



Influence of board interlocking in the selection of the audit firm on the mandatory rotation

La influencia del board interlocking o cruce de consejeros en la selección de la empresa de auditoría en el período de cambio obligatorio

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Abstract

In the board of directors is common to observe the interaction between companies from inserting the same counselor in different councils, which is called the Board Interlocking (BI), disseminating information and experience among advisers who seek to use them for decision making. The aim of the study is to assess the influence of Board Interlocking in audit firm selection in mandatory rotation in companies listed on the BM&FBovespa. This is a study, documentary and quantitative. We used a sample of 235 companies that had the exchange of the audit firm in 2012. The processing and analysis of data using descriptive statistics and logistic regression. The results indicate the existence of BI in the enterprises. The result of the regression indicates an improvement in the model assertiveness, but without statistical significance. It was concluded that the BI is practiced by Brazilian companies and does not influence the choice of audit firm on mandatory rotation.

JEL Classification: M42, M41, O16

Keywords: Board Interlocking; Independent Audit; Rotation audit firm.

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Resumen

En el consejo de administración es común observar la interacción entre las empresas a partir de la inserción del mismo consejero en diferentes consejos, asunto denominado Board Interlocking (BI) o Cruce de Consejeros, que busca difundir información y experiencia entre los consejeros, útiles para la toma de decisiones. El objetivo del estudio es verificar la influencia del Board Interlocking en la selección de las sociedades de auditoría en el período de cambio obligatorio, de las empresas que cotizan en la BM&FBovespa. Se trata de un estudio documental y cuantitativo. Se utilizó una muestra de 235 empresas que tuvieron el cambio de firma de auditoría en 2012. El procesamiento y análisis de datos fue realizado mediante estadística descriptiva y regresión logística. Los resultados indican la existencia de BI en las empresas. El resultado de la regresión indica una mejora en la asertividad del modelo, pero sin significancia estadística. Se llegó a la conclusión de que el BI practicado por las empresas brasileñas no influye en la elección de la firma de auditoría en el período de cambio obligatorio.

Códigos JEL: M42, M41, O16

Palabras clave: Board Interlocking; Cruce de Consejeros; Auditoría Independiente; Cambio de la empresa de auditoría.

Introduction

The agency problems that are triggered by the separation of ownership and control in companies can be softened with strong corporate governance structures (Bianchi, Silva, Gelatti & Rocha, 2009). Lodi (2000) the corporate governance is a doctrine of a link among shareholders, the executive of the company, the company executives, the board members and auditors. The objective of the corporate governance (GC) it is protect the interests company's shareholders in several mechanisms are established to that goal. Santos e Silveira (2007) have elected the board members (CA) as one of main mechanisms of the company's corporate governance, it serves to monitoring the management of the administrators, as well as the company's strategy definition. For Hallqvist (2000) has mentioned that function essence of CA at this defense of the investor patrimony, how a way to obtain the biggest return possible and introduce values to the business, always acting in the minimize agency problems.

Other mechanism of corporate governance that visualize to minimize the problem of the agency its audit extreme of the financial demonstrations. When confirming the account information, the external auditors reduce the way how managers manipulate results and it can hurt the shareholders (Nichols & Smith, 1983). Nichols and Smith (1983) say, the external auditors help to the alignment of interests between the shareholders and the administrators, mitigating the agency problems related to this relationship.

For Mintzberg (1983), the counselors have established networkings of contacts with objective to collaborate the companies. The counselor choice happens it gives him the power to create a relationship with others companies and represents a link, how a way to beneficitation a company which is inserted. A manner to create this networking of contacts is, the counselor participation in several meeting, this is a common practice in organization, how was studied for Mizruchi (1996) and Fich and White (2003). The counselor form its networking of contacting with participation in others administration meeting, inserting knowledge and sharing experience (Mintzberg, 1983).

According to Mizruchi (1996), this phenomenon it's denominate board interlocking (BI). Fich and White (2005), describe that the board interlocking means a professional participation in the CA from two or more companies, articulating as a linking between them.

Hallock (1997), Fich and White (2003), Francis (2004), Beckman, Haunschild and Phillips (2004) e Kaczmarek, Kimino and Pye (2012) it shows that the formation of BI disseminate information and experience among the counselors that bring use them to making their decision. Kaczmarek, Kimino and Pye (2014) they says that, information exchange and experiences, The advice needs be receptive in new ideas and innovation tested by the others advice. Thus, that information is used in the right moment of decision of the CA as the selection of the independent audit.

In this context, we can see the possibility of counselor interferences at moment of the company's audit and in the determination of yours wages, because the counselor can to resort to another counselor to obtain information about firm audit by the BI (Johansen & Pettersson, 2013).

According to Podolny (2001) the BI is graduated by the counselor and it retain experiences relating to the services offered by third-part and it has influenced over the salary paid to this. The social relation, relationship's networking, integrated among companies and their counselor, it has possibility of negotiation of different values from that value of market which does not exist this social relation (Granovetter, 1985).

Might be observed for the context introduced that the formation from BI on administration counselors, disseminating experiences, practice, preference and knowledge the counselors, it can change the whole idea of making decision to the advice (Fich & White, 2003; Francis, 2004; Kaczmarek, Kimino & Pye, 2012).

This manner, the advice's decision at the selection the audit firm and the value of the wages contract can be affected at constitution of BI on administration advice (Davison, Stening & Way, 1984; Johansen & Pettersson, 2013).

Although, when the formation of administration advice as a tool in the corporate governance, looking for minimizing problems agency, the counselors can establish contact network with participation of other advice, called at literature of board interlocking. By intermedium of BI formed by counselors, there is an actual transmission of experience among them. In this way, previous experience can influence the counselor in the choice audit firm at moment, he already knows that firm, because he has participated of the advice from other company which the audit firm is contracted and can indicate their own choice.

Exposed in this scenario, this project demand replies that question: Which is, the influence of board interlocking on selection in the rotation of audit firm that is an obligation in the listed companies on BM&FBovespa? Thus, the main objective is to verify the influence from board interlocking in the rotation obligated.

The justification of the study proposed an understanding from relation between organizations, in this study specifying for the connexion formed by BI. Also it contributed to studies of the variable who explain the choice of audit firm, selected in the moment obligated of caster, helping in the discussion about the reflexes arising from good corporate governance practices through the board of directors.

How much the justifying of the study, the mechanism of formation of the BI makes part of decision and strategies corporate, Influencing the environment to which the company is inserted, thus, this kind of study have contributed, because provides information about decision

of the board directors, indicating the behavior to the company in the networking in which she is participating. Still, at this context, the study have contributed to the investor, in which can be investigated as a CA act in relation to audit and by the results, the good governance corporate practices.

Therefore, it is not equal to another studies, has the objective of investigating the existence of board interlocking and its influence in the selection of the audit firm in a brazilian context. This article is structured in five section. At the first section, has introduced the context who insert this study, its importance, the problem and the main objective of the article. The second section has shown the theoretical foundations. Third section is approached the methodology used to this search. The next section is made data analysis and it was introduced what was found to the search. At the end, expose a final comment and conclusions.

Theoretical reference

Board interlocking

When a counselor or chief executive officer of the company “A” at the same time is participating in the board from other company “B” or more companies, or yet, when a counselor of the company “X” and another company “Y” and simultaneously is participating in a third company “Z”, it is verified a linking among companies by the middle of CA, what literature calls board interlocking (Pennings, 1980; Mizruchi, 1996; Fich & White, 2005). Through board interlocking (BI), In the literature one observes different nomenclatures for the same phenomenon, as interlocking directorates (Dooley, 1969; Ornstein, 1982), board network (Battiston, Weisbuch & Bonabeau, 2003; Kim, 2005), interlocking directorship (Peng, 2001) e director interlocks (Haunschild & Beckman, 1998).

The BI can be constituted for the path of simple board interlocking (Mizruchi, 1996) and board interlocking (Fich & White, 2005). The simple board interlocking occur when a person of the company “X” comes to participate of CA company “Y”, however, no other person of the company “Y” comes to participate in the board company “X” (Mizruchi, 1996).

Reciprocal board interlocking occurs when an individual of company “X” participates in the CA of company “Y” and another individual of company “Y”, participates in the CA of company “X”, thus constituting the condition of reciprocity between companies.

The occurrence of simple board interlocking and reciprocal board interlocking is found in many companies, being this phenomenon verified through studies executed with the function of analyzing their perspectives and effects in companies (Mizruchi, 1996; Larcker, So & Wang, 2013; Johansen & Pettersson, 2013).

Fich and White (2005) clarify that BI is an interaction of two companies from the insertion of the same professional in the CA of both. It is a primordial indication that companies connect with other companies through their advisors, forming a network of contacts with the corporate environment in which they are inserted (Mizruchi, 1996). Still to Mizruchi (1996) the analysis between companies can show a conduct from these companies, because they have the same counselors. It should be noted that the director it is an important member of the company and can provide relevant channels to catch resources fundamental to organization (Hung, 1998).

Although it can be a common practice observed among organization in the world, the practice of BI it criticized various studies (Dooley, 1969; Burrell, 2005). Even Mizruchi (1996) has confirmed that BI between the own environment of activity of the company it appears the

construction of an oligopoly in the market, reducing the competitiveness of the sector. Pennings (1980) and Burt (1983) does not have the same idea than Mizruchi's (1996) analysis and prove by means of studies that the interaction of advisors is greater between sectors of activity in which there are a few companies, concentrating the market, The possibility of oligopoly in the sector involved.

How an alternative to avoid oligopoly from the organization, the country as Italy has law that censures the BI formation in the sector banking of the country. The law 6.404 de 1976 its article 147, do not approve the BI between the organizations of the same sector. Various investigations have measured the BI by its agency theory, confirming that your formation among companies can hurt some decision of the CA. This intervention might be in fact the knowledge and experience with others board can change the decision of the counselor and it can change the answer of the company (Hallock, 1997; Fich & White, 2003; Francis, 2004; Beckman, Haunschild & Phillips, 2004; Kaczmarek, Kimino & Pye, 2012).

Including the studies of Drago *et al.*, (2015), in Italian companies have identified that BI formation has saved the results in period where she was more used.

Several researchers have also observed the condition of IB in disseminating practices and preferences on the boards of management involved, such as Haunschild's studies (1994), Gulati and Westphal (1999), Larcker, Richardson and Tuna (2007) and Bouwman (2011). other studies, such as Davison Stening and Way (1984), Baydoun (1999) and Johansen and Pettersson (2013), have analyzed the transmission of the predilection and practices in the CA inserted in BI relative to audit firm and the moment caster of an audit. The relation of the BI with audit must be to a fact of the moment caster of an audit, be obligated or not, there will be unsure in the decision in what firm will be chosen (Craswell & Francis, 1999). This insecurity can be decreased through of the experience and knowledge acquired for counselors in another, ou better, through of the BI.

Podolny (2001) indicates that the links working as channels of market disclosure, being this market also considered as opportunities information, exactly what happened at the time of rotation of the audit firm. This suggests that the information associated with auditors' experience can be disseminated at whole the network environment. To Lennox and Yu (2016) in the choice from the new auditor, there is a doubt and does not know how to make the choice of the new auditor, without clarity the CEO and executive, can reduce when they going to choose a new auditor whose they are always in contact. So companies tend to select audit firms that their directors and executives are more familiar with the service of other companies, that conclude the links between executives is helping companies to take decision more accurate and, however, the better decision of audit (Lennox & Yu, 2016).

Mandatory caster of independent audit

Johnson, Khurana and Reynolds (2002) affirm that the financial statements are important through of the information with the external stakeholders of the organizations, while the independent auditors are responsible for the validation of these statements.

Lopes and Martins (2005) Understand that independent auditors perform the function of information agents and in the capital market contribute to the reduction of information asymmetry. Becker *et al.* (1998) corroborate that the audit reduces the asymmetry of information between managers and other stakeholders within the organization as well as external stakeholders in the case of investors as they validate the financial statements. According to Johnson, Khurana and

Reynolds (2002), The external auditor is a useful mechanism for all stakeholders, however, the definition of which audit will be contracted is carried out by the company's managers. Not always the managers have the same interest of the third parties involved in the environment in which the company is inserted (Schwartz, 1997).

To Schwartz (1997), the auditor, by approving the choices of the organization's managers, can assure an increase in the value of the fees and the continuity of the work of the audit firm. Boynton, Johnson and Kell (2002) that the independence of the auditor is its main basis and that if this autonomy is impaired, the results presented by it in its report should not be considered as reliable by the stakeholders.

Oliveira (2005) highlight that in order to maintain the independence of the auditor there is a rotation of audit firms with the function of preserving the independence of the auditor. This rotation prevents audit firms from fixing their work over long periods in the same organization, in order to maintain the client and increase their fees.

The fundamental aspect of auditing firm rotation is the termination of the audit contract between the audit firm and the audited organization. Otherwise, the rotation of the auditor has as fundamental aspect, the exchange of auditors who develop the work of the audit in the organizations without ceasing the audit contract between the audit firm and the audited company (Formigoni, Antunes, Leite & Paulo, 2009).

This control of the working time of the auditor in organizations is based on the condition that if the audit firm performs its work over a long period in the same organization, it may give rise to the auditor conniving with the actions of the managers and possible influence in their opinion of the Financial statements of the organization (Myers, Myers & Omer, 2003).

Still to Nagy (2005) to determine this mandatory rotation position, regulators and external users allege that auditors, after spending much time in the same organization, are no longer suspicious of managers and believe that the actions taken by them are correct, thus, the rotation of the firm This type of situation.

As a benefit of auditing firm rotation, Oliveira (2005) indicates that this action safeguards the auditors' commitment to the audited organization, maintaining the autonomy of the auditor, since the long-term maintenance of the same audit firm can lead to corrupted conclusions.

In Brazil The basic purpose of the audit is to safeguard the independence of the auditors and, in line with the studies of Nagy (2005) and Oliveira (2005), reduce the possibility of problems associated with the work of the audit. As an example, we can cite the corporate problems involving Economic Bank S.A and the National Bank S.A (Assunção & Carrasco, 2008). The Central Bank from Brazil (BACEN) which in the 1990s initially postulated the need for regular and mandatory rotation of audit firms. BACEN postponed the rotation in financial institutions operating in Brazil after confirmation of imperfection in the audits of the financial statements of the Economic Bank S.A and National Bank S.A (Assunção & Carrasco, 2008).

This determination aimed at improving confidence in financial institutions after these two cases, in which the institutions closed their activities, harming the financial market and its customers clientes (Braunbeck, 2010). For the Brazilian Securities and Exchange Commission (CVM, 1999), by means of Instruction 308/1999, auditing by a single auditor or audit firm for a long time may affect the quality of the audit and hurts its independence. The CVM by means of Instruction 308 of May 14, 1999, article 31, establishes the mandatory rotation of audit firms for companies that participate in the securities market. The CVM determines that the independent auditor can not perform the audit of the same client for a term exceeding five

years. It also establishes the possibility of the return of the independent auditor to the client, however, only after a minimum period of three years has elapsed.

On November 16, 2011, CVM, through Instruction 509, made Instruction 308/1999 less strict and authorized the contracting of the same auditor for up to ten years, but with two conditions. The first condition is that the auditor is a legal entity, the second condition is that the organization has the Statutory Audit Committee with constant functioning.

Method and research procedures

Population and sample

The study population includes all open companies with shares traded on the BM&FBovespa, constituting a number of 510 companies as verified on the BM&FBovespa website on December 11, 2013.

Initially, we opted for the use of data from the entire population, that is, all open companies with shares traded on BM&FBovespa. However, at the time of the data collection, 36 companies could not have their data collected, due to two reasons: the first for the inclusion in BM&FBovespa of some companies only as of 2013, thus not having the 2012 Reference Form available; And the second reason is due to an error in the Reference Form file, making it impossible to verify document information. Thus, the number of the company was reduced to 474 companies, where it was detected the existence of the Board Interlocking. After that, the number of companies that performed the mandatory rotation of the audit firm was verified. In this case, 235 firms were identified, constituting the final sample of the study.

Research Variables

In order to realize the research, we defined the research variables that are shown in Table 1.

Table 1

Description of the search variable

Variable	Operationalization
Dependent variable	
Audit Caster (ROD)	Audit firm: 1 was attributed to firms big four and 0 for non big four firms
Independent variables	
Interlocking Board (BI)	Number of ties made up by the board of directors
Size of the audited company (LOG AT)	Of total assets Log
Registration time with the CVM (REG)	Numerical value of the number of years that the company is registered with the CVM
AC Size (TAMCON)	Number of effective directors of each board of directors
Number of CA meetings (REUN)	Number of meetings of the board of directors in the 12 months prior to rotation
Independence of CA (IND)	Number of members Divided by the total number of board members
Duality of the position of CEO and chairman of the board (DUA)	Dummy. One is attributed to a company in which the position of CEO and chairman of the board is occupied by the same person and if occupied by different people.
Audit Committee (CAUDIT)	Dummy. One is attributed to a company with an audit committee and 0 the case does not have

Source: Research data.

It appears in Table 1 for the dependent variable rotation audit was performed segregation in Big Four audit firms and not Big Four. Big Four audit firms are the big four calls, which are KPMG, PricewaterhouseCoopers, Ernst & Young, and Deloitte Touche Tohmatsu, considering the four largest audit firms in the world.

The Board Interlocking represents the number of bonds formed by the directors of the companies. A tie represents an advisor who participates in your CA and one more CA, your participation in two more CAs will generate two loops, and so on. The total number of ties of each company is generated by the sum of ties of each director, measured numerically, starting at zero for companies that do not have ties. The number of loops of each company was generated at the time of characterization of BI.

Control variables were determined to better interpret the influence of independent and dependent variables. There are control variables linked to the size of the company, such as size (Davison, Stening & Way, 1984; Phan, Lee & Lau, 2003; Mendes-da-Silva, Rossoni, Martin & Martelanc, 2008; Johansen & Pettersson, 2013). This variable is represented by the log of the total assets of each company.

Another variable related to the company's activity, refers to the time, in years, of registration with the CVM. It is justified its use as a consequence of the fact that a longer time of activity of the company can make it a parameter for companies with shorter registration time (Phan, Lee & Lau, 2003; Oliveira, 2010). Thus, firms with shorter time select the same audit firms as those with the longest registration time, since they serve as a reference for selection.

Five variables related to the board of directors were included, one of them the size of the CA, since larger boards tend to perform more BI (Davison, Stening & Way, 1984; Mendes-da-Silva *et al.*, 2008; Johansen & Pettersson, 2013). A larger number of advisors should be favorable to the company's performance and efficiency, as it entails a greater variety of knowledge and experience (Hsu & Petchakulwong, 2010). Thus, a larger CA, in the circumstance of the selection of the audit firm, will make an adequate decision due to the variety of knowledge and experience, seeking a better performance and efficiency of the organization.

The number of CA meetings in the 12 months prior to the rotation date has also been included. Their use is motivated by the fact that a larger number of meetings provides a scenario conducive to the dissemination of knowledge and experiences among the advisors (Haunschild, 1993; Larcker, Richardson & Tuna, 2007; Bouwman, 2011), So the selection of the firm to be hired can be influenced by the number of meetings (Soltani & Rekik, 2013).

The variable independence of the board is calculated by dividing the number of independent members by the total number of board members (Santos & Silveira, 2007; Johansen & Pettersson, 2013). Independent advisors are able to work freely and are not susceptible to stakeholder influence in the organization (Hsu & Petchsakulwong, 2010), is the case of the audit firm. The last control variable related to CA is the duality of the CEO position and the chairman of the board, in this case, was assigned 1 for companies in which they were the same person and 0 when they were not (Santos & Silveira, 2007; Oliveira, 2010). It should be emphasized that only the effective counselors were used for the study.

Also, included was a control variable related to the existence of the audit committee, company that owns, was assigned 1 and 0 when it does not have. Their inclusion is due to the condition that companies with committee tend to require a higher quality audit (Klein, 2002; Soltani & Rekik, 2013) and thus select big four firms because they have higher quality services compared to smaller firms (Palmrose, 1986).

Collection and analysis of data

Data collection was done through documentary research, from the websites of companies, CVM and BM&FBovespa. The data collection was related to the year of 2012, justifying this time cut because it is the year with the highest number of auditing firms in the last 5 years. It is observed that 65.9% of all casters in the last 5 years were made this year.

The high number of audit firm audit this year is due to the fact that the second round of compulsory rounding was instituted in 2002, culminating in a larger number in this year. Data collection was done from the Reference Form of the 474 companies in the general sample proposed by the study.

The treatment and analysis of the data were performed through descriptive statistics and through logistic regression. Identifying BI each company has been identified by the number of bonds that it has through its members, which is the nomenclature to refer to the links between the actors (Burt, 1983), achieved through UCINET® software. The data were organized in a spreadsheet and further processed by the software SPSS 21 (Statistical Package for Social Sciences).

Analysis of results

Descriptive analysis of variables

First, a descriptive statistic is presented of the variables that comprise the values obtained for the 235 companies that performed the mandatory rotation of the audit in the year 2012. The results are shown in Table 2. The dichotomous variables were analyzed by their relative frequency and the variables not dichotomous by the average.

The results shown in Table 2, related to the dependent variable ROD indicate a relative frequency of 66.8%, meaning that 78 of the 235 companies hired a big four firms at the time of mandatory rotation. This result corroborates Dallochio's (2002) study, which indicated the existence of market concentration by the largest audit firms.

For the independent variable BI, it is observed that the minimum value was 0, that is, there is a company that audited the audit and did not have an adviser on another board. The maximum number of BI Was 36 and its mean was 6.76. It is noted that the average was below 7.95, which was the average of the 474 companies that practiced BI in 2012.

The company Cemig SA went to the company with the largest number of BI that carried out the audit rotation. This number is due to the company participate in the Cemig group also formed by the companies Cemig Distribution and Cemig Generation, who share the same advisors generating a high number of BI for them, but a few connections between them and other companies. In this scenario the spread of knowledge and experiences may be limited to the group companies, since the participation of CA in other companies is limited.

It was verified that 30.6% of the companies did not practice BI At the time of mandatory rotation. This shows that despite the reduction of 474 companies from the general sample to 235 that had a mandatory rotation, the proportion without BI remained close because, in the case of the 474, the percentage was 27%. In this way, the companies that practiced BI totaled almost 70%, indicating the existence of a scenario conducive to the dissemination of practices among companies, because BI is a mechanism for the generalized spread of knowledge and information between them.

Table 2
 Descriptive statistics of search variables

Variables	Minimum	Maximum	Average	Medium	Relative Frequency	Standard deviation
Dependent						
Audit Caster (ROD)	0	1	X	1	66.8%	0.47191
Dependent						
Board interlocking (BI)	0	36	6.766	3	X	8.6613
Control						
Size of the company (LOGAT)	3.3010	11.8310	8.6618	9.1386	X	1.63746
Registration time with the CVM (REG)	1	74	18.323	14	X	14.3752
AC Size (TAMCON)	1	15	5.800	5	X	2.7234
Number of CA meetings (REUN)	1	26	6.106	4	X	3.9432
Independence of CA (IND)	0	100%	14.98%	0	X	22.0781
Duality of the position of CEO and chairman of the board (DUA)	0	1	X	0	24.3%	0.4295
Audit Committee (CAUDIT)	0	1	X	0	20.9%	0.4071

Source: Research data.

The control variable size of the company's assets is in log, which converting into real, has the average of 459 million. The maximum amount was a little more than 677 billion reals and a minimum of R\$2 thousand reals.

In the variable related to the time of registration in the CVM, the average was 18 years. The oldest record is of 74 years of the Industry Romi, but this company does not have prominence regarding the network of relationship of its members of the board of directors, being linked to only one company.

The size of the council, on average, was almost 6 members, a larger amount than the one recommended by the IBGC which is at least 5. The largest council verified in the companies was of 15 members. It should be noted that the larger boards tend to have the more interlocking board (Davison & Stening Way, 1984; Mendes-da-Silva *et al.*, 2008;. & Johansen Pettersson, 2013). However, according to Reddy, Locke, and Scrimgeour (2010), at the moment of decision-making, smaller CAs are more likely to agree on ideas, since they provide a more authentic discussion among board members.

The variable number of meetings pointed out that there are companies that only held one meeting, in this case, the propensity to share experiences and knowledge expected by Mintzberg (1983), Haunschild (1993), Larcker, Richardson and Tuna (2007) and Bouwman) Can be reduced by the small number of encounters. The average number of company meetings was 6, that is, one every two months. It is noteworthy that the result of the median indicates that half of the companies performed less than 4 meetings per year. The maximum number of meetings was 26, more than twice a month. It is important to note that the frequency of meetings is fundamental to fulfill the expectations of the CA by the good practices of KM, to control and monitor the actions of the agent, aiming at alignment with that expected by the principal (Hermalin & Weisbach, 2003).

The independence of the board of directors was 14.98%. Even if there are companies with 100% independence from CA, independence is low for companies that have made a mandatory rotation. Fama and Jensen (1983) and Hermalin and Weisbach (2003), point out that it is important that the CA is independent in order to maintain its decision-making capacity. For Hsu and Petchsakulwong (2010) independent advisors are more efficient because they work freely and are not subject to influences from interested third parties in the company. In this way, this low percentage of independence can indicate a vulnerability of the CA to be influenced by third parties.

Only for 24.3% of the companies, the position of CEO and president of the CA is occupied by the same individual, that is, 57 out of 235 companies. This condition is congruent to the study by Yemarck (1996) in which he advises that the positions of CEO and president of the CA should be occupied by different individuals, thus resulting in benefits to the company. Of the companies that carried out a mandatory rotation, almost 21%, that is, 49 companies out of 235 have an audit committee. For these firms, the auditor tends to be more demanding on the quality of the audit (Klein, 2002).

Analysis of the Board of Influence Interlocking at Rotation Required of Independent Audit

For the analysis of the influence of the Board Interlocking rotation of independent auditors used the logistic regression. It used the dependent variable of auditors and the independent variables BI and the control variables, noting that the dependent variable was segregated in Big Four audit firms and not Big Four. Table 3 shows how the companies would be classified if the model were allowed to conduct exclusively according to the observed frameworks.

Table 3
 Classification table former to logistic regression analysis

Observed			Foreseen		
			FIRM		Right Percentage
			No BIG4	BIG4	
Step 0	FIRM	No BIG4	0	78	0
		BIG4	0	157	100
	Overall percentage				66.8

Source: Research data.

From Table 3 it is observed that the sample consisted of 78 companies not selected in a big four casters and 157 companies selected a big four, which have a pre-assessment in which all companies would find themselves grouped as audited by a Big Four. This indicates, as Corrar, Paulo and Dias Filho (2009), that the model would correctly group companies are audited by the big four and incorrectly those that are not audited by the big four.

By the model shown, the overall hit percentage would be 66.8%. For Corrar, Paulo and Dias Filho (2009), this analysis is relevant, since, after the inclusion of the independent variables, the percentage is expected to rise, thus serving to evaluate the effectiveness of the model. Table 4 shows the independent variables with the respective results.

Table 4
 Logistic regression independent variables

Example	B	S.E.	Wald	Sig.
Board Interlocking	-0.001	0.020	0.002	0.967
Size of the company (LOGAT)	0.280	0.119	5.536	0.019
AC Size (TAMCON)	0.166	0.088	3.616	0.057
Registration time with the CVM (REG)	-0.040	0.012	10.572	0.001
Number of CA meetings (REUN)	0.072	0.048	2.301	0.129
Independence of CA (IND)	0.012	0.010	1.236	0.266
Duality of the position of CEO and chairman of the board (DUA)	-1.315	0.388	11.492	0.001
Audit Committee (CAUDIT)	0.791	0.638	1.536	0.215
Constant	-2.107	0.933	5.107	0.024

Source: Research data.

The effect of each explanatory variable (independent and control) of the model can be described by means of the analysis of its coefficients and its significance, shown in Table 4, which shows that the control variables REG and Duality DUA) are statistically significant at a level of 1% (p-value <0.01), but this influence is negative for both variables. In the case of the DUA variable indicates that companies in which the chairman of the board and the CEO are the same people tend to not hire big four firms in the mandatory rotation. The negative result of the variable REG reveals that a longer registration time in the CVM does not influence the selection of one of the four largest audit firms. It is also observed that the company size control variable (LOGAT) is statistically significant at a level of 5% (p-value <0.05). In this case, this influence is positive, in another word, it indicates that companies with higher active select big four companies at the time of mandatory rotation (Davison, Stening & Way, 1984; Simunic & Stein, 1996; Han, Lee & Lau, 2003).

The other control variables, CA Size, number of meetings, independence and Audit Committee are not statistically significant, as Table 3. The independent variable BI is included in this condition. Thus, the number of BI is not statistically significant for the selection of an

audit firm considered big four. This result does not corroborate with Gulati and Westphal (1999), Bouwman (2011) and Kaczmarek, Kimino and Pye (2014), which indicate the propagation of the same preferences between the organizations that relate through the CA. It also does not corroborate Davison, Stening and Way (1984), Baydoun (1999) and Johansen and Pettersson (2013), who point out the influence of BI in the choice of the audit firm.

Table 5 presents the Step tests, and Block Model, Hosmer & Lemeshow, and -2LL indicators, Cox-Snell R² and Nagelkerke, which allow determining the inclusion of the independent variable and control in order to check whether the model Can be considered apt to carry out the predictions with the expected accuracy.

Table 5

Tests for validation of the logistic regression model

Tests of model coefficients Omnibus				
		Qui-quadrado	df	Sig.
Etapa 1	Step	74.577	8	0.000
	Block	74.577	8	0.000
	Model	74.577	8	0.000
Model Summary				
Etapa 1	Verossimilhança de log -2	R quadrado <i>Cox & Snell</i>	R quadrado <i>Nagelkerke</i>	
	224.121	0.272	0.378	
Hosmer and Lemeshow test				
Etapa 1	Qui-quadrado	Df	Sig.	
	9.402	8	0.310	

Source: Research data.

The Step tests, Block Mode and have the goal to attest the competence of predictive model. Table 5 shows a statistically significant result of 74,577, which is statistically significant at a level of 1% (p-value <0.01), validating that the independent variables help improve the quality of the predictions. Also, notes that if the results of the Cox & Snell and Nagelkerke test, which are considered Pseudos-R-squared and resemble the coefficient of determination R² used in the linear regression, as Corrar, Paulo and Dias Filho (2009).

The Cox & Snell shows that 27.2% of the variations in the log of the ratio of the dependent variable (size of the audit firm) are explained by the set of the independent variable (BI) and control. Already Nagelkerke test as expose Corrar, Paulo and Dias Filho (2009), it is an adjusted version of the Cox & Snell, in which the study points out that the model is able to explain 37.8% of the variations in the dependent variable. The value found in this study is lower than that of Davison, Stening and Way (1984) and Johansen and Pettersson (2013), who found respectively 61% and 83%.

The Hosmer and Lemeshow test as Corrar, Paulo and Dias Filho (2009), aims to test the hypothesis that does not appear significant differences between what was predicted and observed by the model resulted in a value of 9,402 and has no statistical significance At a level of 1% (p-value <0.01). This shows that the predicted values were not significantly different from those observed, therefore, there is a sign that the model is appropriate to verify that the BI influences the choice of big four. Table 6 indicates the percentage of correct answers in the classifications after the introduction of the independent variable and the control variables.

Table 6
 Final classification table of logistic regression analysis

Observed			Foreseen		
			FIRM		Right Percentage
			No BIG4	BIG4	
Step 1	FIRM	No BIG4	46	32	59
		BIG4	22	135	86
	Overall percentage				77

Source: Research data.

Table 6 shows the occurrence after the introduction of the independent variable and the control variable. The success rate of the model, which was 66.8%, rose to 77%. When examining the 78 companies which were not audited by big four, 59% were classified correctly. For the 157 that were audited by a Big Four, the hit percentage rose to 86%.

Although the final classification table obtained an improvement in assertiveness with the inclusion of the independent variable and the control variable, the fact that almost all variables do not present statistical significance differs from the results of similar studies (Davison, Stening & Way, 1984; Baydoun, 1999; Johansen & Pettersson, 2013). The results of Cox and Snell and Nagelkerke similar studies were far (Davison & Stening Way, 1984; Johansen & Pettersson, 2013). One of the reasons for the results of Davison, Stening and Way (1984), Baydoun (1999) and Johansen and Pettersson (2013), may be that the countries analyzed are distinct and with different conditions. In Australia, the United States and Denmark, countries studied by these authors, the dissemination of experiences among boards of directors through BI is much earlier than in Brazil, where this practice is only beginning. It may also be that counselors are not reticent about new ideas and innovations from other boards, and thus, there is not the expected spread in the literature (Kaczmarek, Kimino & Pye, 2014).

Other reasons that may indicate the non-confirmation of results with previous surveys are the condition of the size, a number of meetings and independence of the board of directors, different in these countries with respect to that verified in Brazil. In the case of council size, in Brazil, we have an average of 6 members, and in the study by Johansen and Pettersson (2013) in Denmark, for example, the average was 12.5. Thus, as the advice of these countries is larger, tend to have more board interlocking, and consequently, a greater possibility of spreading practices and experiences among members, as indicated by Davison, Stening and Way (1984), Mendes-da-Silva *et al.*, (2008) and Johansen and Pettersson (2013).

The discussion in front of the number of meetings shows that in Brazil the average was 6 meetings per year, in the study by Davison, Stening and Way (1984), the average was 8.5 meetings, which can directly impact the result of the exchange of experiences And information among the directors. In the case of Brazil, the propensity to share experiences and knowledge expected by Mintzberg (1983), Haunschild (1993), Larcker, Richardson and Tuna (2007), Bouwman (2011) and Kaczmarek, Kimino and Pye (2014) can be reduced By the smallest number of meetings.

Another condition that is different in the context of the countries already studied, and which may influence the result found, is the condition of the variable independence of the board of directors, which in Brazil was only 14.98%, very different from that seen in countries such

as Denmark and the United States, 91.72% and 68.40% respectively. According to Fama and Jensen (1983) and Hermalin and Weisbach (2003), there is a problem of maintaining their decision-making capacity in their studies, with the possibility of Decision of the directors.

So we can not confirm that the Board Interlocking influences the choice of a big four audit firm at the time of mandatory rotation in the Brazilian scene. These results may indicate that even companies that hired big four firms are still hiring big four and companies that did not hire big four firms to follow with not big four. This condition has been observed in studies of Johl *et al.*, (2016) that in Indian companies found that the exchange of audit firms, which were audited by a Big Four continued to be audited by a Big Four, especially if companies were from the same business group and with that, they had the same advisers. Suspicion falls to two simple questions: first, out of a big four firms to a not big four may indicate bad situation for the market, so companies avoid this exchange, the second, the change from a not big firm four for a big four would indicate a positive situation for the market, but this exchange hampered by budget limitations.

Conclusions

This study aimed to verify the influence of board interlocking in the audit firm of selection in the mandatory rotation of companies listed on the BM&FBovespa. Initially, there was the existence of the Board Interlocking (BI) in companies with shares traded on the BM&FBovespa, to then check its influence on the selection of the audit firm.

The results related to the Board Interlocking demonstrate its existence among companies listed on the BM&FBovespa, through its board members, since the total of 474 companies in the overall sample, 344 have some bond with others, through the BI, constituting More than 70% of companies.

This condition of the existence of Board Interlocking in companies listed on the BM&FBovespa is a common practice, as had also been proven in other periods, such as the studies of Mendes-da-Silva (2010), which linked the Board Interlocking with financial performance and Value of enterprises. Oliveira (2010) which analyzed the relationship of the Board Interlocking with financial performance and Santos and Silveira (2007) which indicated the existence of the Board Interlocking and related to its effect on the value of companies.

Thus, there is a favorable scenario for the dissemination of practices among companies, since there are mechanisms for the generalized spread of knowledge and information among them. It was also verified the occurrence of rotation of audit firms in the analyzed period, consisting of 235 occurrences, indicating that companies are following the mandatory rules regarding mandatory rotation. It is noteworthy that in a little over 65% of which occurred casters, selected audit firms were one big four.

With the evidence of the formation of the Board Interlocking between companies, expected to influence the selection of the audit firm, as the national scene formed favors the expansion of knowledge and experience related to the audit. The formation of the Board Interlocking and its influence on the audit firm selection has also been found in Danish companies, according to a study of Johansen and Pettersson (2013), and Australian companies, the studies of Davison, Stening and Way (1984) and Hossain and Monroe (2013).

It was found through the data and its treatment, the Board Interlocking does not influence the choice of a big four firms at the time of mandatory rotation. This result does not assume

what is expected in the results of the investigation of Fiolleau *et al.* (2010) who found that before hiring the audit firm companies seek information from auditors, including obtaining other customer references, which in this case would be held by the directors that form the Board Interlocking.

The conclusion is thus that the Board Interlocking is practiced by Brazilian companies and does not influence the choice of the independent auditing firm on mandatory rotation.

This study, despite its contributions, has limitations. One of them is related to the period of analysis, in which even using the year with the largest number of audit rotation, in other years the company also performed the rotation and were not included in the analysis of this study. Another constraint is related to the analysis of audit firm rotation only by the bias of the formation and influence of BI, ignoring other factors that may influence this decision, that is, factors beyond the formation of the relationship network. A third limitation that can be shown is the possibility of the influence of BI in selecting the audit firm to be perceived only in a future occasion, since the effects can happen only in subsequent periods when analyzed, or better, the future rotation to be performed.

As a recommendation for future studies, it is suggested to extend the period analyzed, covering other years and mainly the replication of the study when the practice of the third cycle of audit rotation, which is expected to happen in 2017. In addition, it is suggested that the analysis of BI and its influence on the rotation of the audit through other existing statistical tools, since the conclusions of this study can be ratified or not due to the method used. The use of other variables derived from the literature can also be a source in the realization of new studies, relating the audit and the formation of social networks. The relationship between BI and audit can be deepened through the qualitative treatment of this relationship in new studies.

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