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Determinants of Board Interlocking in the Brazilian Capital Market

Abstract:

The objective in this article was to identify the main determinants of Board Interlocking in the Brazilian capital market. As the theoretical structure, the Agency theory and Corporate Governance, the Resource Dependence theory and the Board of Administrators and the Characteristics of Board Interlocking. The sample consists of 58 Brazilian companies that participate in the Bovespa Index (Ibovespa). An empirical-analytic study was undertaken. With regard to the objectives, it is characterized as exploratory and, with regard to the procedures, a documentary research was undertaken. The data on the Boards of Administrators were collected from the Reference Forms available on the website of the São Paulo Stock Exchange (BM&FBOVESPA). The results found demonstrate the generalized presence of Board Interlocking in these companies, normally associated with four factors: (1) economic group formation; (2) governmental control; (3) formation of pension funds; and (4) presence of professionals with acknowledged market experience. The results also suggest that the first three factors give rise to long-lasting links and that these connections are hard to break. On the other hand, the links established through professionals with market experience tend to be more unstable because the presence of these professionals is highly demanded to serve on the board of different companies.

Key words: Board Interlocking; Board of Administrators; Brazilian capital market; Bovespa. Social networks.

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1. Introduction

The formation of Board Interlocking is associated with the financial connections of the organization and the existence of economic groups (Dooley, 1969). However, Schoorman, Bazerman and Atkin (1981), Hillman, Cannella and Paetzold (2000) and Barringer and Harrison (2000) suggest that the presence of professionals on different boards is tied to the exchange of knowledge and expertise that professionals provide to the company and the favoring of the image in the market. The growth of organizations and the development of the world economy were decisive for the separation of ownership and control in modern companies. Individual control that was previously dominant became infeasible. To maximize their wealth, investors have been forced to hire specialist people to run their organizations.

With the pulverization of capital, the power of managers was strengthened, allowing autonomy and decisions aligned with their own interests. This strengthening has created problems, since some managers' decisions are not necessarily consistent with shareholders' interests. The need to control different interests converged to the creation of boards of directors. The main role of the Board of Directors is to monitor the conflicts between agents (Fama & Jensen, 1983). However, in recent years, the Resource Dependence theory (Pfeffer, 1972, Pferffer & Salancik, 1978) has highlighted the use of board professionals as a means of linking business, a phenomenon known as Board Interlocking. Such links are sources of important resources for the company, but they can also become channels for dissemination of corporate practices, such as results management, for example.

Studies on boards of directors have focused on two main theoretical lines: (i) agency theory (Fama & Jensen, 1983) and (ii) resource dependence theory (Pfeffer, 1972; Johnson, Daily & Ellstrand, 1996). The Agency theory assigns to the Board of Directors the role of controlling and monitoring the decisions made by managers, minimizing the conflict of interest between the parts of the organization (Fama & Jensen, 1983). Most board studies are based on Agency theory (Hillman & Dalziel, 2003). However, the complexity of corporate environments has limited the application of this theory, because it is not able to explain some social phenomena related to the council (Eisenhardt, 1989).

The Resource Dependence theory seeks to fill this gap left by the Agency theory. In the view of the Resource Dependence theory, the board acts as a reducer of uncertainties in the corporate environment, establishing links with other companies through its directors, and, therefore, seeking the funding needed for the development of the organization (Pfeffer, 1972, Pfeffer & Salancik, 1978).

The reduction of environmental uncertainty can be managed by the organization, employing certain strategies (Pfeffer, 1972). The relationship between the firm and the environment is a process of exchange (Camilo, Marcon & Bandeira-de-Mello, 2012), in which the organization needs vital resources to be promoted, which are obtained through interaction with the environment. This interaction is a way of responding to competitiveness factors, improving performance (Pearce, 1983).

The presence of a board member on another company's board characterizes a phenomenon known internationally as Board Interlocking (Knowles, 1973). Thus, it is understood that this phenomenon occurs when a director of one company holds the same position in the board of directors of another. Board Interlocking is an important phenomenon in the organizational context (Fontes Filho & Leal, 2012). Through it, companies get important resources, such as access to business partners and specific knowledge (Gales & Ksner, 1994). In this context, this article intends to answer the following question: What are the determinants of the formation of Board Interlocking for companies in the Brazilian capital market?

The article seeks to identify the main determinants for the formation of Board Interlocking in the Brazilian capital market. In order to do so, we seek to contemplate the organizational aspects that influence the formation of corporate ties between organizations and, specifically, consider the phenomenon of Board Interlocking. It is noteworthy that there are few studies on Board Interlocking found in the Brazilian economy. That creates the possibility for the present article to arouse the interest in the subject and to permit the appropriate theoretical discussion and the corresponding empirical studies in Financial Accounting and Corporate Finance research.

2. Agency Theory and Corporate Governance

Adam Smith, in the eighteenth century, fostered the discussion about the separation between ownership and control, a theme later studied in the financial literature on the Corporate Governance structure. In the book The Wealth of Nations, Smith (1776) showed concern with the separation between ownership and control in organizations and highlighted managers' disdain for investors' money. The organizational characteristics of the time did not allow this proposition to be empirically proven.

After a long period of time, Berle and Means (1932), in The Modern Corporation and Private Property, rekindled the discussion about the separation of ownership and control. For Iudícibus and Lopes (2004), this work was fundamental to introduce the essential bases for understanding the agency conflict between the shareholder and the executive. Berle and Means (1932) observed that, as the organizations grew, they could no longer be controlled by a single person or a single family. They demonstrated that the division of control had become necessary to maximize organizational wealth. The pulverization of control strengthened the power of managers, allowing them to have autonomy in decisions and to act in favor of their own interests. Berle and Means' (1932) study provided empirical evidence on the concentration of ownership, but the absence of mandatory reporting by companies put an important constraint on results.

Problems arising from the separation between ownership and control in organizations are related to one of the most important theoretical paradigms in accounting literature, the Agency theory (Lambert, 2001). That theory has since helped to explain the conflicts between managers and majority shareholders and between the latter and minority shareholders. The studies of Spence and Zeckhauser (1971) and Ross (1973) stand out as being the first to evidence the Agency theory. Both works were based on the analysis of executives' varying remuneration structure.

The agency relationship can be defined "as a contract in which one or more persons (the principal) employs another person (the agent) to perform a service or work on their behalf, involving the delegation of some authority" (Jensen & Meckling, 1976, p.310). The authors postulate that the contract between the shareholder and the executive is permeated by a list of agents, in which the agent is seen as the principal and the agent. If both parties act in a way that maximizes their wealth, it is consistent to believe that the agent will not always act on the principal's behalf. This distinction between the behavior of the principal and the agent is the fundamental premise that transcends the Agency theory. In 1994, in The Nature of Man, Jensen and Meckling (1976) discussed human behavior, contemplating the idea of the impossibility of an individual prioritizing the maximization of another person's wealth to the detriment of his or her own. Thus, an environment is created to base the main hypothesis of the Agency theory: the lack of a perfect agent (Okimura, 2003). This hypothesis opens gaps for the divergence between the behavior expected by the principal and that actually manifested by the agent.

Iudícibus and Lopes (2004) argue that the agency conflict arises when agents have divergent interests from the principal and, by putting their personal interests on the forefront, end up harming the functioning of organizations. According to this view, the shareholder must protect himself against the intended expropriation by the administrator. This expropriation can happen through a simple misappropriation of an asset or even through more sophisticated forms, such as making investments with a dubious return, increasing the manager's power in the organization and reducing the amount of dividends to be distributed.

For Barney and Hesterly (2004), the transfer of power from the owner to the executive can be problematic for three reasons: (i) the divergence of interests that normally occurs between the principal and the agent; Ii) the costs inherent in monitoring the actions of the agent; and (iii) the costs incurred in obtaining the information available to the agent or in his possession. The costs of perfectly monitoring the manager's actions are related to information asymmetry since, on many occasions, managers have a much higher level of information than investors.

Recent studies involving agency conflicts converge to problems generated by incomplete information, a situation in which not all participants in the organization have the same level of information. This phenomenon is known in the financial literature as informational asymmetry (Hendriksen & Van Breda, 2007). For Copeland, Weston and Shastri (2005), information asymmetry cannot be understood as an event, but as an inherent process in the existence of different levels of knowledge between the parties that negotiate.

For Pratt and Zeckhauser (1985), the available information is hardly complete. This informational imperfection causes the principal to enter into contracts with the agent so that his interests are respected. Dependence behavior among individuals causes agency problems. Therefore, it is interesting to identify the level of informational asymmetry, since the ability to observe the environment is limited. If this did not happen, the information would be transparent and there would be no agency problems (Segatto-Mendes, 2001).

Practical examples of conflicts of interest and informational asymmetry problems have been observed since the end of the 20th century due to corporate scandals, especially in the United States. The stories of the American giants, Enron, WorldCom and Tyco were instrumental in reinstating government entities to rethink new ways of controlling executives' powers (Guerra, 2009). The existence of agency problems and different levels of knowledge among investors and managers were decisive for the creation of a set of internal and external mechanisms to harmonize the relationship of interests between the principal and the agent. For this set of mechanisms, it was called Corporate Governance (Silveira, Barros & Famá, 2003).

From the 1990s, the term Governance became widespread in the general public (Carlsson, 2001). For Shleifer and Vishny (1997), Corporate Governance can be defined as a set of mechanisms by which the investor guarantees the return on his investment. In further detail, the Organization for Economic Co-operation and Development (Oecd, 2004) defines Corporate Governance as a set of relationships among investors, executives, advisors and other stakeholders, providing a structure in which the organization's objectives are defined and performance is monitored. Corporate Governance is not restricted to guaranteeing the return to investors, but it proposes the definition of organizational objectives and the valuation of corporate performance.

For the Brazilian Institute of Corporate Governance (IBGC, 2004), in the conception of the Traditional Economic theory, Corporate Governance serves to overcome the problems between agent and principal, present due to the separation between ownership and control in organizations. In this sense, the Brazilian Securities and Exchange Commission (CVM, 2002) describes Corporate Governance as a set of practices that seek, in addition to protecting stakeholders, to improve company performance and facilitate access to capital.

The emergence of Corporate Governance is associated to business control and monitoring, helping to identify and solve possible agency problems and allowing the company to have better access to the capital market. According to Guerra (2009), the implementation of the Corporate Governance model was demanded from the private sector after the corporate scandals. Cadburry and Millstein (2005) point out that the events led to the introduction of new standards, such as the Sarbanes-Oxley Act (SOX), in 2002, which made certain voluntary practices mandatory for companies listed on the New York Stock Exchange. These regulatory changes, according to Becht, Bolton and Röell (2005), were aimed at re-establishing investor confidence in companies' financial reports.

3. Board of Administrators and Resource Dependence Theory

The Board of Directors is one of the main Corporate Governance mechanisms (Shleifer & Vishny, 1997). Its importance is supported by the adoption of actions for the transparency, integrity and accountability of the company and its management, including board supervision (Terra & Lima, 2006). From the perspective of the Agency theory, the Board of Directors is fundamental in solving conflicts of interest inherent in organizational management, constituting an important internal mechanism for the governance structure of large corporations (Hermalin & Weisbach, 2001). Williamson (1984) describes that the legal authority granted to the board of directors to hire, dismiss and compensate managers is one of the characteristics that make the board an essential element of Corporate Governance.

The performance of the Board of Directors has stood out by minimizing problems arising from a pulverized capital organization. In this type of organization, investors adopt a passive position as shareholders, leaving executives the role of defining and executing corporate strategies. The passivity of investors opens space for countless cases of opportunism, when executives act according to their own interests (Fontes Filho & Leal, 2012).

In countries like Japan and Germany, characterized by the concentration of ownership around corporate groups and banks, the board's performance has been directed to meeting the expectations of interest groups and society's demands (Fontes Filho & Leal, 2012). Therefore, in concentrated property markets, it is noted that the board of directors has stood out for playing another important role: the liaison role between the organizations.

It should be noted that the concentration of ownership in Brazilian corporations also reaches very high levels. According to Clemente, Taffarel e Silva (2012), only eight sectors correspond to 85% of the trading volume of the shares, with 24 companies representing 72.30% of this volume. Although Agency theory has proved essential to understand the role of Board of Directors control, Eisenhardt (1989) describes that it alone is not sufficient to understand the complexity of organizations. According to Huse (2007), Agency theory has long been considered a "divine authority" in Corporate Governance debates. However, its attributions have been a source of questioning for not considering the social characteristics of individuals. In this context, the need for another theoretical approach becomes important to understand some phenomena that occur in the organizational scenario.

In this discussion, several studies (Boyd, 1990; Pearce & Zahra, 1992; Daily & Dalton, 1994; Gales & Kensen, 1994; Hillman & Dalziel, 2003) have used management theory as a source of essential organizational resources.

The Resource Dependence theory proposes that the board of directors is an external resource management mechanism (Pfeffer & Salancik, 1978), acting as a reducer of uncertainties (Pfeffer, 1972) and providing for a reduction in transaction costs (Williamson, 1984). The role of counselors according to the Resource Dependence theory diverges from the agency role, although counselors can play both roles simultaneously (Johnson et al., 1996). From the perspective of resource dependence, directors serve as connections between the firm and the corporate environment, minimizing the uncertainties of contingency factors (Hillman, Cannella & Paetzold, 2000).

According to Zald (1969), the premise underlying the Resource Dependence theory is based on the idea that organizations, however independent they may seem, cannot disregard the relevance of external resources for their development. In other words, however autonomous the organization, it will always need resources that are not in its power. For Thompson and McEwen (1958), access to external resources becomes easier when corporations establish links with other firms, working towards common goals.

To survive, organizations need to deal efficiently with uncertainties (Pfeffer & Salancik, 1978). Such uncertainties restrict the access and control of organizations in relation to strategic resources and choices, compromising their performance. To minimize the level of uncertainty, organizations use the board as a mechanism to access other corporations, bringing resources such as information, skills, access to funding sources and legitimation (Gales & Kesner, 1994). The consolidation of these connections is due to the insertion of professionals in common in the boards of directors, that is, a same professional acting on the board of two companies.

According to Judge and Zeithaml (1992), the involvement of the Board of Directors in strategic decisions is a complex process. Changes in the environment are usually associated with transformations in corporate strategies (Hillman, Cannella & Paetzold, 2000). These changes can partially be explained by the existence of contingent factors inherent in the organization.

Contingency factors can influence the organizational environment, both internally and externally. For Mintzberg (1983), factors of external origin, such as market, customers, government, society and competitors, are more important because the organization cannot directly control them. These factors hinder the company's acquisition of resources and increase the level of market uncertainty (Hung, 1998). Under the influence of contingent factors of external origin, the board of directors has an important role in accessing resources critical to the company, as is recognized in the Resource Dependence theory (Pfeffer, 1972). According to this perspective, companies depend on each other to gain valuable resources, establishing links between them in an attempt to regulate their interdependence (Hung, 1998). When the connections occur through the board of directors, the phenomenon called Board Interlocking appears.

4. Characteristics of Board Interlocking

The expressions *Board Interlocking* (Santos & Silveira, 2007; Bizjak, Lemmon & Whitby, 2009; Silva, 2010; Connelly & Slyke 2012), *interlocking directorship* (Zajac, 1988; Hung, 1998; Au; Peng & Wang, 2000), *board network* (Battiston, Weisbuch & Bonabeau, 2003; Kim, 2005), *director interlocks* (Hauschild & Beckman, 1998) and *interlocking directorates* (Dooley, 1969; Ornstein, 1982) have been used in the financial literature to define links between companies through the Board of Administrators.

Board Interlocking occurs when a professional acts simultaneously on the Board of Directors of two companies. In other words, it is a social relation created between two companies through the inclusion of a professional in common in the boards of directors (Fich & White, 2005). This professional provides access to important resources indispensable to the company (Hung, 1998).

In the US, it is common for board members and executives to participate in more than one company (Fontes Filho & Leal, 2012). In the 1930s, Dooley (1969) found that, of the 250 largest American organizations, 90% had at least one advisor working in another company. Davis (1991) describes that the presence of links between American organizations was evident in the 1980s. Large corporation advisers participated on average in the board of directors of seven other large corporations, forming networks of more than forty companies.

In Canada, the presence of Board Interlocking is a common phenomenon among the largest corporations. Ornstein (1982) found that, in the period from 1946 to 1977, the 100 largest Canadian firms presented approximately 1,600 ties in each period. Au, Peng and Wang (2000) identified Board Interlocking in approximately 61% of the 200 largest companies in Hong Kong in 1997, slightly below that of England (69%) and the United States (64%) for the same period. Cox and Rogerson (1985) investigated the 115 largest organizations in South Africa, 110 industries and five banks showed that approximately 50% have a director acting in more than one corporation.

Santos and Silveira (2007) investigated 320 companies traded in the Brazilian capital market, in 2003 and 2005. The results indicated a percentage of 74% (2003) and 68.8% (2005) of Board Interlocking. Also, in 2005, about 50% of the professionals who served as chairman of the board participated in the council of another company, simultaneously. Silva (2010) studied 452 companies from 1997 to 2007, and found that, on average, 60% of the directors were connected to seven companies.

The main studies on Board Interlocking are based on the Resource Dependence theory to explain the reasons for the connections created between the companies (Hillman, Cannella & Paetzold, 2000). Pfeffer and Salancik (1978) describe that, when an organization appoints a professional to serve on its board of directors, that advisor is expected to provide resources to help the company develop. It also suggests that the adoption of Board Interlocking may provide several benefits to the entity, such as: i) provision of specific resources; (ii) assistance in securing support from important outside parties; iii) legitimacy; and iv) creation of a channel of communication between organizations.

Hillman, Cannella and Paetzold (2000) explain that Board Interlocking is a substantial source of external resources and that companies seek to include professionals on their boards who perform managerial functions in other organizations, in order to increase the sources of funding. These professionals add valuable resources as they provide information and help in the decision-making process of the company. The basic premise of the Resource Dependence theory suggests that the provision of resources through Board Interlocking is directly related to the firm's performance (Hillman, Cannella & Paetzold, 2000).

Board Interlocking is beneficial for companies gaining support from important external elements. The inclusion of professionals representing social groups or movements can help the organization to avoid conflicting actions with such groups (Selznick, 1965). Another benefit gained when companies establish connections among themselves through their advisors is legitimacy. For Schoorman, Bazerman and Atkin (1981), Hillman, Cannella and Paetzold (2000) and Barringer and Harrison (2000), it is interesting to add professionals with recognized experience and knowledge to their advice. This attitude reflects a good image of the company in the market. Finally, companies seek to add professionals to the board who are linked to organizations that dominate scarce resources, thus gaining easy access. Pfeffer and Salancik (1978) point out that the companies include professionals in their board who belong to financial institutions in order to obtain easier access to differentiated lines of credit.

It is noted in the international literature that there are different causes for the formation of Board Interlocking, such as the search for support from external groups (Selznick, 1965); Legitimation (Hillman, Cannella & Paetzold, 2000); and easy access to scarce resources (Pfeffer & Salancik, 1978). However, in the Brazilian literature, there are still practically no studies on the factors that determine the existence of corporate connections. Thus, this article seeks, through the analysis of the companies on Ibovespa, to launch the first questions about this practice in the Brazilian capital market, identifying its main determining factors.

5. Method

The Bovespa Index (Ibovespa) represents a theoretical portfolio based on the average performance of the most representative stock prices in the Brazilian capital market. The inclusion of the security on Ibovespa is subject to certain requirements: i) figure among the eligible securities that have a Tradability Index (TI) of more than 85%, taking into account the last three portfolios; Ii) have a presence of 95% in trading sessions; Iii) hold a participation of 0.1% or higher in the financial volume; and iv) does not qualify as a "Penny Stock", that is, an asset whose quotation is lower than R $ 1.00 (one real) (BM & FBOVESPA, 2015).

The theoretical portfolio of Ibovespa has a four-month term, coming into effect on the first Monday of each period. At the end of each four-month period, the portfolio is rebalanced for the new portfolio (BM & FBOVESPA, 2015). For the study, the portfolio corresponding to the period from September to December 2013 was used, represented by 69 shares. Among the stocks identified, there were cases of the same company in the composition of the index, with common and preferred stock, like in the cases of: Petrobras, Eletrobras, Vale, Usiminas and Oi. Therefore, the number of companies analyzed was reduced to 64 stocks. In addition, financial institutions (6 companies) were excluded from the sample, in order not to distort the analysis, thus constituting a sample based on accessibility.

This article covers the Brazilian companies that entered the composition of Ibovespa in the period from 2008 to 2014. The sample comprises 58 non-financial companies, distributed among 14 sectors of activity, according to the classification of the Economática database, as presented in Table 1.

Table 1:
Distribution of research sample

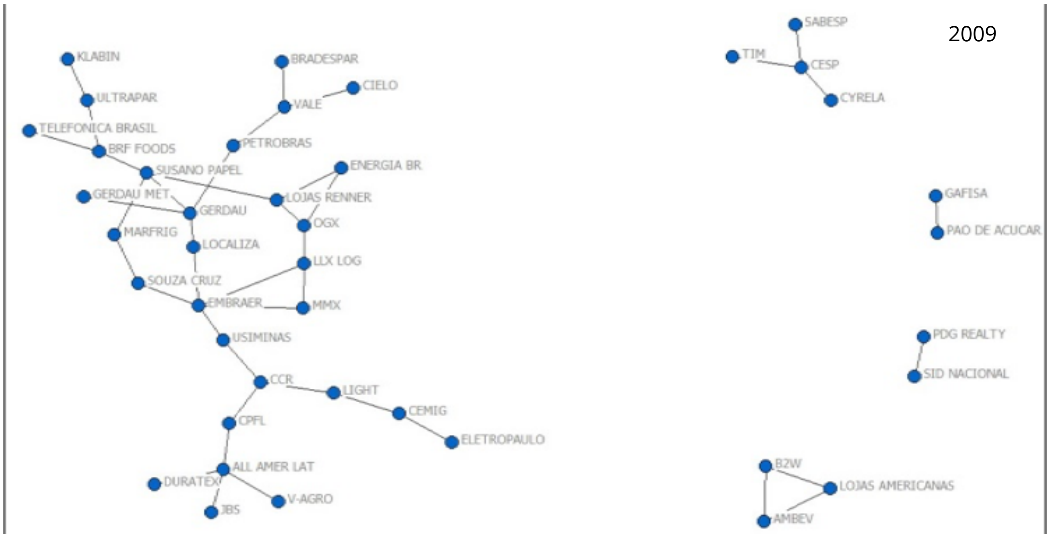
	Sectors	Sample	%
1	Food and Beverages	4	6.90%
2	Trade	6	10.34%
3	Construction	7	12.07%
4	Electric Energy	10	17.24%
5	Mining	3	5.17%
6	Others	9	15.52%
7	Paper and Pulp	3	5.17%
8	Oil and Gas	2	3.45%
9	Chemistry	2	3.45%
10	Iron and Steel	4	6.90%
11	Software and Data	1	1.72%
12	Telecommunication	3	5.17%
13	Transport Service	3	5.17%
14	Vehicles and parts	1	1.72%
Total		**58**	**100.00%**

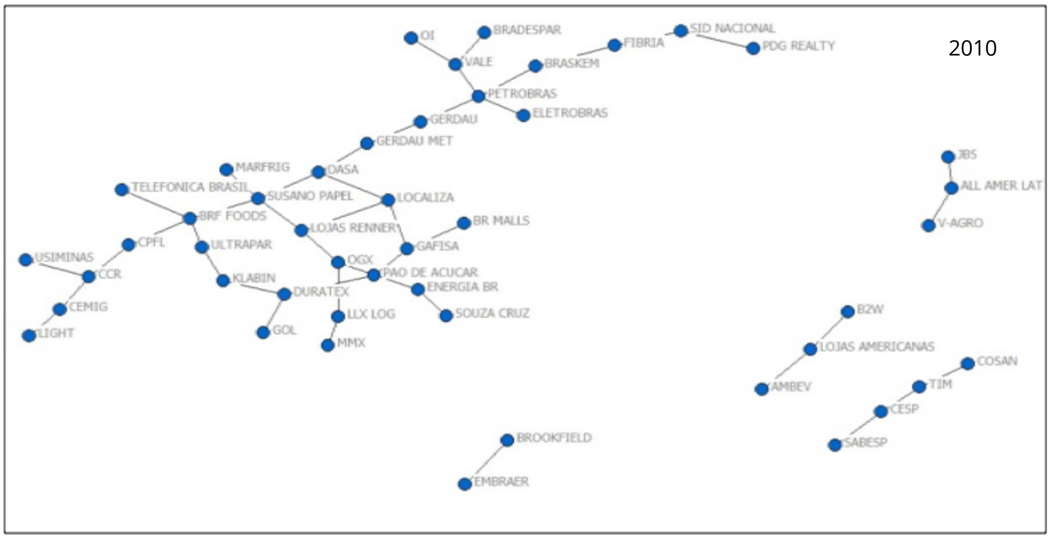
Source: data from Economática® database

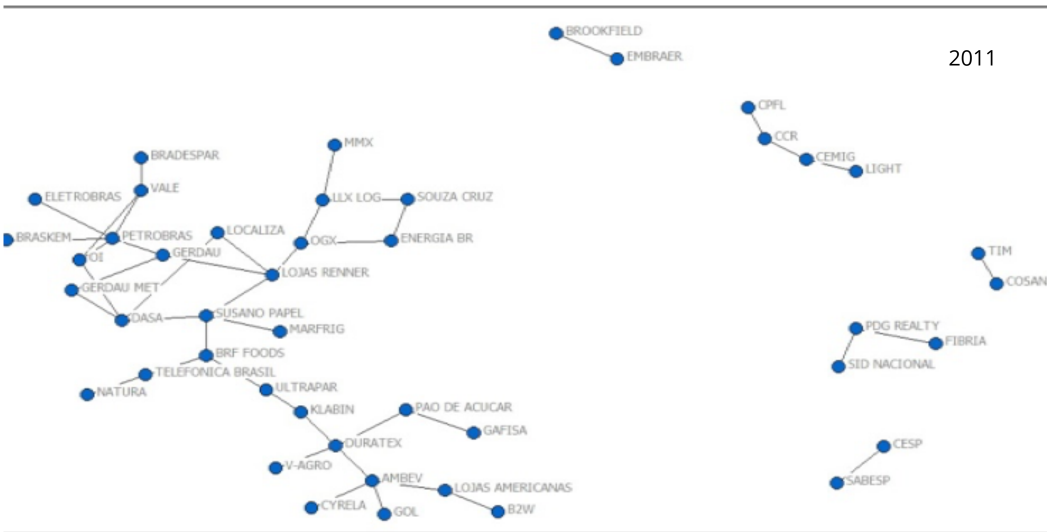
The classification per sector followed the Economática® criteria. This database classifies the companies into 20 sectors, 14 of which were covered in the sample. The electric energy stands out as the largest in the sample with approximately 17%. To identify the data on the boards of administrators, the information in the Reference Forms was used, available on the website of the São Paulo Stock Exchange (BM&FBOVESPA). This information permitted the collection of variables and measures employed in social network analysis. First, for each of the six years, information on the board members was collected. Then, using MS Excel, squared matrices were developed to identify the links between companies. After creating the matrices, *Ucinet 6* and *Net Miner 3.0* were used to obtain the social network measures.

6. Structural network analysis

In Figure 1, the corporate network configurations of Brazilian companies listed on Ibovespa between 2009 and 2014 are displayed.


2009
KLABIN
ULTRAPAR
TELEFONICA BRASIL
BRF FOODS
SUSANO PAPEL
GERDAU MET
GERDAU
MARFRIG
LOCALIZA
SOUZA CRUZ
EMBRAER
USIMINAS
CCR
LIGHT
CEMIG
ELETROPAULO
CPFL
ALL AMER LAT
DURATEX
JBS
V-AGRO
BRADESPAR
VALE
CIELO
PETROBRAS
ENERGIA BR
LOJAS RENNER
OGX
LLX LOG
MMX
SABESP
TIM
CESP
CYRELA
GAFISA
PAO DE ACUCAR
PDG REALTY
SID NACIONAL
B2W
LOJAS AMERICANAS
AMBEV


2010
OI
BRADESPAR
VALE
BRASKEM
FIBRIA
SID NACIONAL
PDG REALTY
PETROBRAS
ELETROBRAS
GERDAU
GERDAU MET
MARFRIG
DASA
TELEFONICA BRASIL
SUSANO PAPEL
LOCALIZA
BRF FOODS
LOJAS RENNER
BR MALLS
CPFL
ULTRAPAR
GAFISA
USIMINAS
CCR
OGX
PAO DE ACUCAR
KLABIN
DURATEX
ENERGIA BR
CEMIG
LIGHT
LLX LOG
SOUZA CRUZ
GOL
MMX
JBS
ALL AMER LAT
V-AGRO
B2W
LOJAS AMERICANAS
AMBEV
COSAN
TIM
CESP
SABESP
BROOKFIELD
EMBRAER


2011
BROOKFIELD
EMBRAER
CPFL
CCR
CEMIG
LIGHT
MMX
BRADESPAR
VALE
ELETROBRAS
LLX LOG
SOUZA CRUZ
BRASKEM
PETROBRAS
LOCALIZA
OGX
ENERGIA BR
OI
GERDAU
LOJAS RENNER
GERDAU MET
DASA
SUSANO PAPEL
MARFRIG
BRF FOODS
TELEFONICA BRASIL
NATURA
ULTRAPAR
KLABIN
PAO DE ACUCAR
GAFISA
DURATEX
V-AGRO
AMBEV
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GOL
B2W
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COSAN
PDG REALTY
FIBRIA
SID NACIONAL
CESP
SABESP

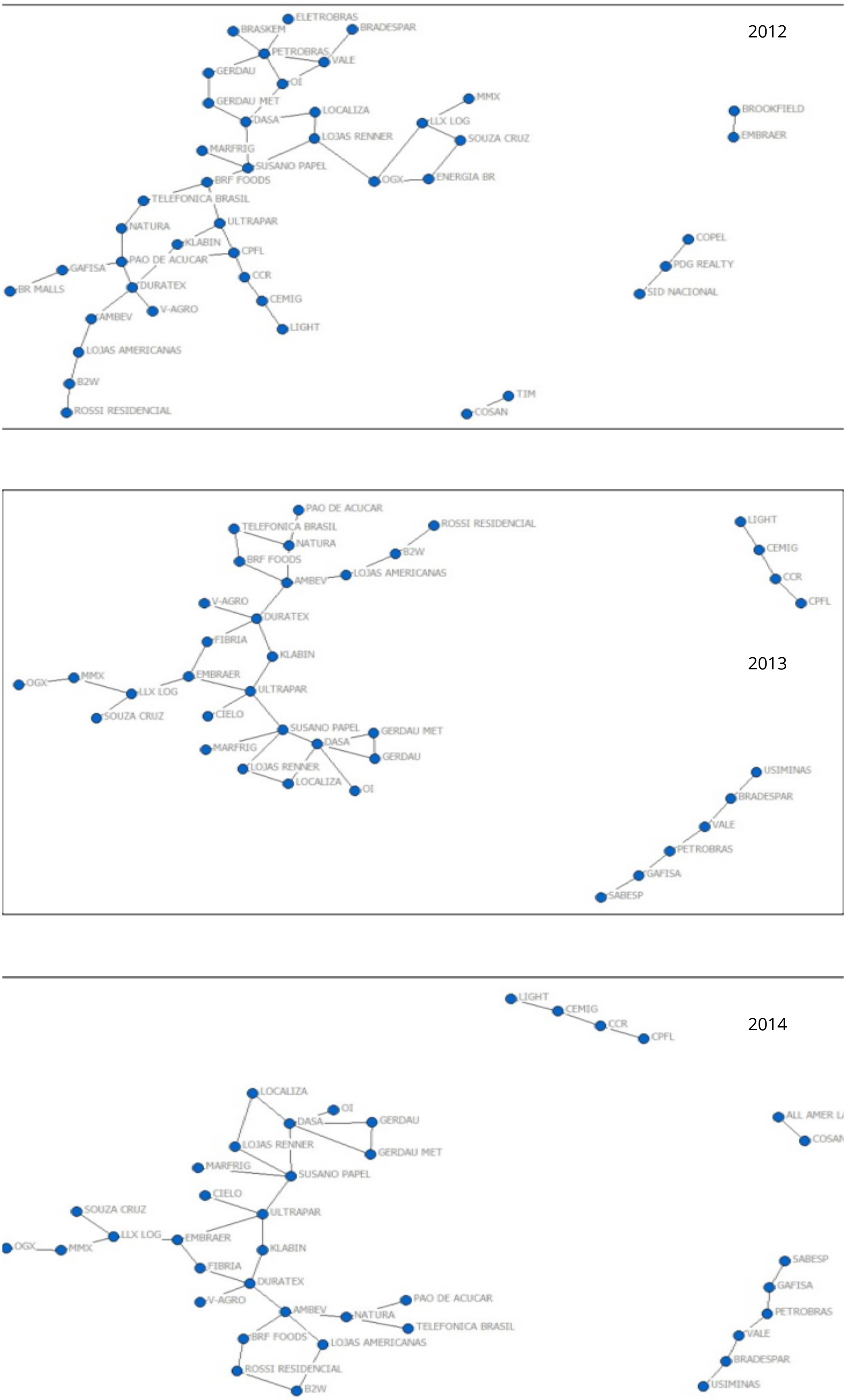

Figure 1. Configuration of links among companies on Ibovespa between 2009 and 2014

Source: elaborated by the authors.

The arrangement of the sample companies in 2009 shows a large network comprising more than 60% of the companies on Ibovespa, in addition to four minor links. Among the companies belonging to the largest network, Suzano S.A. has eight direct links, that is, it shares its board members with BRF Foods, Gerdau, Lojas Renner, Marfrig, OGX, Localiza, Ultrapar and Gerdau Metallurgy.

A priori, there are some changes in the structure of the connections in relation to 2009. The network of the companies Pão de Açúcar, Gafisa and BrMalls, which were isolated in 2009, became part of the main network through the sharing of an advisor from Pão de Açúcar with Klabin and Duratex. A similar situation occurred with Siderúrgica Nacional and PDG Realty. The companies Usiminas, CPFL, CCR, Cemig and Light dismantled themselves from the main network to constitute a smaller network. These changes demonstrate the dynamics of the corporate environment and lead one to think that, although links between companies belonging to the core network are more consistent, replacing advisors in peripheral networks is a common feature.

The structure of the networks showed changes compared to 2010. Companies such as Tim, Cosan, Cesp and Sabesp, which formed a network of contacts, separated themselves into two small networks; the first formed by the companies Tim and Cosan; and the second by Cesp and Sabesp. This segmentation may be associated with the departure of former BNDES president Andrea Sandro Calabi from Tim's Board of Directors, to assume the post of Secretary of Finance of the State of São Paulo. His departure from the company broke the ties the company had with Cesp and Sabesp.

With the departure of BNDES director of Capital Markets Eduardo Rath Fingerl from Brasken's Board, Fibria dismembered the main network and created a new network with PDG Realty and Sid. Nacional. On the other hand, companies such as B2W, Lojas Americanas and Ambev became part of the main network through the sharing of directors with Duratex and Gol. B2W, Lojas Americanas and Ambev are part of the economic group of the Lemann family. The group's connection with Duratex and Gol was due to the sharing of former Citibank Private Bank president Álvaro Antônio Cardoso de Souza. For the market analysts, the inclusion of Álvaro de Souza on the Board of Directors adds experience and credibility to the organizations.

It is observed that the main network absorbed some networks that were isolated. Companies such as Light, Cemig, CCR and CPFL, which formed a small network in 2011, joined the main network, sharing advisors with Ultrapar and Pão de Açúcar. The connection of the company CPFL with the company Pão de Açúcar arose from the insertion of the former president of the Securities and Exchange Commission (CVM), Maria Helena dos Santos Fernandes Santana, in the Board of both companies. Her presence was mainly due to her experience in the capital market.

On the other hand, the ties created between CPFL and Ultrapar are related to the control exercised by Banco do Brasil employees' pension funds. This premise is based on the presence of banker Ivan de Souza Monteiro on the Board of Directors of both companies. This link leads one to think that companies tend to include professionals in the board of companies linked to pension funds as a way to monitor the decisions made by executives of these organizations. Table 2 shows the links between organizations in the period analyzed.

Table 2:
Relation between companies and Board Interlocking

	Absolute Frequency	Relative Frequency
None	6	10.34%
Presented during one year	2	3.45%
Presented during two years	3	5.17%
Presented during three years	8	13.79%
Presented during four years	8	13.79%
Presented during five years	3	5.17%
Presented during six years	28	48.28%
Total	**58**	**100.00%**

Source: research data.

As observed, 28 out of 58 companies analyzed, slightly more than half, maintained Board Interlocking throughout the six-year period. Only six companies, about 10%, did not present Board Interlocking in that period. Five of these six present capital spread. That suggests that companies with this characteristic tend not to establish links and to maintain their boards independent from others. In that sense, the high incidence of Board Interlocking among the companies listed on BM&FBOVESPA is associated with the presence of economic groups with a strong majority presence, governmental control and the activity of pension funds.

In Figure 2, the companies are presented whose bonds remained stable during the period from 2009 till 2014.

Figure 2. Continuing bonds from 2009 till 2014.

Source: elaborated by the authors.

There are six permanent networks among the companies analyzed. The networks formed by Gerdau and Gerdau Met and MMX and LLX (Prumo Logística) represent the formation of economic groups. The network constituted by Petrobras, Vale and Bradespar characterizes the establishment of connections from the perspective of governmental controls. Indirect governmental connections are also noted in which, through BNDES, the government exerts its influence in the companies' top management.

It is also noted that the existence of pension funds can be decisive for the establishment of links between boards. Previ (Banco do Brasil), Petros (Petrobras) and Funcef (Caixa Econômica Federal) hold a stake in several publicly traded companies. Thus, the inclusion of joint counselors among companies tends to assist in monitoring decisions made by the investee. Finally, it was observed that the networks are constituted by the presence of professionals with market knowledge and expertise, since the insertion of people like these tends to favor the image of the organization towards investors.

Therefore, it is noted that the presence of Board Interlocking is a common feature among the companies on Ibovespa. According to the results obtained, this characteristic can be associated to the following factors:

- **(i)** **existence of economic groups:** it occurs when professionals serve simultaneously on the board of companies belonging to the same group, acting as a source of information between parent and subsidiary. This fact was observed among the companies OGX, MMX and LLX, Gerdau and Gerdau Metalúrgica and Ambev, Lojas Americanas and B2W;
- **(ii)** **government control:** verified when the Union, through its entities, exerts influence in the control of certain companies. BNDES Participações S.A. is an example. Its representative share in companies like Petrobras, Vale, Suzano, Klabin, Gerdau, CPFL, among others, allows the inclusion of professionals on the board of those respective companies;
- **(iii)** **existence of pension funds:** it happens when companies create investment portfolios to assist in the retirement of their employees. Banco do Brasil is a company that makes this type of investment. Therefore, the inclusion of professionals in the board of companies with shares belonging to the pension fund is essential for the control of managers' decisions; and
- **(iv)** **inclusion of professionals with acknowledged market experience:** companies usually seek to include professionals with great market knowledge in their boards, so that their experiences help in the decision making process. Professionals like Maria Helena dos Santos Fernandes Santana and Álvaro Antônio Cardoso de Souza, for example, are highly requested by companies, since their knowledge baggage is an important source of information when adopting certain corporate practices.

It is also worth noting that most of the changes in the configuration of corporate networks occur due to connections between companies through professionals with recognized experience. These links tend to be more fickle, since such professionals are much in demand by companies. On the other hand, ties associated with other factors, such as economic groups, government control and pension funds, tend to be more stable because they correspond to long-term relationships.

7. Conclusions

The research aims to identify the main determinants for the formation of Board Interlocking in the Brazilian capital market. For this purpose, 58 Brazilian companies on Ibovespa were used as a sample. The study contributed to the understanding of organizational aspects that influence the formation of corporate ties in organizations, specifically when considering the existence of Board Interlocking.

The exploratory analysis was performed based on data referring to the Board of Directors in the Reference Forms, available on the website of the São Paulo Stock Exchange (BM & FBOVESPA). Such information was collected for each of the six years and later converted into squared matrices, so that the connections between companies could be identified.

Based on the identification of the connections between the companies, the results found demonstrate that the presence of Board Interlocking is common for the companies belonging to Ibovespa and are usually associated to four factors: (1) formation of economic group; (2) government control; (3) formation of pension funds; and (4) the presence of professionals with acknowledged market experience. The first three factors give rise to longer lasting connections, and such connections are rarely broken. On the other hand, the connections established through professionals with market experience tend to be more unstable, due to the fact that the presence of these professionals is much requested on the board of different companies.

The results partially agree with the study by Dooley (1969) regarding the favoring of Board Interlocking due to the existence of economic groups; with the studies by Schoorman, Bazerman, and Atkin (1981); Hillman, Cannella, and Paetzold (2000) and Barringer and Harrison (2000) regarding the inclusion of a professional with knowledge and expertise on the company's Board of Directors. This attitude reflects a good image of the company in the market.

It is believed that, in terms of the Resource Dependence theory, the connections established through Board Interlocking are fundamental to facilitate the obtaining of important financial resources for the company, but they can also become channels for the dissemination of corporate practices, such as earnings management, information asymmetry and loss of information quality.

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