223	206	402	466
Percentage of mandates held by big linkers (number of mandates)	21.9%	17.6%	24.5%	26.4%

Source: Own elaboration.

Appendix F

Table 15

Top 30 firms by Degree Centrality in 2000's main component

N°	Firm name	Degree	nDegree	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	54	0.08	1986	Public	Peru	Construction
2	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	43	0.064	1992	Public	Peru	Insurances
3	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	41	0.061	1879	Public	Peru	Food and Beverages
4	Banco de Crédito del Perú	40	0.06	1889	Public	Peru	Financial
5	LP Holding S.A.	38	0.057	1977	Public	Peru	Construction
6	Credicorp Ltd.	30	0.045	1995	Public	Peru	Financial Services
7	Creditítulos Sociedad Titulizadora S.A.	29	0.043	1997	Public	Peru	Financial Services
8	Alicorp S.A.A.	27	0.04	1956	Public	Peru	Food and Beverages
9	Rimac Seguros y Reaseguros	26	0.039	1896	Public	Peru	Insurances
10	Textil San Cristobal S.A.	26	0.039	1942	Public	Peru	Textile
11	Industria Textil Piura S.A.	25	0.037	1972	Public	Peru	Textile
12	Inversiones Nacionales de Turismo S.A.	24	0.036	1971	Public	Peru	Tourism
13	Exsa S.A.	23	0.034	1954	Public	Peru	Mining
14	La Positiva Seguros y Reaseguros	23	0.034	1937	Public	Peru	Insurances
15	Banco Wiese Sudameris	22	0.033	1943	Public	Peru	Financial
16	Cervecería San Juan S.A.	21	0.031	1971	Public	Peru	Food and Beverages

17	Los Portales S.A.	21	0.031	1996	Public	Peru	Services
18	Compañía Universal Textil S.A.	19	0.028	1989	Public	Peru	Textile
19	Industrias del Envase S.A.	19	0.028	1971	Public	Peru	Packaging
20	BBVA Banco Continental	17	0.025	1951	Public	Peru	Financial
21	Edelnor S.A.A.	17	0.025	1994	Mixed	Peru	Energy
22	Edegel S.A.A.	17	0.025	1906	Public	Peru	Energy
23	Minsur S.A.	16	0.024	1977	Public	Peru	Mining
24	Compañía Minera San Ignacio de Morococha S.A.A.	15	0.022	1942	Public	Peru	Mining
25	Negocios e Inmuebles S.A.	15	0.022	1982	Public	Peru	Infrastructure, transport and logistics
26	Telefonica del Peru S.A.A.	15	0.022	1920	Public	Peru	Telecommunications
27	Ferreyros S.A.A.	13	0.019	1922	Public	Peru	Construction
28	Profuturo A.F.P.	13	0.019	1993	Public	Peru	Pension fund manager
29	Peruana de Energía S.A.A.	13	0.019	1996	Public	Panama	Energy
30	Minera Andina de Exploraciones S.A.A.	12	0.018	1996	Public	Peru	Construction

Source: Own elaboration.

Appendix G

Table 16

Top 30 firms by Degree Centrality in 2000's main component dichotomized

N°	Firm name	Degree	nDegree	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	23	0.24	1986	Public	Peru	Construction
2	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	19	0.198	1992	Public	Peru	Insurances
3	LP Holding S.A.	19	0.198	1977	Public	Peru	Construction
4	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	19	0.198	1879	Public	Peru	Food and Beverages
5	Banco de Crédito del Perú	16	0.167	1889	Public	Peru	Financial
6	Cervecería San Juan S.A.	16	0.167	1971	Public	Peru	Food and Beverages
7	Industrias del Envase S.A.	15	0.156	1971	Public	Peru	Packaging
8	Credicorp Ltd.	15	0.156	1995	Public	Peru	Financial Services
9	Industria Textil Piura S.A.	14	0.146	1972	Public	Peru	Textile
10	Textil San Cristobal S.A.	14	0.146	1942	Public	Peru	Textile
11	Creditítulos Sociedad Titulizadora S.A.	14	0.146	1997	Public	Peru	Financial Services
12	Telefonica del Peru S.A.A.	13	0.135	1920	Public	Peru	Telecommunications
13	Banco Wiese Sudameris	13	0.135	1943	Public	Peru	Financial
14	Alicorp S.A.A.	12	0.125	1956	Public	Peru	Food and Beverages
15	Inversiones Nacionales de Turismo S.A.	12	0.125	1971	Public	Peru	Tourism
16	Los Portales S.A.	12	0.125	1996	Public	Peru	Services
17	Edegel S.A.A.	12	0.125	1906	Public	Peru	Energy
18	Compañía Universal Textil S.A.	11	0.115	1989	Public	Peru	Textile
19	Edelnor S.A.A.	11	0.115	1994	Mixed	Peru	Energy
20	Cementos Pacasmayo S.A.A.	11	0.115	1998	Public	Peru	Construction
21	Negocios e Inmuebles S.A.	10	0.104	1982	Public	Peru	Infrastructure, transport and logistics
22	Rimac Seguros y Reaseguros	10	0.104	1896	Public	Peru	Insurances

23	La Positiva Seguros y Reaseguros	10	0.104	1937	Public	Peru	Insurances
24	Exsa S.A.	9	0.094	1954	Public	Peru	Mining
25	Motores Diesel Andinos S.A.	9	0.094	1998	Mixed	Peru	Infrastructure, transport and logistics
26	BBVA Banco Continental	8	0.083	1951	Public	Peru	Financial
27	Corporación Aceros Arequipa S.A.	8	0.083	1997	Public	Peru	Construction
28	Graña y Montero S.A.A.	8	0.083	1996	Public	Peru	Construction
29	Minsur S.A.	8	0.083	1977	Public	Peru	Mining
30	Mapfre Perú Vida Compañía de Seguros y Reaseguros	8	0.083	1998	Public	Spain	Insurances

Source: Own elaboration.

Appendix H

Table 17

Top 30 firms by Eigenvector in 2000's main component

N°	Firm name	Eigenvector	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	0.422	1986	Public	Peru	Construction
2	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	0.363	1992	Public	Peru	Insurances
3	Banco de Crédito del Perú	0.355	1889	Public	Peru	Financial
4	LP Holding S.A.	0.296	1977	Public	Peru	Construction
5	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	0.27	1879	Public	Peru	Food and Beverages
6	Alicorp S.A.A.	0.231	1956	Public	Peru	Food and Beverages
7	Credicorp Ltd.	0.229	1995	Public	Peru	Financial Services
8	Creditítulos Sociedad Titulizadora S.A.	0.223	1997	Public	Peru	Financial Services
9	Textil San Cristobal S.A.	0.2	1942	Public	Peru	Textile
10	Industria Textil Piura S.A.	0.19	1972	Public	Peru	Textile
11	Los Portales S.A.	0.157	1996	Public	Peru	Services
12	Rimac Seguros y Reaseguros	0.14	1896	Public	Peru	Insurances
13	Compañía Universal Textil S.A.	0.138	1989	Public	Peru	Textile
14	Edelnor S.A.A.	0.138	1994	Mixed	Peru	Energy
15	Cervecería San Juan S.A.	0.13	1971	Public	Peru	Food and Beverages
16	Exsa S.A.	0.111	1954	Public	Peru	Mining
17	Inversiones Nacionales de Turismo S.A.	0.109	1971	Public	Peru	Tourism
18	Industrias del Envase S.A.	0.105	1971	Public	Peru	Packaging
19	BBVA Banco Continental	0.084	1951	Public	Peru	Financial
20	Minsur S.A.	0.075	1977	Public	Peru	Mining
21	Banco Wiese Sudameris	0.073	1943	Public	Peru	Financial
22	Mapfre Perú Vida Compañía de Seguros y Reaseguros	0.067	1998	Public	Spain	Insurances

23	Cementos Pacasmayo S.A.A.	0.062	1998	Public	Peru	Construction
24	Corporación Cerámica S.A.	0.057	1967	Public	Peru	Construction
25	Motores Diesel Andinos S.A.	0.055	1998	Mixed	Peru	Infrastructure, transport and logistics
26	Desarrollos Siglo XXI S.A.A.	0.038	1997	Public	Peru	Construction
27	Negocios e Inmuebles S.A.	0.033	1982	Public	Peru	Infrastructure, transport and logistics
28	Corporación Aceros Arequipa S.A.	0.024	1997	Public	Peru	Construction
29	Edegel S.A.A.	0.023	1906	Public	Peru	Energy
30	Sociedad Minera El Brocal S.A.A.	0.018	1956	Public	Peru	Mining

Source: Own elaboration.

Appendix I

Table 18

Top 30 firms by Eigenvector in 2000's main component dichotomized

N°	Firm name	Eigenvector	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	0.321	1986	Public	Peru	Construction
2	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	0.273	1879	Public	Peru	Food and Beverages
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	0.271	1992	Public	Peru	Insurances
4	LP Holding S.A.	0.264	1977	Public	Peru	Construction
5	Industria Textil Piura S.A.	0.245	1972	Public	Peru	Textile
6	Credicorp Ltd.	0.236	1995	Public	Peru	Financial Services
7	Banco de Crédito del Perú	0.233	1889	Public	Peru	Financial
8	Textil San Cristobal S.A.	0.226	1942	Public	Peru	Textile
9	Creditítulos Sociedad Titulizadora S.A.	0.222	1997	Public	Peru	Financial Services
10	Industrias del Envase S.A.	0.221	1971	Public	Peru	Packaging
11	Cervecería San Juan S.A.	0.219	1971	Public	Peru	Food and Beverages
12	Los Portales S.A.	0.21	1996	Public	Peru	Services
13	Alicorp S.A.A.	0.204	1956	Public	Peru	Food and Beverages
14	Compañía Universal Textil S.A.	0.204	1989	Public	Peru	Textile
15	Edelnor S.A.A.	0.163	1994	Mixed	Peru	Energy
16	Inversiones Nacionales de Turismo S.A.	0.157	1971	Public	Peru	Tourism
17	Cementos Pacasmayo S.A.A.	0.137	1998	Public	Peru	Construction
18	Motores Diesel Andinos S.A.	0.127	1998	Mixed	Peru	Infrastructure, transport and logistics
19	Rimac Seguros y Reaseguros	0.123	1896	Public	Peru	Insurances
20	Exsa S.A.	0.118	1954	Public	Peru	Mining
21	BBVA Banco Continental	0.117	1951	Public	Peru	Financial
22	Minsur S.A.	0.117	1977	Public	Peru	Mining

23	Mapfre Perú Vida Compañía de Seguros y Reaseguros	0.085	1998	Public	Spain	Insurances
24	Corporación Cerámica S.A.	0.083	1967	Public	Peru	Construction
25	Banco Wiese Sudameris	0.075	1943	Public	Peru	Financial
26	Desarrollos Siglo XXI S.A.A.	0.074	1997	Public	Peru	Construction
27	Corporación Aceros Arequipa S.A.	0.066	1997	Public	Peru	Construction
28	Negocios e Inmuebles S.A.	0.061	1982	Public	Peru	Infrastructure, transport and logistics
29	Sociedad Minera El Brocal S.A.A.	0.036	1956	Public	Peru	Mining
30	Edegel S.A.A.	0.031	1906	Public	Peru	Energy

Source: Own elaboration.

Appendix J

Table 19

Top 30 firms by Betweenness in 2000's main component

N	Firm name	nBetweenness	Founding	Owner	Nationality	Economic sector
1	Banco Wiese Sudameris	18.788	1943	Public	Peru	Financial
2	LP Holding S.A.	13.776	1977	Public	Peru	Construction
3	Industrias Electro Químicas S.A.	13.6	1963	Public	Peru	Technology
4	A.F.P. Integra S.A.	12.485	1993	Public	Peru	Pension Fund Manager
5	Interseguro Compañía de Seguros S.A.	12.292	1998	Public	Peru	Insurances
6	Telefonica del Peru S.A.A.	11.164	1920	Public	Peru	Telecommunications
7	Edegel S.A.A.	10.6	1906	Public	Peru	Energy
8	Negocios e Inmuebles S.A.	10.427	1982	Public	Peru	Infrastructure, transport and logistics
9	Quimpac S.A.	8.965	1996	Public	Peru	House and cleaning
10	Mapfre Perú Vida Compañía de Seguros y Reaseguros	7.206	1998	Public	Spain	Insurances
11	Sociedad Minera Cerro Verde S.A.A.	6.779	1993	Public	Peru	Mining
12	Inversiones Centenario S.A.A.	6.734	1986	Public	Peru	Construction
13	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	6.54	1992	Public	Peru	Insurances
14	Mibanco Banco de la Micro Empresa S.A.	6.162	1998	Public	Peru	Financial
15	Banco Internacional del Perú S.A.A. - INTERBANK	6.118	1897	Public	Peru	Financial
16	Cavali S.A. I.C.L.V.	6.061	1997	Public	Peru	Financial Services
17	Cementos Pacasmayo S.A.A.	5.891	1998	Public	Peru	Construction
18	Bolsa de Valores de Lima S.A.A.	5.312	1970	Public	Peru	Financial Services
19	Empresa Eléctrica de Piura S.A.	4.924	1996	Mixed	Peru	Energy
20	Corporación Aceros Arequipa S.A.	4.821	1997	Public	Peru	Construction

21	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	4.601	1879	Public	Peru	Food and Beverages
22	Edelnor S.A.A.	4.327	1994	Mixed	Peru	Energy
23	Motores Diesel Andinos S.A.	4.247	1998	Mixed	Peru	Infrastructure, transport and logistics
24	Cervecería San Juan S.A.	4.161	1971	Public	Peru	Food and Beverages
25	Cartavio S.A.A.	4.145	1997	Public	Peru	Agrarian
26	Compañía Minera San Ignacio de Morococha S.A.A.	4.123	1942	Public	Peru	Mining
27	América Leasing S.A.	4.123	1995	Public	Chile	Financial Services
28	La Positiva Seguros y Reaseguros	4.038	1937	Public	Peru	Insurances
29	Banco de Crédito del Perú	3.206	1889	Public	Peru	Financial
30	Ferreyros S.A.A.	3.167	1922	Public	Peru	Construction

Source: Own elaboration.

Appendix K

Table 20

Top 30 directors by Degree and Betweenness in 2000's main component

N	Director name	G	Degree	nDegree	Director name	G	nBetweenness
1	Gonzalo de la Puente Wiese	M	78	0.023	Gonzalo de la Puente Wiese	M	22.312
2	Juan Francisco Raffo Novelli	M	72	0.021	Carlos Gliksman Latowicka	M	14.053
3	Fernando Fort Marie	M	69	0.02	Raul Alberto Musso Vento	M	11.677
4	Dionisio Romero Seminario	M	67	0.02	Alberto Benavides de la Quintana	M	10.597
5	Luis Nicolini Bernucci	M	62	0.018	Fernando Fort Marie	M	9.224
6	Pedro Brescia Cafferata	M	61	0.018	John Van der Westhuizen	M	8.785
7	Mario Augusto Brescia Cafferata	M	60	0.018	Susana de la Puente Wiese	F	8.642
8	Reynaldo Llosa Barber	M	58	0.017	Jose Alfonso Bustamante y Bustamante	M	8.035
9	Augusto Wiese Moreyra	M	55	0.016	Raul Temistocles Salazar Olivares	M	7.147
10	Jose Antonio Onrubia Romero	M	52	0.015	Felipe Barclay Piazza	M	7.057
11	Juan Carlos Verme Giannoni	M	51	0.015	Oscar Javier de Osma Berckemeyer	M	6.511
12	Alberto Benavides de la Quintana	M	49	0.014	Javier Otero Nosiglia	M	6.511
13	Arturo Woodman Pollit	M	47	0.014	Francisco Moreyra Garcia-Sayan	M	6.29
14	Jose Alejandro Graña Miro-Quesada	M	45	0.013	Dionisio Romero Seminario	M	5.904
15	Ernesto Raffo Paine	M	44	0.013	Erasmo Jesus Wong Lu Vega	M	5.856
16	Eugenio Bertini Vinci	M	44	0.013	Enrique Normand Sparks	M	5.651
17	Oscar Berckemeyer Perez-Hidalgo	M	44	0.013	Gonzalo de la Puente Lavalle	M	5.579
18	Calixto Romero Seminario	M	43	0.013	Jose Alejandro Graña Miro-Quesada	M	5.33
19	Jose Alfonso Bustamante y Bustamante	M	40	0.012	Oscar Berckemeyer Perez-Hidalgo	M	5.306
20	Diomedes Arias-Schreiber Wiese	M	39	0.012	Augusto Wiese Moreyra	M	5.141
21	Mario Brescia Moreyra	M	39	0.012	Eugenio Bertini Vinci	M	5.11
22	Susana de la Puente Wiese	F	37	0.011	Juan Carlos Verme Giannoni	M	5.105
23	Carlos Enrique Palacios Rey	M	36	0.011	Ivan Galvez Delgado	M	5.033

24	Jose Maria Hidalgo Martin-Mateos	M	36	0.011	Eduardo Pio Villa Luna	M	4.842
25	Pablo Casado Reboiro	M	36	0.011	Carlos Enrique Palacios Rey	M	4.319
26	Francisco Moreyra Garcia-Sayan	M	35	0.01	Arturo Woodman Pollit	M	4.129
27	Victor Montori Alfaro	M	35	0.01	Juan Francisco Raffo Novelli	M	4.019
28	Andreas Von Wedemeyer Knigge	M	34	0.01	Roberto Calda Cavanna	M	3.854
29	Enrique Normand Sparks	M	34	0.01	Jose Maria Hidalgo Martin-Mateos	M	3.798
30	Paul Fort Magot	M	34	0.01	Pablo Casado Reboiro	M	3.798

Source: Own elaboration.

Appendix L

Table 21

Top 30 directors by Eigenvector and boards number in 2000's main component

N	Director name	G	Eigenvector	Director name	G	Number of Boards
1	Juan Francisco Raffo Novelli	M	0.34	Juan Francisco Raffo Novelli	M	9
2	Luis Nicolini Bernucci	M	0.337	Dionisio Romero Seminario	M	8
3	Dionisio Romero Seminario	M	0.314	Fernando Fort Marie	M	8
4	Fernando Fort Marie	M	0.294	Mario Augusto Brescia Cafferata	M	8
5	Reynaldo Llosa Barber	M	0.275	Jose Antonio Onrubia Romero	M	7
6	Jose Antonio Onrubia Romero	M	0.261	Luis Nicolini Bernucci	M	7
7	Ernesto Raffo Paine	M	0.227	Pedro Brescia Cafferata	M	7
8	Juan Carlos Verme Giannoni	M	0.215	Juan Carlos Verme Giannoni	M	6
9	Arturo Woodman Pollit	M	0.204	Reynaldo Llosa Barber	M	6
10	Pedro Brescia Cafferata	M	0.193	Alberto Benavides de la Quintana	M	5
11	Calixto Romero Seminario	M	0.189	Andreas Von Wedemeyer Knigge	M	5
12	Mario Augusto Brescia Cafferata	M	0.163	Arturo Woodman Pollit	M	5
13	Jose Antonio Onrubia Holder	M	0.124	Calixto Romero Seminario	M	5
14	Paul Fort Magot	M	0.119	Ernesto Raffo Paine	M	5
15	Alberto Pescetto Labbe	M	0.104	Gonzalo de la Puente Wiese	M	5
16	Gonzalo de la Puente Lavalle	M	0.101	Jose Alfonso Bustamante y Bustamante	M	5
17	Mario Brescia Moreyra	M	0.1	Augusto Wiese Moreyra	M	4
18	Roberto Calda Cavanna	M	0.087	Carlos Tomas Rodriguez-Pastor Persivale	M	4
19	Victor Montori Alfaro	M	0.084	Enrique Normand Sparks	M	4
20	Baltazar Caravedo Molinari	M	0.079	Eugenio Bertini Vinci	M	4
21	Ernesto Fernandini Raffo	M	0.079	Francisco Moreyra Garcia-Sayan	M	4
22	Carlos Bentin Remy	M	0.077	Gonzalo de la Puente Lavalle	M	4
23	Oscar Berckemeyer Perez-Hidalgo	M	0.075	Jose Alejandro Graña Miro-Quesada	M	4
24	Pedro Brescia Moreyra	M	0.071	Manuel Bustamante Olivares	M	4
25	Carlos Enrique Palacios Rey	M	0.069	Mario Brescia Moreyra	M	4

26	Diego de Osma Ayulo	M	0.067	Oscar Guillermo Espinosa Bedoya	M	4
27	Tulio Ghio Massa	M	0.067	Paul Fort Magot	M	4
28	Elias Bentin Peral	M	0.064	Pedro Brescia Moreyra	M	4
29	Alfonso Olaechea Alvarez-Calderon	M	0.06	Ramon Jose Barua Alzamora	M	4
30	Jaime Rizo-Patron Remy	M	0.06	Victor Montori Alfaro	M	4

Source: Own elaboration

Appendix M

Table 22

Top 30 firms by Degree Centrality in 2005's main component

N	Firm name	Degree	nDegree	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	42	0.037	1986	Public	Peru	Construction
2	Banco de Crédito del Perú	39	0.034	1889	Public	Peru	Financial
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	35	0.03	1992	Public	Peru	Insurances
4	Credicorp Ltd.	33	0.029	1995	Public	Peru	Financial Services
5	La Positiva Seguros y Reaseguros	29	0.025	1937	Public	Peru	Insurances
6	Rimac Seguros y Reaseguros	27	0.024	1896	Public	Peru	Insurances
7	Inversiones Nacionales de Turismo S.A.	26	0.023	1971	Public	Peru	Tourism
8	Exsa S.A.	26	0.023	1954	Public	Peru	Mining
9	Minsur S.A.	24	0.021	1977	Public	Peru	Mining
10	La Positiva Vida Seguros y Reaseguros S.A.	24	0.021	2005	Public	Peru	Insurances
11	Solución Financiera de Crédito del Perú S.A.	24	0.021	1979	Public	Peru	Financial Services
12	Creditítulos Sociedad Titulizadora S.A.	24	0.021	1997	Public	Peru	Financial Services
13	Alicorp S.A.A.	22	0.019	1956	Public	Peru	Food and Beverages
14	Profuturo A.F.P.	21	0.018	1993	Public	Peru	Pension fund manager
15	Industria Textil Piura S.A.	19	0.017	1972	Public	Peru	Textile
16	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	19	0.017	1879	Public	Peru	Food and Beverages
17	Corporación Financiera de Inversiones S.A.	19	0.017	1998	Public	Peru	Financial Services
18	Compañía Universal Textil S.A.	18	0.016	1989	Public	Peru	Textile
19	BBVA Banco Continental	17	0.015	1951	Public	Peru	Financial
20	Inmuebles Panamericana S.A.	17	0.015	1998	Public	Peru	Construction

21	Cervecería San Juan S.A.	17	0.015	1971	Public	Peru	Food and Beverages
22	Banco Internacional del Perú S.A.A. - INTERBANK	16	0.014	1897	Public	Peru	Financial
23	Ferreyros S.A.A.	16	0.014	1922	Public	Peru	Construction
24	InVita Seguros de Vida	16	0.014	2000	Public	Peru	Insurances
25	Corporación Cervesur S.A.A.	14	0.012	1926	Public	United Kingdom	Construction
26	Creditex S.A.A.	14	0.012	1980	Public	Peru	Textile
27	Compañía Minera San Ignacio de Morococha S.A.A.	12	0.01	1942	Public	Peru	Mining
28	LP Holding S.A.	12	0.01	1977	Public	Peru	Construction
29	Cementos Pacasmayo S.A.A.	12	0.01	1998	Public	Peru	Construction
30	Corporación Aceros Arequipa S.A.	11	0.01	1997	Public	Peru	Construction

Source: Own elaboration.

Appendix N

Table 23

Top 30 firms by Degree Centrality in 2005's main component dichotomized

N	Firm name	Degree	nDegree	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	22	0.268	1986	Public	Peru	Construction
2	Banco de Crédito del Perú	14	0.171	1889	Public	Peru	Financial
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	14	0.171	1992	Public	Peru	Insurances
4	Credicorp Ltd.	13	0.159	1995	Public	Peru	Financial Services
5	Alicorp S.A.A.	12	0.146	1956	Public	Peru	Food and Beverages
6	Corporación Financiera de Inversiones S.A.	11	0.134	1998	Public	Peru	Financial Services
7	Corporación Aceros Arequipa S.A.	10	0.122	1997	Public	Peru	Construction
8	La Positiva Seguros y Reaseguros	10	0.122	1937	Public	Peru	Insurances
9	Cementos Pacasmayo S.A.A.	10	0.122	1998	Public	Peru	Construction
10	Compañía Universal Textil S.A.	9	0.11	1989	Public	Peru	Textile
11	Industria Textil Piura S.A.	9	0.11	1972	Public	Peru	Textile
12	Ferreyros S.A.A.	9	0.11	1922	Public	Peru	Construction
13	La Positiva Vida Seguros y Reaseguros S.A.	9	0.11	2005	Public	Peru	Insurances
14	Solución Financiera de Crédito del Perú S.A.	9	0.11	1979	Public	Peru	Financial Services
15	Creditítulos Sociedad Titulizadora S.A.	9	0.11	1997	Public	Peru	Financial Services
16	Banco Internacional del Perú S.A.A. - INTERBANK	8	0.098	1897	Public	Peru	Financial
17	Corporación Cervesur S.A.A.	8	0.098	1926	Public	United Kingdom	Construction
18	Creditex S.A.A.	8	0.098	1980	Public	Peru	Textile
19	Profuturo A.F.P.	8	0.098	1993	Public	Peru	Pension fund manager

20	Motores Diesel Andinos S.A.	8	0.098	1998	Mixed	Peru	Infrastructure, transport and logistics
21	Inmuebles Panamericana S.A.	7	0.085	1998	Public	Peru	Construction
22	Inversiones Nacionales de Turismo S.A.	7	0.085	1971	Public	Peru	Tourism
23	Rimac Seguros y Reaseguros	7	0.085	1896	Public	Peru	Insurances
24	Exsa S.A.	7	0.085	1954	Public	Peru	Mining
25	Unión Andina de Cementos S.A.A. - UNACEM S.A.A.	7	0.085	1967	Public	Peru	Construction
26	Edelnor S.A.A.	7	0.085	1994	Public	Peru	Energy
27	InVita Seguros de Vida	7	0.085	2000	Public	Peru	Insurances
28	Corporación Cerámica S.A.	6	0.073	1967	Public	Peru	Construction
29	LP Holding S.A.	6	0.073	1977	Public	Peru	Construction
30	Los Portales S.A.	6	0.073	1996	Public	Peru	Services

Source: Own elaboration.

Appendix O

Table 24

Top 30 firms by Eigenvector in 2005's main component

N	Firm name	Eigenvector	Founding	Owner	Nationality	Economic sector
1	Banco de Crédito del Perú	0.455	1889	Public	Peru	Financial
2	Inversiones Centenario S.A.A.	0.39	1986	Public	Peru	Construction
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	0.386	1992	Public	Peru	Insurances
4	Credicorp Ltd.	0.351	1995	Public	Peru	Financial Services
5	Solución Financiera de Crédito del Perú S.A.	0.254	1979	Public	Peru	Financial Services
6	Creditítulos Sociedad Titulizadora S.A.	0.254	1997	Public	Peru	Financial Services
7	Alicorp S.A.A.	0.24	1956	Public	Peru	Food and Beverages
8	Industria Textil Piura S.A.	0.18	1972	Public	Peru	Textile
9	Rimac Seguros y Reaseguros	0.16	1896	Public	Peru	Insurances
10	Compañía Universal Textil S.A.	0.157	1989	Public	Peru	Textile
11	Exsa S.A.	0.132	1954	Public	Peru	Mining
12	Inversiones Nacionales de Turismo S.A.	0.126	1971	Public	Peru	Tourism
13	Minsur S.A.	0.12	1977	Public	Peru	Mining
14	Cementos Pacasmayo S.A.A.	0.114	1998	Public	Peru	Construction
15	BBVA Banco Continental	0.1	1951	Public	Peru	Financial
16	Edelnor S.A.A.	0.079	1994	Public	Peru	Energy
17	Corporación Cerámica S.A.	0.076	1967	Public	Peru	Construction
18	LP Holding S.A.	0.06	1977	Public	Peru	Construction
19	Motores Diesel Andinos S.A.	0.06	1998	Mixed	Peru	Infrastructure, transport and logistics
20	Compañía de Minas Buenaventura S.A.A.	0.059	1953	Public	Peru	Mining
21	Los Portales S.A.	0.047	1996	Public	Peru	Services
22	Unión Andina de Cementos S.A.A. -UNACEM S.A.A.	0.034	1967	Public	Peru	Construction

23	Sociedad Minera El Brocal S.A.A.	0.026	1956	Public	Peru	Mining
24	Inmuebles Panamericana S.A.	0.019	1998	Public	Peru	Construction
25	Compañía Minera Milpo S.A.A.	0.018	1949	Public	Peru	Mining
26	Mapfre Perú Vida Compañía de Seguros y Reaseguros	0.017	1998	Public	Spain	Insurances
27	Prima AFP S.A.	0.016	2005	Public	Peru	Pension fund manager
28	InVita Seguros de Vida	0.012	2000	Public	Peru	Insurances
29	Banco del Trabajo S.A.	0.011	1994	Public	Panama	Financial
30	Negocios e Inmuebles S.A.	0.01	1982	Public	Peru	Infrastructure, transport and logistics

Source: Own elaboration.

Appendix P

Table 25

Top 30 firms by Eigenvector in 2005's main component dichotomized

N	Firm name	Eigenvector	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	0.387	1986	Public	Peru	Construction
2	Banco de Crédito del Perú	0.317	1889	Public	Peru	Financial
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	0.316	1992	Public	Peru	Insurances
4	Credicorp Ltd.	0.314	1995	Public	Peru	Financial Services
5	Alicorp S.A.A.	0.269	1956	Public	Peru	Food and Beverages
6	Solución Financiera de Crédito del Perú S.A.	0.242	1979	Public	Peru	Financial Services
7	Creditítulos Sociedad Titulizadora S.A.	0.242	1997	Public	Peru	Financial Services
8	Compañía Universal Textil S.A.	0.241	1989	Public	Peru	Textile
9	Industria Textil Piura S.A.	0.241	1972	Public	Peru	Textile
10	Cementos Pacasmayo S.A.A.	0.223	1998	Public	Peru	Construction
11	Edelnor S.A.A.	0.19	1994	Public	Peru	Energy
12	Motores Diesel Andinos S.A.	0.167	1998	Mixed	Peru	Infrastructure, transport and logistics
13	Corporación Cerámica S.A.	0.156	1967	Public	Peru	Construction
14	LP Holding S.A.	0.139	1977	Public	Peru	Construction
15	Los Portales S.A.	0.139	1996	Public	Peru	Services
16	Unión Andina de Cementos S.A.A. - UNACEM S.A.A.	0.09	1967	Public	Peru	Construction
17	Inversiones Nacionales de Turismo S.A.	0.074	1971	Public	Peru	Tourism
18	Rimac Seguros y Reaseguros	0.074	1896	Public	Peru	Insurances
19	Exsa S.A.	0.074	1954	Public	Peru	Mining
20	Compañía de Minas Buenaventura S.A.A.	0.071	1953	Public	Peru	Mining
21	BBVA Banco Continental	0.07	1951	Public	Peru	Financial

22	Minsur S.A.	0.07	1977	Public	Peru	Mining
23	Compañía Minera Milpo S.A.A.	0.063	1949	Public	Peru	Mining
24	Mapfre Perú Vida Compañía de Seguros y Reaseguros	0.059	1998	Public	Spain	Insurances
25	Sociedad Minera El Brocal S.A.A.	0.047	1956	Public	Peru	Mining
26	Corporación Financiera de Inversiones S.A.	0.042	1998	Public	Peru	Financial Services
27	Corporación Cervesur S.A.A.	0.038	1926	Public	United Kingdom	Construction
28	Creditex S.A.A.	0.038	1980	Public	Peru	Textile
29	Banco del Trabajo S.A.	0.035	1994	Public	Panama	Financial
30	Prima AFP S.A.	0.033	2005	Public	Peru	Pension fund manager

Source: Own elaboration.

Appendix Q

Table 26

Top 30 firms by Betweenness in 2005's main component

N	Firm name	nBetweenness	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	25.421	1986	Public	Peru	Construction
2	Alicorp S.A.A.	19.064	1956	Public	Peru	Food and Beverages
3	Laive S.A.	14.406	1910	Public	Peru	Food and Beverages
4	Corporación Aceros Arequipa S.A.	14.308	1997	Public	Peru	Construction
5	Quimpac S.A.	13.956	1996	Public	Peru	House and cleaning
6	Unión Andina de Cementos S.A.A. - UNACEM S.A.A.	13.08	1967	Public	Peru	Construction
7	Banco Wiese Sudameris	12.422	1943	Public	Peru	Financial
8	Motores Diesel Andinos S.A.	12.023	1998	Mixed	Peru	Infrastructure, transport and logistics
9	Ferreyros S.A.A.	11.659	1922	Public	Peru	Construction
10	Banco Internacional del Perú S.A.A. - INTERBANK	10.785	1897	Public	Peru	Financial
11	Cementos Pacasmayo S.A.A.	10.338	1998	Public	Peru	Construction
12	Banco de Crédito del Perú	8.504	1889	Public	Peru	Financial
13	Graña y Montero S.A.A.	7.715	1996	Public	Peru	Construction
14	Volcan Compañia Minera S.A.A.	7.136	1943	Public	Peru	Mining
15	Compañía Minera Milpo S.A.A.	6.882	1949	Public	Peru	Mining
16	Mapfre Perú Vida Compañía de Seguros y Reaseguros	6.031	1998	Public	Spain	Insurances
17	Corporación Financiera de Inversiones S.A.	5.632	1998	Public	Peru	Financial Services
18	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	5.119	1992	Public	Peru	Insurances
19	Rimac Seguros y Reaseguros	5.069	1896	Public	Peru	Insurances

20	Banco Falabella Perú S.A.	4.848	1996	Public	Chile	Financial
21	Compañía Minera Atacocha S.A.A.	4.818	1936	Public	Panama	Mining
22	Refinería La Pampilla S.A.	4.494	1994	Public	Netherlands	Energy
23	Corporación Cervesur S.A.A.	4.28	1926	Public	United Kingdom	Construction
24	Creditex S.A.A.	4.28	1980	Public	Peru	Textile
25	Credicorp Ltd.	3.686	1995	Public	Peru	Financial Services
26	Edelnor S.A.A.	3.009	1994	Public	Peru	Energy
27	Exsa S.A.	2.67	1954	Public	Peru	Mining
28	Inmuebles Panamericana S.A.	2.657	1998	Public	Peru	Construction
29	InVita Seguros de Vida	2.529	2000	Public	Peru	Insurances
30	Compañía Minera San Ignacio de Morococha S.A.A.	2.439	1942	Public	Peru	Mining

Source: Own elaboration.

Appendix R

Table 27

Top 30 directors by Degree and Betweenness in 2005's main component

N	Director name	G	Degree	nDegree	Director name	G	nBetweenness
1	Dionisio Romero Paoletti	M	73	0.033	Jesus Antonio Zamora Leon	M	17.28
2	Reynaldo Llosa Barber	M	58	0.026	Gustavo Caillaux Zazzali	M	16.384
3	Alex Fort Brescia	M	54	0.024	Raul Temistocles Salazar Olivares	M	16.135
4	Luis Nicolini Bernucci	M	51	0.023	Dionisio Romero Paoletti	M	15.629
5	Andreas Von Wedemeyer Knigge	M	49	0.022	Francisco Moreyra Garcia-Sayan	M	15.187
6	Victor Montori Alfaro	M	48	0.021	Raul Barrios Orbegoso	M	13.658
7	Jose Antonio Onrubia Holder	M	46	0.02	Oscar Alfredo Romero Vega	M	11.836
8	Juan Carlos Verme Giannoni	M	45	0.02	Jose Picasso Salinas	M	10.935
9	Juan Francisco Raffo Novelli	M	45	0.02	Luis Moreyra Ferreyros	M	9.749
10	Fernando Fort Marie	M	44	0.02	Jorge Von Wedemeyer Knigge	M	9.022
11	Mario Augusto Brescia Cafferata	M	43	0.019	Alex Fort Brescia	M	8.542
12	Pedro Brescia Cafferata	M	43	0.019	Victor Montori Alfaro	M	8.538
13	Pedro Brescia Moreyra	M	43	0.019	Manuel Galup Fernandez-Concha	M	8.123
14	Jesus Antonio Zamora Leon	M	37	0.016	Ricardo Cilloniz Champin	M	8.104
15	Juan Manuel Peña Roca	M	37	0.016	Gianfranco Maximo Castagnola Zuñiga	M	7.971
16	Manuel Bustamante Olivares	M	37	0.016	Fernando Fort Marie	M	7.524
17	Carlos Bentin Remy	M	36	0.016	Gonzalo de la Puente Wiese	M	7.306
18	Gonzalo de la Puente Wiese	M	36	0.016	Jose Antonio Baertl Montori	M	6.905
19	Fortunato Brescia Moreyra	M	34	0.015	Alfredo Gastañeta Alayza	M	6.668
20	Jose Alfonso Bustamante y Bustamante	M	34	0.015	Oscar Javier de Osma Berckemeyer	M	6.397
21	Mario Brescia Moreyra	M	34	0.015	Francisco Jose Garcia-Calderon Portugal	M	6.066
22	Oscar Guillermo Espinosa Bedoya	M	33	0.015	Andreas Von Wedemeyer Knigge	M	5.955
23	Dionisio Romero Seminario	M	32	0.014	Reynaldo Llosa Barber	M	5.583

24	Eduardo Hochschild Beeck	M	32	0.014	Jose Antonio Onrubia Holder	M	5.233
25	Alberto Preciado Arbelaez	M	31	0.014	Pyers Griffith Mostyn	M	5.025
26	Alejandro Santo Domingo Davila	M	31	0.014	Hernando Graña Acuña	M	4.79
27	Carlos Alejandro Perez Davila	M	31	0.014	Gonzalo de la Puente Lavalle	M	4.606
28	Felipe Osterling Parodi	M	31	0.014	Jose Miguel Morales Dasso	M	4.496
29	German Montoya Velez	M	31	0.014	Benedicto Cigueñas Guevara	M	4.365
30	Jon David Silverman Gordon	M	31	0.014	Drago Kisic Wagner	M	4.309

Source: Own elaboration.

Appendix S

Table 28

Top 30 directors by Eigenvector and boards number in 2005's main component

N	Director name	G	Eigenvector	Director name	G	Number of Boards
1	Dionisio Romero Paoletti	M	0.382	Dionisio Romero Paoletti	M	8
2	Reynaldo Llosa Barber	M	0.364	Andreas Von Wedemeyer Knigge	M	7
3	Luis Nicolini Bernucci	M	0.326	Reynaldo Llosa Barber	M	7
4	Juan Carlos Verme Giannoni	M	0.299	Alex Fort Brescia	M	6
5	Fernando Fort Marie	M	0.296	Fernando Fort Marie	M	6
6	Jose Antonio Onrubia Holder	M	0.227	Juan Carlos Verme Giannoni	M	6
7	Dionisio Romero Seminario	M	0.226	Juan Francisco Raffo Novelli	M	6
8	Juan Francisco Raffo Novelli	M	0.205	Luis Nicolini Bernucci	M	6
9	Alex Fort Brescia	M	0.173	Carlos Tomas Rodriguez-Pastor Persivale	M	5
10	Eduardo Hochschild Beeck	M	0.16	Jose Alfonso Bustamante y Bustamante	M	5
11	Felipe Arturo Ortiz de Zevallos Madueño	M	0.145	Jose Antonio Onrubia Holder	M	5
12	German Suarez Chavez	M	0.145	Juan Manuel Peña Roca	M	5
13	Luis Enrique Yarur Rey	M	0.135	Manuel Bustamante Olivares	M	5
14	Mario Augusto Brescia Cafferata	M	0.107	Mario Augusto Brescia Cafferata	M	5
15	Pedro Brescia Cafferata	M	0.107	Pedro Brescia Cafferata	M	5
16	Pedro Brescia Moreyra	M	0.107	Pedro Brescia Moreyra	M	5
17	Luis Enrique Romero Belismelis	M	0.097	Dionisio Romero Seminario	M	4
18	Edgardo Arbocco Valderrama	M	0.092	Fortunato Brescia Moreyra	M	4
19	Fortunato Brescia Moreyra	M	0.09	Francisco Jose Garcia-Calderon Portugal	M	4
20	Mario Brescia Moreyra	M	0.09	Jesus Antonio Zamora Leon	M	4
21	Benedicto Cigueñas Guevara	M	0.079	Jorge Von Wedemeyer Knigge	M	4
22	Roberto Calda Cavanna	M	0.078	Mario Brescia Moreyra	M	4
23	Jesus Antonio Zamora Leon	M	0.077	Oscar Guillermo Espinosa Bedoya	M	4

24	Jorge Raul Camet Dickmann	M	0.076	Ramon Jose Barua Alzamora	M	4
25	Juan Bautista Isola Cambana	M	0.076	Victor Montori Alfaro	M	4
26	Arturo Woodman Pollit	M	0.075	Augusto Felipe Wiese de Osma	M	3
27	Ernesto Romero Belismelis	M	0.07	Augusto Wiese Moreyra	M	3
28	Ricardo Cesar Rizo-Patron de la Piedra	M	0.07	Carlos Alberto Neuhaus Tudela	M	3
29	Jose Miguel Morales Dasso	M	0.069	Carlos Bentin Remy	M	3
30	Alberto Camet Blanco-Velo	M	0.065	Carlos Gonzalez-Taboada	M	3

Source: Own elaboration.

Appendix T

Table 29

Top 30 firms by Degree Centrality in 2010's main component

N	Firm name	Degree	nDegree	Founding	Owner	Nationality	Economic sector
1	Banco de Crédito del Perú	55	0.03	1889	Public	Peru	Financial
2	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	47	0.025	1992	Public	Peru	Insurances
3	Inversiones Centenario S.A.A.	47	0.025	1986	Public	Peru	Construction
4	Alicorp S.A.A.	43	0.023	1956	Public	Peru	Food and Beverages
5	Soldexa S.A.	41	0.022	1988	Public	Peru	Construction
6	Inversiones Nacionales de Turismo S.A.	41	0.022	1971	Public	Peru	Tourism
7	Exsa S.A.	41	0.022	1954	Public	Peru	Mining
8	Minsur S.A.	40	0.021	1977	Public	Peru	Mining
9	Tecnológica de Alimentos S.A.	40	0.021	1989	Public	Peru	Fishing
10	Credicorp Ltd.	38	0.02	1995	Public	Peru	Financial Services
11	Compañía Minera Raura S.A.	37	0.02	1960	Public	Panama	Mining
12	Romero Trading S.A.	35	0.019	1987	Public	Peru	Agrarian
13	Ransa Comercial S.A.	34	0.018	1939	Public	Peru	Infrastructure, transport and logistics
14	Industria Textil Piura S.A.	32	0.017	1972	Public	Peru	Textile
15	Cementos Pacasmayo S.A.A.	31	0.017	1998	Public	Peru	Construction
16	InVita Seguros de Vida	31	0.017	2000	Public	Peru	Insurances
17	InCasa EAH	31	0.017	2008	Public	Peru	Financial Services
18	Compañía Universal Textil S.A.	30	0.016	1989	Public	Peru	Textile
19	BBVA Banco Continental	29	0.016	1951	Public	Peru	Financial
20	Industrias del Espino S.A.	29	0.016	1992	Public	Peru	Agrarian
21	Trabajos Marítimos S.A. - TRAMARSA	25	0.013	1990	Public	Peru	Infrastructure, transport and logistics

22	Banco Internacional del Perú S.A.A. - INTERBANK	23	0.012	1897	Public	Peru	Financial
23	Unión Andina de Cementos S.A.A. - UNACEM S.A.A.	23	0.012	1967	Public	Peru	Construction
24	Profuturo A.F.P.	22	0.012	1993	Public	Peru	Pension fund manager
25	Pacífico Compañía de Seguros y Reaseguros	21	0.011	1996	Public	Peru	Insurances
26	La Positiva Seguros y Reaseguros	21	0.011	1937	Public	Peru	Insurances
27	Mapfre Perú Vida Compañía de Seguros y Reaseguros	21	0.011	1998	Public	Spain	Insurances
28	Solucion Empresa Administradora Hipotecaria S.A.	21	0.011	1979	Public	Peru	Financial Services
29	Corporación Cerámica S.A.	20	0.011	1967	Public	Peru	Construction
30	Corporación Funeraria S.A.	20	0.011	2001	Public	Peru	Services

Source: Own elaboration.

Appendix U

Table 30

Top 30 firms by Degree Centrality in 2010's main component dichotomized

N	Firm name	Degree	nDegree	Founding	Owner	Nationality	Economic sector
1	Inversiones Centenario S.A.A.	27	0.203	1986	Public	Peru	Construction
2	Banco de Crédito del Perú	24	0.18	1889	Public	Peru	Financial
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	22	0.165	1992	Public	Peru	Insurances
4	Unión Andina de Cementos S.A.A. - UNACEM S.A.A.	21	0.158	1967	Public	Peru	Construction
5	Cementos Pacasmayo S.A.A.	21	0.158	1998	Public	Peru	Construction
6	Credicorp Ltd.	20	0.15	1995	Public	Peru	Financial Services
7	Corporación Cerámica S.A.	17	0.128	1967	Public	Peru	Construction
8	Alicorp S.A.A.	16	0.12	1956	Public	Peru	Food and Beverages
9	Pacífico Compañía de Seguros y Reaseguros	16	0.12	1996	Public	Peru	Insurances
10	Industria Textil Piura S.A.	15	0.113	1972	Public	Peru	Textile
11	Compañía Universal Textil S.A.	14	0.105	1989	Public	Peru	Textile
12	Inversiones Nacionales de Turismo S.A.	13	0.098	1971	Public	Peru	Tourism
13	Ransa Comercial S.A.	13	0.098	1939	Public	Peru	Infrastructure, transport and logistics
14	Scotiabank Peru S.A.A.	13	0.098	1943	Public	Peru	Financial
15	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	13	0.098	1879	Public	Peru	Food and Beverages
16	Romero Trading S.A.	13	0.098	1987	Public	Peru	Agrarian
17	Industrias del Espino S.A.	13	0.098	1992	Public	Peru	Agrarian
18	Corporación Financiera de Inversiones S.A.	13	0.098	1998	Public	Peru	Financial Services
19	Banco Financiero del Perú	12	0.09	1964	Public	Ecuador	Financial

20	Trabajos Marítimos S.A. - TRAMARSA	12	0.09	1990	Public	Peru	Infrastructure, transport and logistics
21	Profuturo A.F.P.	12	0.09	1993	Public	Peru	Pension fund manager
22	Banco Internacional del Perú S.A.A. - INTERBANK	11	0.083	1897	Public	Peru	Financial
23	BBVA Banco Continental	11	0.083	1951	Public	Peru	Financial
24	Edegel S.A.A.	11	0.083	1906	Public	Peru	Energy
25	InVita Seguros de Vida	11	0.083	2000	Public	Peru	Insurances
26	InCasa EAH	11	0.083	2008	Public	Peru	Financial Services
27	Fosfatos del Pacífico S.A.	10	0.075	2009	Public	Peru	Mining
28	Sociedad Minera El Brocal S.A.A.	10	0.075	1956	Public	Peru	Mining
29	Pesquera Diamante S.A.	10	0.075	1986	Public	Peru	Fishing
30	Quimpac S.A.	10	0.075	1996	Public	Peru	House and cleaning

Source: Own elaboration.

Appendix V

Table 31

Top 30 firms by Eigenvector in 2010's main component

N	Firm name	Eigenvector	Founding	Owner	Nationality	Economic sector
1	Soldexa S.A.	0.403	1988	Public	Peru	Construction
2	Exsa S.A.	0.394	1954	Public	Peru	Mining
3	Minsur S.A.	0.375	1977	Public	Peru	Mining
4	Tecnológica de Alimentos S.A.	0.375	1989	Public	Peru	Fishing
5	Inversiones Nacionales de Turismo S.A.	0.359	1971	Public	Peru	Tourism
6	Compañía Minera Raura S.A.	0.348	1960	Public	Panama	Mining
7	BBVA Banco Continental	0.268	1951	Public	Peru	Financial
8	Inversiones Centenario S.A.A.	0.135	1986	Public	Peru	Construction
9	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	0.093	1879	Public	Peru	Food and Beverages
10	Banco de Crédito del Perú	0.087	1889	Public	Peru	Financial
11	Alicorp S.A.A.	0.079	1956	Public	Peru	Food and Beverages
12	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	0.071	1992	Public	Peru	Insurances
13	Rimac Seguros y Reaseguros	0.064	1896	Public	Peru	Insurances
14	Romero Trading S.A.	0.062	1987	Public	Peru	Agrarian
15	Credicorp Ltd.	0.059	1995	Public	Peru	Financial Services
16	Ransa Comercial S.A.	0.057	1939	Public	Peru	Infrastructure, transport and logistics
17	Industria Textil Piura S.A.	0.054	1972	Public	Peru	Textile
18	Compañía Universal Textil S.A.	0.05	1989	Public	Peru	Textile
19	Industrias del Espino S.A.	0.048	1992	Public	Peru	Agrarian
20	Trabajos Marítimos S.A. - TRAMARSA	0.042	1990	Public	Peru	Infrastructure, transport and logistics
21	Cementos Pacasmayo S.A.A.	0.042	1998	Public	Peru	Construction

22	InVita Seguros de Vida	0.033	2000	Public	Peru	Insurances
23	InCasa EAH	0.033	2008	Public	Peru	Financial Services
24	Pacífico Compañía de Seguros y Reaseguros	0.031	1996	Public	Peru	Insurances
25	Solucion Empresa Administradora Hipotecaria S.A.	0.031	1979	Public	Peru	Financial Services
26	Corporación Cerámica S.A.	0.022	1967	Public	Peru	Construction
27	Inmuebles Panamericana S.A.	0.02	1998	Public	Peru	Construction
28	Fosfatos del Pacífico S.A.	0.017	2009	Public	Peru	Mining
29	Primax S.A.	0.015	1945	Public	Peru	Energy
30	Edelnor S.A.A.	0.015	1994	Public	Peru	Energy

Source: Own elaboration.

Appendix W

Table 32

Top 30 firms by Eigenvector in 2010's main component dichotomized

N	Firm name	Eigenvector	Founding	Owner	Nationality	Economic sector
1	Banco de Crédito del Perú	0.295	1889	Public	Peru	Financial
2	Inversiones Centenario S.A.A.	0.293	1986	Public	Peru	Construction
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	0.28	1992	Public	Peru	Insurances
4	Credicorp Ltd.	0.272	1995	Public	Peru	Financial Services
5	Cementos Pacasmayo S.A.A.	0.254	1998	Public	Peru	Construction
6	Alicorp S.A.A.	0.25	1956	Public	Peru	Food and Beverages
7	Pacífico Compañía de Seguros y Reaseguros	0.243	1996	Public	Peru	Insurances
8	Industria Textil Piura S.A.	0.231	1972	Public	Peru	Textile
9	Compañía Universal Textil S.A.	0.229	1989	Public	Peru	Textile
10	Ransa Comercial S.A.	0.227	1939	Public	Peru	Infrastructure, transport and logistics
11	Romero Trading S.A.	0.227	1987	Public	Peru	Agrarian
12	Industrias del Espino S.A.	0.22	1992	Public	Peru	Agrarian
13	Trabajos Marítimos S.A. - TRAMARSA	0.217	1990	Public	Peru	Infrastructure, transport and logistics
14	Corporación Cerámica S.A.	0.178	1967	Public	Peru	Construction
15	Primax S.A.	0.146	1945	Public	Peru	Energy
16	Fosfatos del Pacífico S.A.	0.136	2009	Public	Peru	Mining
17	Solucion Empresa Administradora Hipotecaria S.A.	0.118	1979	Public	Peru	Financial Services
18	Unión Andina de Cementos S.A.A. -UNACEM S.A.A.	0.099	1967	Public	Peru	Construction
19	Motores Diesel Andinos S.A.	0.086	1998	Public	Peru	Infrastructure, transport and logistics

20	Sociedad Minera El Brocal S.A.A.	0.082	1956	Public	Peru	Mining
21	Edelnor S.A.A.	0.082	1994	Public	Peru	Energy
22	Edegel S.A.A.	0.069	1906	Public	Peru	Energy
23	Minera Yanacocha S.R.L.	0.062	1992	Public	USA	Mining
24	Compañía de Minas Buenaventura S.A.A.	0.061	1953	Public	Peru	Mining
25	Inversiones Nacionales de Turismo S.A.	0.055	1971	Public	Peru	Tourism
26	Mapfre Perú Vida Compañía de Seguros y Reaseguros	0.055	1998	Public	Spain	Insurances
27	BBVA Banco Continental	0.052	1951	Public	Peru	Financial
28	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	0.052	1879	Public	Peru	Food and Beverages
29	Soldexa S.A.	0.051	1988	Public	Peru	Construction
30	Minsur S.A.	0.051	1977	Public	Peru	Mining

Source: Own elaboration.

Appendix X

Table 33

Top 30 firms by Betweenness in 2010's main component

N	Firm name	nBetweenness	Founding	Owner	Nationality	Economic sector
1	Unión Andina de Cementos S.A.A. - UNACEM S.A.A.	18.498	1967	Public	Peru	Construction
2	Inversiones Centenario S.A.A.	14.93	1986	Public	Peru	Construction
3	Cementos Pacasmayo S.A.A.	12.694	1998	Public	Peru	Construction
4	Banco Internacional del Perú S.A.A. - INTERBANK	12.227	1897	Public	Peru	Financial
5	Compañía Minera Poderosa S.A.	8.571	1980	Public	Peru	Mining
6	Mibanco Banco de la Micro Empresa S.A.	7.765	1998	Public	Peru	Financial
7	Banco Financiero del Perú	7.532	1964	Public	Ecuador	Financial
8	Banco de Crédito del Perú	6.717	1889	Public	Peru	Financial
9	Corporación Financiera de Inversiones S.A.	6.704	1998	Public	Peru	Financial Services
10	Graña y Montero S.A.A.	6.608	1996	Public	Peru	Construction
11	Quimpac S.A.	6.017	1996	Public	Peru	House and cleaning
12	Corporación Cerámica S.A.	5.266	1967	Public	Peru	Construction
13	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	4.751	1992	Public	Peru	Insurances
14	Scotiabank Peru S.A.A.	4.65	1943	Public	Peru	Financial
15	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	4.612	1879	Public	Peru	Food and Beverages
16	Saga Falabella S.A.	4.607	1953	Public	Peru	Retail
17	Motores Diesel Andinos S.A.	4.34	1998	Public	Peru	Infrastructure, transport and logistics
18	Edegel S.A.A.	4.252	1906	Public	Peru	Energy
19	InCasa EAH	3.822	2008	Public	Peru	Financial Services
20	InVita Seguros de Vida	3.822	2000	Public	Peru	Insurances

21	Credicorp Ltd.	3.605	1995	Public	Peru	Financial Services
22	Sociedad Minera El Brocal S.A.A.	3.492	1956	Public	Peru	Mining
23	Pesquera Diamante S.A.	3.366	1986	Public	Peru	Fishing
24	BBVA Banco Continental	3.262	1951	Public	Peru	Financial
25	Alicorp S.A.A.	3.212	1956	Public	Peru	Food and Beverages
26	Industria Textil Piura S.A.	3.016	1972	Public	Peru	Textile
27	Profuturo A.F.P.	3.006	1993	Public	Peru	Pension fund manager
28	Corporación Aceros Arequipa S.A.	2.985	1997	Public	Peru	Construction
29	Inversiones Nacionales de Turismo S.A.	2.864	1971	Public	Peru	Tourism
30	A.F.P. Integra S.A.	2.643	1993	Public	Netherlands	Pension Fund Manager

Source: Own elaboration.

Appendix Y

Table 34

Top 30 directors by Degree and Betweenness in 2010's main component

N	Director name	G	Degree	nDegree	Director name	G	nBetweenness
1	Dionisio Romero Paoletti	M	93	0.016	Alfredo Gastañeta Alayza	M	16.327
2	Alex Fort Brescia	M	69	0.012	Roberto Enrique Dañino Zapata	M	12.046
3	Jose Raimundo Morales Dasso	M	67	0.011	Gianfranco Maximo Castagnola Zuñiga	M	11.961
4	Luis Enrique Romero Belismelis	M	65	0.011	Dionisio Romero Paoletti	M	11.2
5	Roque Eduardo Benavides Ganoza	M	65	0.011	Roque Eduardo Benavides Ganoza	M	11.098
6	Jose Antonio Onrubia Holder	M	58	0.01	Alex Fort Brescia	M	10.793
7	Andreas Von Wedemeyer Knigge	M	51	0.009	Oscar Javier de Osma Berckemeyer	M	10.167
8	Maria Jesus Hume Hurtado	F	51	0.009	Jesus Antonio Zamora Leon	M	8.851
9	Carlos Gonzalez-Taboada	M	50	0.009	Andreas Von Wedemeyer Knigge	M	7.798
10	Gonzalo de la Puente Lavalle	M	50	0.009	Maria Jesus Hume Hurtado	F	7.749
11	Reynaldo Llosa Barber	M	50	0.009	Raul Temistocles Salazar Olivares	M	7.711
12	Jesus Antonio Zamora Leon	M	49	0.008	Drago Kisic Wagner	M	7.074
13	Fernando Fort Marie	M	48	0.008	Francisco Jose Garcia-Calderon Portugal	M	6.38
14	Mario Augusto Brescia Cafferata	M	48	0.008	Jose Raimundo Morales Dasso	M	6.036
15	Pedro Brescia Cafferata	M	48	0.008	Luis Baba Nakao	M	6.027
16	Pedro Brescia Moreyra	M	48	0.008	Gonzalo de la Puente Lavalle	M	5.639
17	Juan Carlos Cuglievan Balarezo	M	46	0.008	Fernando Fort Marie	M	5.317
18	Juan Carlos Verme Giannoni	M	46	0.008	Reynaldo Llosa Barber	M	5.195
19	Oscar Javier de Osma Berckemeyer	M	44	0.007	Francisco Moreyra Mujica	M	5.057
20	Augusto Felipe Wiese de Osma	M	43	0.007	Luis Enrique Romero Belismelis	M	4.732
21	Alfredo Gastañeta Alayza	M	42	0.007	Jose Alfonso Bustamante y Bustamante	M	4.676
22	Drago Kisic Wagner	M	40	0.007	Augusto Baertl Montori	M	4.669

23	Felipe Arturo Ortiz de Zevallos Madueño	M	40	0.007	Jose Alejandro Graña Miro-Quesada	M	4.276
24	Fortunato Brescia Moreyra	M	40	0.007	Claudio Herzka Buchdahl	M	4.197
25	Francisco Moreyra Mujica	M	40	0.007	Jose Chirinos Fano	M	3.914
26	Mario Brescia Moreyra	M	40	0.007	Ricardo Cesar Rizo-Patron de la Piedra	M	3.662
27	Roberto Enrique Dañino Zapata	M	38	0.006	Hernando Graña Acuña	M	3.337
28	Carlos Tomas Rodriguez-Pastor Persivale	M	37	0.006	Jose Ricardo Briceño Villena	M	3.227
29	Francisco Jose Garcia-Calderon Portugal	M	37	0.006	Carlos Gonzalez-Taboada	M	3.196
30	Eduardo Hochschild Beeck	M	35	0.006	Carlos Alberto Neuhaus Tudela	M	3.149

Source: Own elaboration.

Appendix Z

Table 35

Top 30 directors by Eigenvector and boards number in 2010's main component

N	Director name	G	Eigenvector	Director name	G	Number of Boards
1	Alex Fort Brescia	M	0.425	Dionisio Romero Paoletti	M	13
2	Mario Augusto Brescia Cafferata	M	0.381	Alex Fort Brescia	M	10
3	Pedro Brescia Cafferata	M	0.381	Jose Antonio Onrubia Holder	M	9
4	Pedro Brescia Moreyra	M	0.381	Luis Enrique Romero Belismelis	M	9
5	Fortunato Brescia Moreyra	M	0.341	Jose Raimundo Morales Dasso	M	8
6	Mario Brescia Moreyra	M	0.341	Andreas Von Wedemeyer Knigge	M	7
7	Rosa Brescia Cafferata	F	0.234	Carlos Gonzalez-Taboada	M	7
8	Dionisio Romero Paoletti	M	0.124	Carlos Tomas Rodriguez-Pastor Persivale	M	7
9	Karl Maslo Tobien	M	0.12	Claudio Jose Rodriguez Huaco	M	7
10	Luis Enrique Romero Belismelis	M	0.092	Jorge Columbo Rodriguez Rodriguez	M	7
11	Jose Antonio Onrubia Holder	M	0.09	Mario Augusto Brescia Cafferata	M	7
12	Gonzalo de la Puente Lavalle	M	0.069	Pedro Brescia Cafferata	M	7
13	Jose Raimundo Morales Dasso	M	0.062	Pedro Brescia Moreyra	M	7
14	Karl Maslo Luna	M	0.061	Vito Modesto Rodriguez Rodriguez	M	7
15	Bernardo Fort Brescia	M	0.054	Fernando Fort Marie	M	6
16	Tomas Herrera Diaz	M	0.053	Fortunato Brescia Moreyra	M	6
17	Fernando Fort Marie	M	0.051	Francisco Jose Garcia-Calderon Portugal	M	6
18	Juan Carlos Verme Giannoni	M	0.05	Jesus Antonio Zamora Leon	M	6
19	Calixto Romero Guzman	M	0.044	Maria Jesus Hume Hurtado	F	6
20	Jose Antonio Colomer Guiu	M	0.042	Mario Brescia Moreyra	M	6
21	Manuel Antonio Mendez del Rio Piovich	M	0.042	Ramon Jose Barua Alzamora	M	6

22	Eduardo Enrique Torres-Llosa Villacorta	M	0.041	Roque Eduardo Benavides Ganoza	M	6
23	Jose Antonio Garcia Rico	M	0.041	Calixto Romero Guzman	M	5
24	Vicente Rodero Rodero	M	0.041	Drago Kisic Wagner	M	5
25	Eduardo Hochschild Beeck	M	0.033	Felipe Federico Morris Guerinoni	M	5
26	Reynaldo Llosa Barber	M	0.03	Gianfranco Maximo Castagnola Zuñiga	M	5
27	Angel Manuel Irazola Arribas	M	0.028	Gonzalo de la Puente Lavalle	M	5
28	Felipe Arturo Ortiz de Zevallos Madueño	M	0.026	Juan Carlos Verme Giannoni	M	5
29	German Suarez Chavez	M	0.024	Raul Temistocles Salazar Olivares	M	5
30	Luis Enrique Yarur Rey	M	0.022	Reynaldo Llosa Barber	M	5

Source: Own elaboration.

Appendix AA

Table 36

Top 30 firms by Degree Centrality in 2015's main component

N	Firm name	Degree	nDegree	Founding	Owner	Nationality	Economic sector
1	Banco de Crédito del Perú	48	0.033	1889	Public	Peru	Financial
2	Rimac Seguros y Reaseguros	44	0.03	1896	Public	Peru	Insurances
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	43	0.03	1992	Public	Peru	Insurances
4	Inversiones Centenario S.A.A.	39	0.027	1986	Public	Peru	Construction
5	Minsur S.A.	38	0.026	1977	Public	Peru	Mining
6	Alicorp S.A.A.	37	0.026	1956	Public	Peru	Food and Beverages
7	Futura Consorcio Inmobiliario S.A.	37	0.026	1988	Public	Peru	Construction
8	Pacífico Compañía de Seguros y Reaseguros	37	0.026	1996	Public	Peru	Insurances
9	Exsa S.A.	37	0.026	1954	Public	Peru	Mining
10	Banco Internacional del Perú S.A.A. - INTERBANK	36	0.025	1897	Public	Peru	Financial
11	Inversiones Nacionales de Turismo S.A.	35	0.024	1971	Public	Peru	Tourism
12	Tecnológica de Alimentos S.A.	33	0.023	1989	Public	Peru	Fishing
13	Credicorp Ltd.	32	0.022	1995	Public	Peru	Financial Services
14	Financiera Uno S.A.	30	0.021	2009	Public	Peru	Financial Services
15	Cementos Pacasmayo S.A.A.	27	0.019	1998	Public	Peru	Construction
16	Industria Textil Piura S.A.	26	0.018	1972	Public	Peru	Textile
17	Supermercados Peruanos S.A. - SP S.A.	26	0.018	1979	Public	Peru	Retail
18	BBVA Banco Continental	25	0.017	1951	Public	Peru	Financial
19	Inretail Perú Corp.	25	0.017	2011	Public	Panama	Retail
20	Ferreycorp S.A.A.	25	0.017	1922	Public	Peru	Construction
21	Interseguro Compañía de Seguros S.A.	24	0.017	1998	Public	Peru	Insurances
22	Compañía Universal Textil S.A.	23	0.016	1989	Public	Peru	Textile

23	Ransa Comercial S.A.	23	0.016	1939	Public	Peru	Infrastructure, transport and logistics
24	La Positiva Seguros y Reaseguros	21	0.014	1937	Public	Peru	Insurances
25	Intercorp Financial Services Inc.	21	0.014	2006	Public	Bahamas	Financial Services
26	Sociedad Minera El Brocal S.A.A.	20	0.014	1956	Public	Peru	Mining
27	Profuturo A.F.P.	20	0.014	1993	Public	Peru	Pension fund manager
28	Quimpac S.A.	20	0.014	1996	Public	Peru	House and cleaning
29	Energía del Pacífico S.A.	20	0.014	2011	Public	Peru	Energy
30	Credicorp Capital Perú S.A.A.	20	0.014	2012	Public	Peru	Financial Services

Source: Own elaboration.

Appendix BB

Table 37

Top 30 firms by Degree Centrality in 2015's main component dichotomized

N	Firm name	Degree	nDegree	Founding	Owner	Nationality	Economic sector
1	Banco de Crédito del Perú	23	0.143	1889	Public	Peru	Financial
2	Banco Internacional del Perú S.A.A. - INTERBANK	20	0.124	1897	Public	Peru	Financial
3	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	19	0.118	1992	Public	Peru	Insurances
4	Alicorp S.A.A.	18	0.112	1956	Public	Peru	Food and Beverages
5	Inversiones Centenario S.A.A.	17	0.106	1986	Public	Peru	Construction
6	Credicorp Ltd.	17	0.106	1995	Public	Peru	Financial Services
7	Corporación Cerámica S.A.	16	0.099	1967	Public	Peru	Construction
8	Pacífico Compañía de Seguros y Reaseguros	16	0.099	1996	Public	Peru	Insurances
9	Rimac Seguros y Reaseguros	16	0.099	1896	Public	Peru	Insurances
10	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	15	0.093	1879	Public	Peru	Food and Beverages
11	Cementos Pacasmayo S.A.A.	15	0.093	1998	Public	Peru	Construction
12	Credicorp Capital Perú S.A.A.	15	0.093	2012	Public	Peru	Financial Services
13	Colegios Peruanos S.A.	14	0.087	2015	Public	Panama	Services
14	Inretail Perú Corp.	14	0.087	2011	Public	Panama	Retail
15	Ferreycorp S.A.A.	14	0.087	1922	Public	Peru	Construction
16	JJC Contratistas Generales S.A.	13	0.081	1958	Public	Peru	Construction
17	Compañía Minera Poderosa S.A.	13	0.081	1980	Public	Peru	Mining
18	Corporación Financiera de Inversiones S.A.	13	0.081	1998	Public	Peru	Financial Services
19	Industria Textil Piura S.A.	12	0.075	1972	Public	Peru	Textile
20	Supermercados Peruanos S.A. - SP S.A.	12	0.075	1979	Public	Peru	Retail
21	Quimpac S.A.	12	0.075	1996	Public	Peru	House and cleaning

22	Energía del Pacífico S.A.	12	0.075	2011	Public	Peru	Energy
23	Financiera Uno S.A.	12	0.075	2009	Public	Peru	Financial Services
24	Compañía de Minas Buenaventura S.A.A.	11	0.068	1953	Public	Peru	Mining
25	Corporación Cervesur S.A.A.	11	0.068	1926	Public	United Kingdom	Construction
26	Sociedad Minera El Brocal S.A.A.	11	0.068	1956	Public	Peru	Mining
27	Scotiabank Peru S.A.A.	11	0.068	1943	Public	Peru	Financial
28	Creditex S.A.A.	11	0.068	1980	Public	Peru	Textile
29	Profuturo A.F.P.	11	0.068	1993	Public	Peru	Pension fund manager
30	Interseguro Compañía de Seguros S.A.	11	0.068	1998	Public	Peru	Insurances

Source: Own elaboration.

Appendix CC

Table 38

Top 30 firms by Eigenvector in 2015's main component

N	Firm name	Eigenvector	Founding	Owner	Nationality	Economic sector
1	Rimac Seguros y Reaseguros	0.413	1896	Public	Peru	Insurances
2	Futura Consorcio Inmobiliario S.A.	0.398	1988	Public	Peru	Construction
3	Minsur S.A.	0.398	1977	Public	Peru	Mining
4	Exsa S.A.	0.398	1954	Public	Peru	Mining
5	Inversiones Nacionales de Turismo S.A.	0.37	1971	Public	Peru	Tourism
6	Tecnológica de Alimentos S.A.	0.35	1989	Public	Peru	Fishing
7	BBVA Banco Continental	0.283	1951	Public	Peru	Financial
8	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	0.095	1879	Public	Peru	Food and Beverages
9	Inversiones Centenario S.A.A.	0.03	1986	Public	Peru	Construction
10	Andino Investment Holding S.A.A.	0.024	2005	Public	Peru	Infrastructure, transport and logistics
11	Banco de Crédito del Perú	0.023	1889	Public	Peru	Financial
12	Sociedad Minera El Brocal S.A.A.	0.02	1956	Public	Peru	Mining
13	Alicorp S.A.A.	0.019	1956	Public	Peru	Food and Beverages
14	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	0.018	1992	Public	Peru	Insurances
15	Corporación Aceros Arequipa S.A.	0.017	1997	Public	Peru	Construction
16	Inretail Perú Corp.	0.015	2011	Public	Panama	Retail
17	Pacífico Compañía de Seguros y Reaseguros	0.015	1996	Public	Peru	Insurances
18	Corporación Lindley S.A.	0.015	1928	Public	Peru	Food and Beverages
19	Comercial del Acero S.A.	0.015	1985	Public	Peru	Construction
20	Credicorp Ltd.	0.015	1995	Public	Peru	Financial Services
21	Inversiones La Rioja S.A.	0.013	1996	Public	Peru	Tourism
22	Intradevco Industrial S.A.	0.013	1998	Public	Peru	House and cleaning

23	Industria Textil Piura S.A.	0.012	1972	Public	Peru	Textile
24	Cementos Pacasmayo S.A.A.	0.012	1998	Public	Peru	Construction
25	Banco Internacional del Perú S.A.A. - INTERBANK	0.011	1897	Public	Peru	Financial
26	Compañía Universal Textil S.A.	0.011	1989	Public	Peru	Textile
27	Ransa Comercial S.A.	0.011	1939	Public	Peru	Infrastructure, transport and logistics
28	Credicorp Capital Perú S.A.A.	0.01	2012	Public	Peru	Financial Services
29	Fosfatos del Pacífico S.A.	0.007	2009	Public	Peru	Mining
30	Colegios Peruanos S.A.	0.006	2015	Public	Panama	Services

Source: Own elaboration.

Appendix DD

Table 39

Top 30 firms by Eigenvector in 2015's main component dichotomized

N	Firm name	Eigenvector	Founding	Owner	Nationality	Economic sector
1	Banco de Crédito del Perú	0.316	1889	Public	Peru	Financial
2	El Pacífico - Peruano Suiza Cia. De Seguros y Reaseguros	0.298	1992	Public	Peru	Insurances
3	Credicorp Ltd.	0.282	1995	Public	Peru	Financial Services
4	Pacífico Compañía de Seguros y Reaseguros	0.279	1996	Public	Peru	Insurances
5	Inversiones Centenario S.A.A.	0.271	1986	Public	Peru	Construction
6	Alicorp S.A.A.	0.27	1956	Public	Peru	Food and Beverages
7	Cementos Pacasmayo S.A.A.	0.265	1998	Public	Peru	Construction
8	Credicorp Capital Perú S.A.A.	0.246	2012	Public	Peru	Financial Services
9	Corporación Cerámica S.A.	0.219	1967	Public	Peru	Construction
10	Fosfatos del Pacífico S.A.	0.209	2009	Public	Peru	Mining
11	JJC Contratistas Generales S.A.	0.202	1958	Public	Peru	Construction
12	Industria Textil Piura S.A.	0.191	1972	Public	Peru	Textile
13	Compañía Universal Textil S.A.	0.186	1989	Public	Peru	Textile
14	Ransa Comercial S.A.	0.186	1939	Public	Peru	Infrastructure, transport and logistics
15	Mibanco Banco de la Micro Empresa S.A.	0.156	1998	Public	Peru	Financial
16	Edyficar Perú S.A.	0.116	1997	Public	Peru	Financial Services
17	Prima AFP S.A.	0.112	2005	Public	Peru	Pension fund manager
18	Sociedad Minera El Brocal S.A.A.	0.102	1956	Public	Peru	Mining
19	Compañía de Minas Buenaventura S.A.A.	0.099	1953	Public	Peru	Mining
20	Unión Andina de Cementos S.A.A. -UNACEM S.A.A.	0.096	1967	Public	Peru	Construction
21	Motores Diesel Andinos S.A.	0.082	1998	Public	Peru	Infrastructure, transport and logistics

22	Edelnor S.A.A.	0.08	1994	Public	Peru	Energy
23	Minera Yanacocha S.R.L.	0.076	1992	Public	USA	Mining
24	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	0.071	1879	Public	Peru	Food and Beverages
25	Banco Internacional del Perú S.A.A. - INTERBANK	0.059	1897	Public	Peru	Financial
26	Sociedad Minera Cerro Verde S.A.A.	0.055	1993	Public	Peru	Mining
27	Rimac Seguros y Reaseguros	0.052	1896	Public	Peru	Insurances
28	Colegios Peruanos S.A.	0.051	2015	Public	Panama	Services
29	Solucion Empresa Administradora Hipotecaria S.A.	0.05	1979	Public	Peru	Financial Services
30	Inmobiliaria IDE S.A.	0.039	2011	Public	Peru	Construction

Source: Own elaboration.

Appendix EE

Table 40

Top 30 firms by Betweenness in 2015's main component

N	Firm name	nBetweenness	Founding	Owner	Nationality	Economic sector
1	Compañía Minera Poderosa S.A.	13.416	1980	Public	Peru	Mining
2	Banco Internacional del Perú S.A.A. - INTERBANK	12.066	1897	Public	Peru	Financial
3	Corporación Cerámica S.A.	9.777	1967	Public	Peru	Construction
4	Leasing Perú S.A.	8.515	2009	Public	Colombia	Financial Services
5	Perupetro S.A.	8.37	1993	State	Peru	Energy
6	Banco Financiero del Perú	8.217	1964	Public	Ecuador	Financial
7	Rimac Seguros y Reaseguros	8.025	1896	Public	Peru	Insurances
8	Corporación Financiera de Inversiones S.A.	7.805	1998	Public	Peru	Financial Services
9	Servicio de Agua Potable y Alcantarillado de Lima - SEDAPAL	7.259	1981	Public	Peru	Services
10	Banco de Crédito del Perú	7.238	1889	Public	Peru	Financial
11	Pesquera Exalmar S.A.	7.22	1997	Public	Panama	Fishing
12	Scotiabank Peru S.A.A.	6.691	1943	Public	Peru	Financial
13	Austral Group S.A.A.	6.539	1996	Public	Panama	Fishing
14	Ferreycorp S.A.A.	6.26	1922	Public	Peru	Construction
15	Financiera TFC S.A.	6.087	1997	Public	Chile	Financial Services
16	A.F.P. Integra S.A.	6.017	1993	Public	Peru	Pension Fund Manager
17	Pesquera Diamante S.A.	5.866	1986	Public	Peru	Fishing
18	Alicorp S.A.A.	5.861	1956	Public	Peru	Food and Beverages
19	Profuturo A.F.P.	5.698	1993	Public	Peru	Pension fund manager
20	Motores Diesel Andinos S.A.	5.224	1998	Public	Peru	Infrastructure, transport and logistics
21	Empresa Siderúrgica del Perú S.A.A.	5.213	1998	Public	Brazil	Construction
22	JJC Contratistas Generales S.A.	5.157	1958	Public	Peru	Construction

23	Sociedad Minera El Brocal S.A.A.	5.152	1956	Public	Peru	Mining
24	Industria Textil Piura S.A.	5.133	1972	Public	Peru	Textile
25	Edelnor S.A.A.	5.049	1994	Public	Peru	Energy
26	Inretail Perú Corp.	4.963	2011	Public	Panama	Retail
27	Empresa de Electricidad del Perú S.A. - Electroperu	4.876	1972	State	Peru	Energy
28	Agro Industrial Paramonga S.A.A.	4.876	1970	Public	Peru	Agrarian
29	Union de Cervecerias Peruanas Backus y Johnston S.A.A.	4.843	1879	Public	Peru	Food and Beverages
30	Quimpac S.A.	4.62	1996	Public	Peru	House and cleaning

Source: Own elaboration.

Appendix FF

Table 41

Top 30 directors by Degree and Betweenness in 2015's main component

N	Director name	G	Degree	nDegree	Director name	G	nBetweenness
1	Jose Raimundo Morales Dasso	M	85	0.014	Luis Baba Nakao	M	13.465
2	Dionisio Romero Paoletti	M	75	0.013	Jose Raimundo Morales Dasso	M	13.056
3	Roque Eduardo Benavides Ganoza	M	66	0.011	Maria Jesus Hume Hurtado	F	12.722
4	Alex Fort Brescia	M	64	0.011	Gianfranco Maximo Castagnola Zuñiga	M	11.494
5	Luis Enrique Romero Belismelis	M	59	0.01	Francisco Jose Garcia-Calderon Portugal	M	10.817
6	Fortunato Brescia Moreyra	M	51	0.009	Roque Eduardo Benavides Ganoza	M	10.795
7	Mario Brescia Moreyra	M	51	0.009	Raul Temistocles Salazar Olivares	M	10.4
8	Pedro Brescia Moreyra	M	51	0.009	Alfredo Gastañeta Alayza	M	8.996
9	Andreas Von Wedemeyer Knigge	M	50	0.008	Maria Cecilia Blume Cilloniz	F	8.947
10	Walter Bayly Llona	M	48	0.008	Jesus Antonio Zamora Leon	M	7.67
11	Jose Antonio Onrubia Holder	M	46	0.008	Fernando Martin Zavala Lombardi	M	7.518
12	Luis Baba Nakao	M	46	0.008	Fernando Fort Marie	M	7.34
13	Alfredo Gastañeta Alayza	M	45	0.008	Luis Julian Carranza Ugarte	M	6.869
14	Fernando Martin Zavala Lombardi	M	45	0.008	Julio Cesar Luque Badenes	M	6.661
15	Carlos Tomas Rodriguez-Pastor Persivale	M	44	0.007	Leslie Harold Pierce Diez-Canseco	M	6.422
16	Jaime Araoz Medanic	M	43	0.007	Jose Ricardo Briceño Villena	M	6.358
17	Ramon Jose Barua Alzamora	M	42	0.007	Juan Jose Martinez Ortiz	M	6.244
18	Fernando Fort Marie	M	41	0.007	Andres Mauricio Muñoz Ramirez	M	5.992
19	Jose Miguel Morales Dasso	M	39	0.007	Carmen Rosa Graham Ayllon	F	5.579
20	Juan Carlos Verme Giannoni	M	39	0.007	Jose de Bernardis Cuglievan	M	5.436
21	Carmen Rosa Graham Ayllon	F	38	0.006	Francisco Moreyra Mujica	M	5.381
22	Raul Temistocles Salazar Olivares	M	38	0.006	Erasmo Jesus Wong Lu Vega	M	5.232
23	Eduardo Hochschild Beeck	M	37	0.006	Jose Agustin de Aliaga Fernandini	M	5.161

24	Fernando Dasso Montero	M	37	0.006	Igor Alcides Gonzales Galindo	M	5.019
25	Jose Ricardo Briceño Villena	M	37	0.006	Jorge Gruenberg Schneider	M	4.989
26	Julio Cesar Luque Badenes	M	37	0.006	Oscar Guillermo Espinosa Bedoya	M	4.576
27	Miguel Angel Salmon Jacobs	M	37	0.006	Andreas Von Wedemeyer Knigge	M	4.405
28	Benedicto Cigueñas Guevara	M	36	0.006	Ricardo Cilloniz Champin	M	4.366
29	Francisco Moreyra Mujica	M	36	0.006	Claudio Herzka Buchdahl	M	4.34
30	Carlos Ernesto Galvez Pinillos	M	35	0.006	Jose Chlimper Ackerman	M	4.31

Source: Own elaboration.

Appendix GG

Table 42

Top 30 directors by Eigenvector and boards number in 2015's main component

N	Director name	G	Eigenvector	Director name	G	Number of Boards
1	Alex Fort Brescia	M	0.416	Dionisio Romero Paoletti	M	10
2	Fortunato Brescia Moreyra	M	0.402	Jose Raimundo Morales Dasso	M	10
3	Mario Brescia Moreyra	M	0.402	Alex Fort Brescia	M	8
4	Pedro Brescia Moreyra	M	0.402	Carlos Tomas Rodriguez-Pastor Persivale	M	8
5	Jaime Araoz Medanic	M	0.358	Luis Enrique Romero Belismelis	M	8
6	Miguel Angel Salmon Jacobs	M	0.304	Ramon Jose Barua Alzamora	M	8
7	Rosa Brescia Cafferata	F	0.238	Andreas Von Wedemeyer Knigge	M	7
8	Bernardo Fort Brescia	M	0.121	Claudio Jose Rodriguez Huaco	M	7
9	Luis Julian Carranza Ugarte	M	0.072	Fortunato Brescia Moreyra	M	7
10	Ricardo Cilloniz Champin	M	0.07	Jorge Columbo Rodriguez Rodriguez	M	7
11	Alfonso Brazzini Diaz-Ufano	M	0.069	Jose Antonio Onrubia Holder	M	7
12	Edgardo Arbocco Valderrama	M	0.068	Julio Cesar Luque Badenes	M	7
13	Miguel Aramburu Alvarez-Calderon	M	0.065	Mario Brescia Moreyra	M	7
14	Ana Maria Brescia Cafferata	F	0.061	Pedro Brescia Moreyra	M	7
15	Karl Maslo Tobien	M	0.061	Vito Modesto Rodriguez Rodriguez	M	7
16	Humberto Speziani Cuevas	M	0.054	Fernando Martin Zavala Lombardi	M	6
17	Eduardo Enrique Torres-Llosa Villacorta	M	0.044	Francisco Jose Garcia-Calderon Portugal	M	6
18	Ignacio Lacasta Casado	M	0.044	Gianfranco Maximo Castagnola Zuñiga	M	6
19	Jorge Donaire Meca	M	0.044	Jaime Araoz Medanic	M	6
20	Jose Antonio Colomer Guiu	M	0.044	Luis Baba Nakao	M	6
21	Manuel Antonio Mendez del Rio Piovich	M	0.044	Roque Eduardo Benavides Ganoza	M	6
22	Dionisio Romero Paoletti	M	0.026	Walter Bayly Llona	M	6

23	Fernando Martin Zavala Lombardi	M	0.021	Drago Kisic Wagner	M	5
24	Luis Enrique Romero Belismelis	M	0.021	Felipe Federico Morris Guerinoni	M	5
25	Jose Raimundo Morales Dasso	M	0.02	Fernando Dasso Montero	M	5
26	Carmen Rosa Graham Ayllon	F	0.018	Fernando Fort Marie	M	5
27	Jose Antonio Onrubia Holder	M	0.018	Guillermo Palomino Bonilla	M	5
28	Jose Antonio Payet Puccio	M	0.016	Ivan Eduardo Castro Morales	M	5
29	Alejandro Santo Domingo Davila	M	0.015	Manuel Bustamante Olivares	M	5
30	Andres Mauricio Peñate Giraldo	M	0.015	Maria Jesus Hume Hurtado	F	5

Source: Own elaboration.