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INFLUENCE OF THE CHARACTERISTICS OF THE BOARD OF DIRECTORS ON THE PERFORMANCE OF COMPANIES WITH BOARD INTERLOCKING

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ABSTRACT

This study was developed along with companies which received the Human Resources Distinction Awards for their achievements in strategic management of people from 2010 to 2014, awarded by the Human Resources Association of Serra Gaúcha (ARH Serrana). It aimed to understand how these companies awarded by ARH Serrana establish their ethics committees, and develop, communicate and implement their codes of ethical conduct. Data collection was performed with Qualtrics, and content analysis technique was used to analyze a script of open questions based on a qualitative approach. Data collection revealed that participants are aware of the importance of a code of ethics. However, based on the participants' answers, it is noticeable that the establishment of a committee and the methodology employed to develop a code of ethics are not given the importance they deserve. ARH Serrana not only can convene management professionals but also could serve as a resource for developing the committees as well as the methodologies for establishing the code of ethics thus facilitating the organization's ethical behavior.

Keywords: Ethics; Ethics Committee; Code of Conduct; ARH Serrana.

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RESUMO

Uma questão sobre o Conselho de Administração que tem sido objeto de pesquisas é a situação em que duas ou mais empresas compartilham de um ou mais administradores, fenômeno conhecido na literatura como Board Interlocking. Ao ponderar tal evento, o estudo objetiva verificar a influência de características do Conselho de Administração no desempenho das empresas do Novo Mercado da BM&FBovespa que praticam Board Interlocking. A partir de testes econométricos, avaliou-se o impacto das características destes membros sobre o valor e desempenho corporativos. Das 128 empresas listadas no segmento, 111 se apresentaram interligadas indiretamente pelo fenômeno, o que representa um percentual de 87% da população pesquisada, das quais realizou-se a coleta de 410 observações sobre os dados das caracerísticas dos membros. A análise dos dados foi realizada com aplicação de estatística descritiva, teste Mann-Whitney, correlação e regressão linear múltipla - Mínimos Quadrados Ordinários (MQO). Os resultados mostraram que ao nível de 1% no caso do ROA, e de 5% do Q de Tobin e do Market-to-value, as médias de desempenho são diferentes para as empresas que possuem membros do Conselho de Administração com idades superiores e inferiores à média. Observou-se ainda que a variável de controle Ativo Total exerceu influência positiva significativa sobre as três variáveis independentes, e que as variáveis independentes analisadas explicam em 36% as variações do indicador de desempenho Q de Tobin. Assim, conclui-se que as características do Conselho de Administração investigadas influenciaram no desempenho destas empresas.

Palavras-chave: *Conselho de Administração; Desempenho empresarial; Board Interlocking.*

1 INTRODUCTION

In an era of greater scrutiny, economics can be discussed as a network of economic transactions, which comprises relationships between corporate actors and interorganizational networks of purchases and sales (BURT, 1979). Members of the Board of Directors can be characterized as such actors, since they act as facilitators of strategic information, allowing greater congruence of goals.

The Board of Directors of a company represents a mechanism for monitoring managers and their decision making (FICH; WHITE, 2001). The composition of the Board of Directors is an important element of corporate governance. Thus, understanding the determinants of the organizational structure and its specificities can contribute to a better knowledge of the corporate governance structures, besides facilitating the organization's strategic capacity (RINDOVA, 1999; FICH; WHITE, 2001).

A matter regarding the Board of Directors that has been of concern to several researchers is the situation in which two or more companies share one or more administrators, a phenomenon known in the literature as Board Interlocking (BURT, 1979, 1980; STOKMAN; KNOOP; WASSEUR, 1988; KONO *et al*., 1998; HALLOCK, 1999; BORGATTI; FOSTER, 2003; SANTOS; SILVEIRA, 2007; MENDES-DA-SILVA *et al*., 2008; SHROPSHIRE, 2010; NAWFAL, 2011; DAL VESCO; BEUREN, 2016).

Different perspectives have been observed over time. At the international level, it can be highlighted one of the first researches on the subject, conducted by Dooley (1969), who investigated the nature of Board Interlocking, interest groups and examined the reasons for the existence of the phenomenon. Pfeffer (1972) presented elements of size and composition of the Board of Directors and related them to factors that measure the organization's requirements for co-optation. Mizruchi (1983) discussed the importance of the management relations of the Councils for the theories of contemporary society and presented a framework in which these relations can be analyzed. Hallock (1999) explored the effects of Board Interlocking, as well as the documentation of its frequency, characteristics of the Board Interlocking, and their effect on managerial remuneration. Fich and White (2001) examined the factors that explain the phenomenon.

At the national level, Santos and Silveira (2007) investigated the participation of directors in multiple companies and its effect on the value of the companies. Mendes-da-Silva

(2011) investigated the validity of the small world model in the Brazilian capital market and the associations between the company's position in the corporate relations network and its value. Rossoni and Machado-da-Silva (2013) evaluated how legitimacy conditions the market value of companies, considering as one of the origins of cultural-cognitive legitimacy the position of the Board of Directors in relation to other companies, based on Board Interlocking. Beuren, Dani and Beck (2014) verified the relationship between Board Interlocking practices and characteristics of family owned companies. Piccoli and Cunha (2015) verified the relationship between Board Interlocking and results management. Santos *et al*. (2016) investigated the phenomenon of Board Interlocking and its influence on business performance.

However, most of these discussions did not consider the fact that, in addition to the Board Interlocking phenomenon, the characteristics of the members of the Board of Directors, such as age, experience and number of positions held in companies, can influence the performance of the organizations. Based on the above, this study seeks to answer the following research question: What is the influence of the characteristics of the Board of Directors on the performance of the companies in the Novo Mercado of BM&FBovespa practicing Board Interlocking? Thus, this study aims to verify the influence of characteristics of the Board of Directors on the performance of the companies in the Novo Mercado of BM&FBovespa practicing Board Interlocking. This study contributes to the literature because while observing a possible gap regarding the characteristics of the counselors, it seeks to deepen the reflection on the main findings and to compare the evidences found in the sample investigated.

The research is justified by the understanding of deficiencies related to the deeper aspects of Board Interlocking that tend to be influenced by intrinsic characteristics of the board members, with the argument present in the literature that the interconnection of the companies through their members of the Board of Directors can affect the corporate value of these organizations. It is relevant to mention that most of the studies analyzed the existence of the phenomenon and its reflection in the performance, however, did not observe individually the group that practices the phenomenon, in order to verify particularities. The provision of new information represents an expansion of knowledge in this field and a step forward in understanding the characteristics of the Board of Directors.

2 THEORETICAL FOUNDATIONS

2.1 Board of Directors and Corporate Governance

Brazil has faced changes in its corporate governance practices, following the world scenario in this perspective. For example, one of these situations occurred when companies were forced to become more competitive with the opening of their market and privatization in the 1990s. However, corporate governance is a relatively recent subject and not sufficiently explored in the Brazil. Macroeconomic factors, particularly interest rates and very high rates, raise the cost of the new social capital (LEAL; OLIVEIRA, 2002).

Good corporate governance practices can reduce the cost of capital of Brazilian companies and improve their competitiveness (LEAL; OLIVEIRA, 2002). One of the mechanisms that can contribute to this end is the Board of Directors. "The debate on good corporate governance practices has always highlighted the importance of the Board of Directors as a mechanism for reducing agency costs between managers and shareholders" (SANTOS; SILVEIRA, 2007, p. 156).

The Board of Directors of a company represents a fundamental mechanism for the monitoring of managers and their corporate decision making. The composition of the Board of Directors is a relevant component of the corporate governance system. Thus, increasing the knowl-

edge on the determinants of the composition of the Board of Directors can help to understand the structures of corporate governance (FICH; WHITE, 2001).

The Board of Directors is a decision forum of the company, which acts by delegation of its shareholders. Its processes and practices are determinant for establishing the level of governance of a company, whose role is essential for them. The responsibility of the Board of Directors is to promote the adoption of practices that are closer to the expected profile of a body with high levels of corporate governance, in addition to the predominance of activities related to control (GUERRA, 2010).

Examining the impact of the composition or structure of the Board of Directors on economic-financial performance may contribute to several inferences (WAHBA, 2015). However, the study of corporate governance is concerned with understanding the mechanisms that have evolved to mitigate incentive problems created by the separation of management and financing of business entities (SLOAN, 2001). As for the power-sharing relationship between investors and managers, it is defined by the rules of corporate governance (GOMPERS; ISHII; METRICK, 2003).

Baysinger and Butler (1985) argue that the recognition of governance and of the individual and instrumental functions of members is an important element for the development of a theory of corporate governance. They also argue that the discussion about the board of directors' role in a corporate governance theory without due discussion about its composition is as inappropriate as discussing a company's theory ignoring its internal structure.

2.2 The corporate Board Interlocking phenomenon

The terms Board Interlocking, Interlocking Directorate, or Interlocking Relationships generally refer to any situation in which two or more companies share one or more directors in common, that is, when one or more individuals are on the Board of Directors of both corporations (ALLEN, 1974; BURT, 1979, 1980; STOKMAN; KNOOP; WASSEUR, 1988; KONO *et al.*, 1998; HALLOCK, 1999; BORGATTI; FOSTER, 2003; SANTOS; SILVEIRA, 2007; MENDES-DA-SILVA *et al*., 2008; SHROPSHIRE, 2010; NAWFAL, 2011). This connection between corporations has been subject of debate between corporate governance activists and academics for several decades (FICH; WHITE, 2001).

Dooley (1969, p. 315) states that "intercorporate relationships have continued to exist in organizations since the days of corporate capitalism, and that this has some interest in itself, for it is doubtful that it survived without serving some material purpose". In this sense, the author raises the following question: What purpose is this? According to Santos and Silveira (2007: 132), "studies on this connection of companies through their common advisors have aroused the interest of various fields of research, such as administration, economics, sociology and law". For Borgatti and Foster (2003, p. 996), "empirical research on board interlocks (ties among organizations through a member of one organization sitting on the board of another) has a long history in sociology and management".

Although most of the empirical research on intercorporate relationships does not involve explicit theoretical propositions, virtually all studies are initiated and driven by a set of implicit theoretical assumptions and the basic assumption seems to be Board Interlocking. It is a cooperative strategy to regulate the relationship between organizations, which are to some extent dependent on one another (ALEN, 1974). The main function of the intercorporate relationship presented by Allen (1974, p. 395) is the "exchange of information and knowledge between corporations." The author argues that the phenomenon "also provides stable means of communication and connection between corporations that are, to some extent, dependent on one another".

Organizations assume this relationship of interdependence because they deal with resource scarcity (ALEN, 1974). This strategy allows organizations to control important sources of

uncertainty and share information about acceptable and effective business practices, limiting or reducing unilateral actions that may cause disturbances provoked by other organizations (ALEN, 1974; BURT 1980; BORGATTI; FOSTER 2003). Large corporations are often the main suppliers or consumers of certain resources and, therefore, represent an important source of uncertainty for other corporations. Thus, the size of a firm is directly related to the number of interlocks it holds with other corporations (ALLEN, 1974).

For Dooley (1969), Board Interlocking is formed by a multitude of tangible and intangible forces. Moreover, it occurs in sufficient order to allow an empirical analysis of some of the most evident forces, such as: size of the company; extension of managerial control; financial connection of the corporation; relationship with competitors; and existence of local economic interests. Dooley (1969, p. 316), among other findings, observed that "companies in which managerial control is measured by the proportion of directors on the Board of Directors tend to avoid interlocking with other companies".

Although there are different views, some contrary on the role of these interconnections, several theorists believe that they provide an indicator of social interorganizational relationships that are likely to influence the behavior of the companies (MIZRUCHI, 2006).

It is inferred from the above that it is possible to classify the researchers into two lines of research. On one hand, there are proponents of the phenomenon, who argue that this interrelation is beneficial to companies, especially when they save on scarce management resources, who believe in generating wealth and increasing the efficiency of the Board of Directors. On the other hand, there are the researchers who say that the practice promotes agency conflicts and potentially reduces competition in the market. Although the results of this research do not solve this question, they show the relevance of further details about this practice.

2.3 Similar studies

In order to give support to the empirical results of this research, some previous similar studies are summarized below. Allen (1974) analyzed Board Interlocking through the Theory of Interorganizational Cooptation. The research results showed that, contrary to the theoretical precepts, there was no relationship between organizational characteristics, such as the intensity and growth of capital, and frequency of interconnection with companies. However, it found a significant negative relationship between dependence on foreign debt obligations and frequency of financial interconnections.

Burt (1979) proposed a theory to explain where Board Interlocking should appear in the sectors of an economy, where it should not appear, and the profitability of an efficient Board Interlocking. He proposed measures of alternative strategies for interconnection between sectors and two classes of hypotheses were derived: (i) companies in an industry should interconnect with companies in some other sector as the industry restricts industry profits; (ii) controlling production and market differences, the ability of an industry's companies to achieve exceptionally high profits reflects its success in creating interconnections with problematic sectors for the profits of its industry.

Haunschild (1993) examined direct evidence of the influence of interorganizational imitation on a voluntary, substantive strategic action that affects the company's economic core in the case of corporate acquisitions. It is argued that business managers are exposed to the acquisition activities of other companies when they participate in the boards of these companies.

Kono *et al*. (1998) studied the causes of interconnected local and non-local boards among the largest US industrial corporations in 1964. They noticed that local and nonlocal inter-

connections have different correlations. They concluded that three spatial structures influence the interconnections: the location of a corporation's headquarters in other corporative facilities and upper-class clubs; the territorial distribution of the production facilities of a company; and the spatial configuration of the ownership relationships of a companny.

Leal and Oliveira (2002) examined the practices of the Board of Directors in Brazil. They found out that controlling shareholders interfere with the work of the board and there are few companies with a significant number of truly independent board members. It is argued that good corporate governance practices can reduce the cost of capital of companies and improve their competitiveness, and that Brazilian controlling shareholders are considering the value of good corporate governance practices.

Fich and Shivdasani (2006) analyzed the impact that the overload of directors working in three or more organizations causes on the quality of corporate governance. The authors warn that overburdened members of the Board of Directors, i.e., members who work in a large number of companies at the same time, tend to be less effective managers and thus reduce corporate performance. Considering the participation in more than one company by the practice of interlocking and observing the occurrence of taken over more than one position, the present study focuses on the analyzes of how the variable position, measured by dummy 1 for more than one position and 0 for only one, influences corporate performance.

Aier *et al*. (2005) investigated whether the characteristics, in particular, years of experience as Chief Financial Officer (CFO) or financial director, years of experience in other companies, years of experience in the current company, academic background (MBAs) and professional certificates (CPA – ANBIMA Professional Certification), are associated with accounting errors. To operate the variables and perform the econometric tests they used dummy, as in the present study. Among other findings, the authors found evidence that companies that have CFOs with CPA certification, MBA, or years of experience in and out of the company are less prone to errors and, therefore, add value to the company.

Shropshire (2010) assessed whether the variance among individual directors composing the Board Interlocking affects the quality of the information transmitted, identified organizational characteristics that shape how receptive the diffusion of practices is in the Board of Directors, and proposed a model for analyzing whether directors are more likely to convey experience or knowledge on organizational practices and what factors influence how this information is received. Nawfal (2011) examined the effect of Board Interlocking on the results of merger and acquisition operations in Canada.

Beuren and Dal Vesco (2014) verified the influence of the Board of Directors composition and its social relations (Board Interlocking) in the performance of companies. They carried out a study with a total of 1,163 observations of companies and 18,119 standardized observations related to the advisors and directors. Regarding the effect of the different characteristics of the Board of Directors on the performance of companies, they concluded that, among other aspects, the Tobin's Q all variables were statistically insignificant. Therefore, there was no empirical evidence that the composition of the Board of Directors has a positive influence on the market value of the companies.

Several variables were compared with the Board of Directors, its members dealing with decision making guided by good corporate governance practices. These studies comprise value and theoretical-empirical deepening and reveal a growing search for literary and pulverized contributions in the field of Accounting.

3 METHODOLOGICAL PROCEDURES

In order to analyze the influence of the characteristics of the members of the Board of Directors, this research was conducted by the selection of the companies of one of the levels of corporate governance of BM&FBovespa. The *Novo Mercado* segment was chosen, as it presented itself as the one with the highest level of transparency and corporate governance. This is aligned to the research because, based on the literature, the practice of Board Interlocking can interfere with the goals of the managers and reflect on the objectives of the shareholders.

The temporal cut of the analysis is one year, 2015specifically. This year was chosen to find out the existence of the phenomenon in the previous year when the data were collected, in order to contribute to the literature and to deepen the analysis, since there is a lack of breadth and depth of the subject. The choice of companies listed on BM&FBovespa was due to the broad access to information and the fact that previous studies deal mainly with developed countries, implying research gaps in emerging countries. Frame 1 presents the research constructs.

Frame 1 - Research constructs

Variables	Subvariables	Metrics	Theoretical Basis	Collection Source
Independent Variables				
Characteristics of the Board of Directors	Members age	AGE = Mean (54), *Dummy* 1= > or equal 54, 0= <54	Hallock (1999); Farrell and Whidbee (2003); Fich and Shivdasani (2006); Bezemer and Maassen (2010)	Reference Form, BMF&Bovespa
	Members experience	EXPERTISE = Mean (10,5) *Dummy* 1= > or equal 10,5, 0= <10,4	Aier *et al*. (2005)	Reference Form, BMF&Bovespa
	Position held	POSITION = *Dummy* 1= more than one position, and 0= only one position.	Adapted from Fich and Shivdasani (2006)	Reference Form, BMF&Bovespa
Dependent Variables				
Variables of Interest				
Performance and Corporate Value	Market-to-Value	Market Value / Net Equity		*Economática®*
	ROA	Return on Assets (Ratio between operating profit and company's total asset)	Santos and Silveira (2007)	*Economática®*
	Tobin's Q	(Market value of the shares / Equity value of the shares) converted into Log in base 10.	Santos and Silveira (2007)	*Economática®*
Control Variable				
Asset	Total Asset	Value of Total Asset converted into Log in base 10 of the Total Asset	Santos and Silveira (2007)	*Economática®*

Source: Prepared by the author.

The variable Asset was used as control variable due to the theoretical-empirical evidence indicating that the size of a company is directly related to the number of interlocks it maintains with other corporations (ALLEN; 1974, LEAL; OLIVEIRA, 2002; SANTOS; SILVEIRA, 2007).

The data set, related to the variables described in Table 1, was collected in the 2016 Reference Form, which focuses on the data for the year 2015. The data collected, regarding the 128 companies that make up the research population, were restricted to the name, age, position(s) and experience of the members of the Board of Directors.

The data were compiled and organized into spreadsheet. This way it was possible to consult how many companies were interconnected by the members of the Board of Directors, that is, to identify which professional held a position in more than one company. Any doubts about names were corrected from the member's CPF (taxpayer registration number) information. With the aid of statistical packages, the financial performance indicators (Market-to-Value and Tobin's Q) were calculated, in addition to the control variable (natural logarithm of Total Asset), and a dummy was added for the characteristics of the Board of Directors (age, experience and positions), according to information from the database, to assess the relationship between the behavior of these qualitative explanatory variables and organizational performance.

From the econometric tests, the impact of the characteristics of these members on corporate value and performance was evaluated. Of the 128 companies listed in the segment, 111 were indirectly interconnected through interlocking, which represents a percentage of 87% of the population surveyed. 410 observations were collected from these companies in order to assess the profile of the members of the Board of Directors. The data for analysis of economic-financial performance and corporate value were collected in *Economática*® database.

To verify the interaction of the characteristics that compose this study, three formulas were used, according to the three equations bellow. The results of these equations guided the data analysis of this study to reach the objective of the research.

$$PERFORM = \alpha + \beta_1 AGE_i + \beta_2 EXPERTISE_i + \beta_3 POSITIONS_i + \beta_4 ASSET_i + \mu$$

$$PROFITAB = \alpha + \beta_1 AGE_i + \beta_2 EXPERTISE_i + \beta_3 POSITIONS_i + \beta_4 ASSET_i + \mu$$

$$MARKET = \alpha + \beta_1 AGE_i + \beta_2 EXPERTISE_i + \beta_3 POSITIONS_i + \beta_4 ASSET_i + \mu$$

Where:

PERFORM = Natural logarithm on base 10 of the dependent variable measured by Tobin's Q, which consists of the ratio between the Market Value of the Shares and the Net Asset Value of the Shares.

PROFITAB = Return on Asset (ROA), measured by the ratio between the Operating Profit to the Total Asset of the firm.

MARKET = Market-to-Value measured by the ratio between Market Value and Shareholders' Equity.

AGE = Binary variable that indicates whether the age of the members is above or below the sample mean.

EXPERTISE = Binary variable that indicates whether members' experience within organizations is above or below the sample mean.

POSITIONS = Binary variable that indicates whether members act in one or more roles in the organization.

ASSETS = Natural logarithm on base 10 of the control variable Assets Total of the sample companies.

μ = Residual value not computed in the model.

4 RESULTS ANALYSIS

4.1 Descriptive statistics of the Board of Directors

Table 1 presents the results of the descriptive statistics of the variables of the Board of Directors. These variables were calculated as shown in Table 1. If there were no observations about the individual, it was decided to eliminate it from the analysis.

Table 1 - Descriptive statistics of the variables

Board of Directors	Minimum	Maximum	Mean	Standard Deviation	Yes/ No	Frequency
Independent Variables						
AGE	29	82	54	11,39		
EXPERTISE	1	43		9,22	42/59	41,6%
POSITION	0	1	0,04	0,20		
Control Variable in Thousands						
Asset	4,01	9,18	6,61	0,80		
Dependent Variables						
ROA	-20,66	0,58	-0,14	1,67		
Tobin's Q	2,68	7,34	5,48	0,91		
Market-to-Value	-17,71	16,10	1,90	3,05		

Source: Research data.

Table 1 shows the descriptive statistics of the dependent, independent and control variables. The sample, composed of 111 companies, shows interconnections by the presence of 171 members of the Board of Directors. The average age of the members of the Board of Directors was 54 years, with a standard deviation of 11.39. These results are close to those found in Hallock's (1999) study, which found an average of 57 years for CEOs. However, they are more distant from the results of Farrell and Whidbee's (2003) study, that found an average of 60 years, and Bezemer and Maassen's (2010), that found an average of 64 years.

In agreement with the study of Aier *et al*. (2005), who analyzed the CFO's expertise in his current position, i.e., his time of experience in the company, the present study found an average of 10.5 years of experience. Making an adaptation of the study of Aier *et al*. (2005), as it was already observed by the Board Interlocking that the member worked in more than one company, dummy 1 represents the member with more than 10.5 years of experience in the current company and dummy 0 the member with less of 10.4 years of experience in the company. It is noteworthy that, of the total number of members analyzed, it was found information that shows experience of more and of less than 10 years of only 42 and 59 individuals, respectively. Non-disclosure of this information constitutes a limitation of the research and may entail biases of analysis, since the time of experience of part of the sample cannot be stated.

Some assumptions about the use of statistical technique need to be discussed. As for the normality test, after analyzing the histogram of the residuals, the normal probability plot and the Jarque-Bera (JB) normality test, it was verified that the data did not present a normal distribution. From this result, the non-parametric Mann-Whitney test was used to obtain explanations about the variables.

In agreement with Fávero *et al*. (2009, p. 163), "the test for two independent samples is an alternative when the use of two related samples is inappropriate. One of the most commonly used tests is the Mann-Whitney test". Therefore, this test was used since it presents itself as "an alternative to the parametric t-test when the sample is small and / or when the normality test is violated" (FÁVERO *et al*., 2009, p. 163). Table 2 presents the results of the Mann-Whitney test, based on the information found in the data collection, and is limited to these.

Table 2 - Mann-Whitney non-parametric test

Panel A - Age								
Variable	**Age**	**N**	**Maximum**	**Minimum**	**Mean**	**Standard Deviation**	***Mann -Whitney***	**Sig.**
Market-to-Value	0	29	2,461	-0,261	0,916	0,682	-2,545	0,011
	1	381	16,103	-17,710	1,971	3,155		
ROA	0	29	0,219	-9,718	-0,322	1,811	-2,623	0,009
	1	381	0,585	-20,659	-0,121	1,666		
Tobin's Q	0	29	5,671	0,000	4,867	1,174	-2,566	0,010
	1	381	7,340	0,000	5,299	1,399		
Panel B - Expertise								
Variable	**Expertise**	**N**	**Maximum**	**Minimum**	**Mean**	**Standard Deviation**	***Mann -Whitney***	**Sig.**
Market-to-Value	0	368	16,103	-17,710	1,992	2,985	-0,401	0,689
	1	42	5,831	-17,710	1,054	3,572		
ROA	0	368	0,585	-20,659	-0,151	1,766	-0,663	0,507
	1	42	0,321	-0,879	-0,002	0,205		
Tobin's Q	0	368	7,340	0,000	5,283	1,377	-0,620	0,535
	1	42	7,013	0,000	5,137	1,493		
Panel C - Positions								
Variable	**Positions**	**N**	**Maximum**	**Minimum**	**Mean**	**Standard Deviation**	***Mann -Whitney***	**Sig.**
Market-to-Value	0	393	16,103	-17,710	1,930	2,858	-0,007	0,994
	1	17	9,830	-17,710	1,106	6,193		
ROA	0	393	0,585	-20,659	-0,144	1,710	-0,348	0,728
	1	17	0,184	-0,225	0,048	0,100		
Tobin's Q	0	393	7,340	0,000	5,272	1,346	-0,989	0,323
	1	17	7,340	0,000	5,165	2,199		

Source: Research data.

It is observed in Table 2 that, by applying the Mann-Whitney test, at the significance level of 1% of ROA and 5% of Tobin's Q and Market-to-Value, the performance averages are different for companies that have members of the Board of Directors who are above and below the average.

According to the Mann-Whitney test, the variables Expertise and Number of Positions were not significant for differences in performance averages, that is, the companies in the sample showed no difference in performance when their members of the Board of Directors were more

or less occupied, even when they had greater experience within the organization.

The assumptions of the research on the problem of Heteroscedasticity were also tested. According to Fávero *et al.* (2009, p. 357), this problem occurs when "each error term does not have the same probability of assuming positive or negative values". This was tested by applying the White's Test to the three dependent variables (Market-to-Value, ROA, Tobin's Q). In this case, the hypotheses that the residues are homocedastic were rejected, that is, they are normally distributed within a normal probability density curve, and inferred by the existence of Heteroscedasticity.

Therefore, in order to ensure a better fit for the data set and to minimize the sum of the squares of the residual differences, multiple linear regression was chosen, using the Ordinary Least Squares (OLS) method.

Due to the fact that the Jarque-Bera (JB) test indicated no data normality, it was chosen to perform the non-parametric Spearman correlation coefficient test or Spearman correlation. According to Fávero (2015, p. 46), "non-adherence to the normality of error terms may indicate that the model was incorrectly specified as to the functional form and that there were omission of relevant explanatory variables". The correlations between the explanatory variables are presented in Table 3.

Table 3 - Correlations of the variables

	Market-to-Value	**Asset**	**ROA**	**Tobin's Q**	**Age**	***Expertise***	**Position**
Market-to-Value	1						
Asset	0,241**	1					
ROA	0,653**	0,009	1				
Tobin's Q	0,784**	0,610**	0,513**	1			
Age	0,126*	0,026	0,130**	0,139**	1		
Expertise	-0,091	0,018	-0,132	-0,04	0,034	1	
Position	0	0,059	0,017	0,087	0,057	0,224*	1

** Significant correlation at the level of 0.01. * Significant correlation at the level of 0.05.
Source: Research data.

Table 3 shows the significance of the correlation between Market-to-Value dependent variables, measured by the ratio between Market Value and Shareholders' Equity, and Return on Asset (ROA), which is the ratio between Net Income and Total Assets, at the level of 5% (r = 0.653).

The Market-to-Value performance indicator correlates with the variable Total Asset Value (r = 0.251) and with the Tobin's Q variable (r = 0.784), at a significance level of 1%. It is also worth mentioning its correlation with the age of the members, at the level of significance of 5% (r = 0.126). The dependent variable Tobin's Q is correlated to the significance level of 1%, this time with the variables Total Asset (r = 0.610) and Asset Profitability (r = 0.513). The independent variable Age correlates with two indicators at the significance level of 1%, Tobin's Q (r = 0.139) and Asset Profitability (r = 0.130). The independent variable Position correlates with the significance level of 5% with Expertise, another independent variable (r = 0.224).

The correlation test does not determine cause and effect relationships, nor does it show the existence of influence of one over the other, in cases of their increase or decrease in values. It only indicates the existence of a correlation between the variables. However, this does not invalidate the test and allows for a more detailed analysis of the phenomenon, in order to evaluate the influence of the dependent variables on the independent variables, as well as to verify the level of supposed omissions of explanatory variables.

4.2 Influences of characteristics of the members of the Board of Directors in Performance

Data analysis was performed with the application of the multiple linear regression model, processed in SPSS software. According to Fávero (2015, p.6), this model "considers the inclusion of several explanatory variables for the study of the behavior of the phenomenon in question". According to the author, "the main objective of the regression analysis is to provide the researcher with conditions to evaluate how a variable Y behaves based on the behavior of one or more X variables, without necessarily having a cause and effect relationship" (FÁVERO, 2015, p. 7). Table 4 shows the values of the multiple linear regression.

Table 4 - Multiple linear regressions - Ordinary Square Minima (OLS or OLS)

Independent Variables / Dependent Variables	ROA		Tobin's Q		*Market-to-Value*	
	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
(Constant)	−2,11872	0,0082	0,0664	0,9277	−2,56644	0,2935
AGE	−0,0638820	0,8539	0,4369	0,1553	1,1795	0,2717
EXPERTISE	0,0574	0,7420	−0,0839277	0,5882	−0,812529	0,1331
POSITIONS	−0,0633262	0,8504	0,1056	0,6513	−2,80639	0,0077
ASSET	0,3232	0,0040	0,7484	0,0000	0,5632	0,0998
R^2	**0,071**		**0,365**		**0,114**	
R^2 Adjusted	**0,039**		**0,342**		**0,083**	

Source: Research data

Table 4 shows the individual explanatory power of all the independent and control variables tested. It enables to analyze the influence of the variables under three perspectives of financial performance. The first perspective raises questions about the power of the characteristics of the members who practice the Board Interlocking on the ROA indicator; the second on Tobin's Q; and the third analyzes the influence of the independent and control variables on Market-to-Value. The first perspective shows that only the Total Asset variable exerts a significant influence on ROA. As in the second perspective, the influence of the explanatory variables on the independent variable, Tobin's Q, has a value of $R^2 = 0.365$, that is, the variation of the variable Y is explained in 36% by the values of X.

These results raise a question about the size of the company influencing the level of interlock, since one can try to explain what several authors (LEAL; OLIVEIRA, 2002; SANTOS; SILVEIRA, 2007) found in their studies that the greater the company, the greater the number of members in the Board of Directors and, consequently, the greater the Board Interlocking. This is corroborated by the studies of Fich and White (2001), who claim that the Tobin's Q of a company is positively associated with Board Interlocking. And that a high value attributed to Tobin Q is probably an indication that the company has growth opportunities and is highly valued in the market.

The results are partially aligned with the study by Aier *et al*. (2005), who measured the variable experience on financial adjustments, which had positive and significant repercussions on the organizational value. The values obtained in the regression of the model of the third equation did not indicate significance for the influence of Expertise on the market value, but the values had positive effects. Therefore, there is the need for future research to detect which explanatory variables have significant influence on market value, which are no longer addressed in this and other studies.

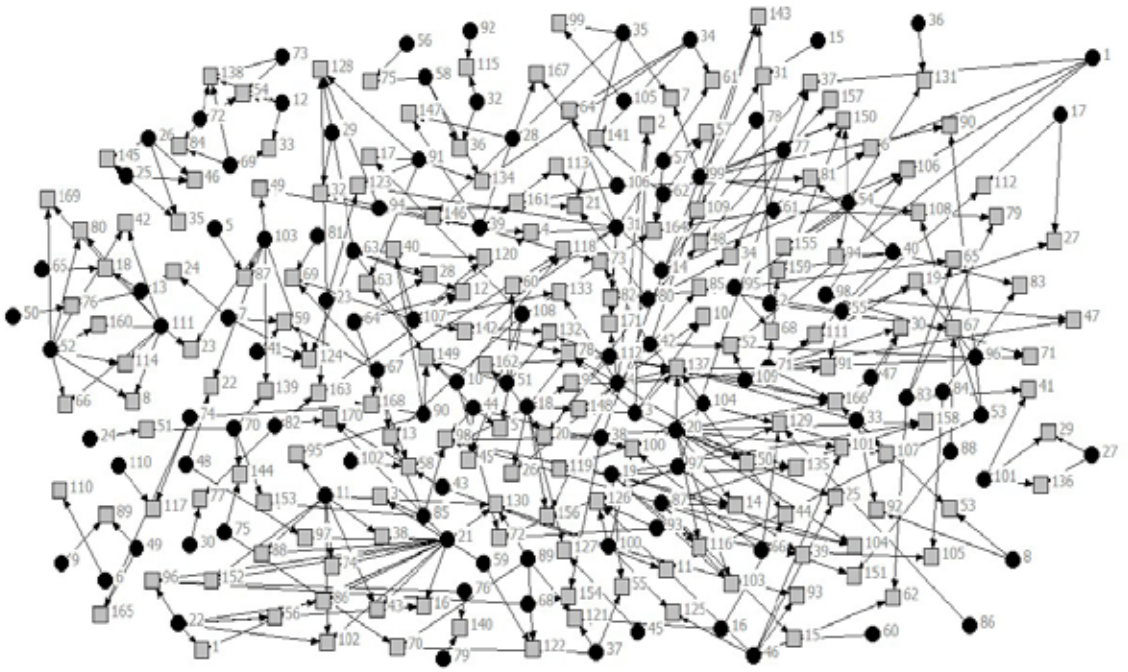
Regarding the influence found in the third regression test, it occurs in two ways: one between the Total Asset on the Market-to-Value; and another on the number of positions held by members within current organizations. It is relevant to complement that the experience of the member in the current company influences the chances he has to act in more than one Board of

Directors, once his network of contacts provides him with invitations to work in other companies (FICH; WHITE, 2001; SANTOS; SILVEIRA, 2007).

The variable Age did not result in a significant value, but its positive effect should be carefully observed, since even with a low significance value, it represents an influencing factor of the Market-to-Value dependent variable. Santos and Silveira (2007, p. 133) argue that "the fact that a board member of a major company X is invited to participate in the Board of Directors in another company Y may indicate to investors that company Y is trustworthy [...] ". This question may pave the way for future research to delve deeper into the relationship of qualitative variables with the characteristics of the members who practice Interlock.

Figure 1 shows the networks formed by the members of the boards and their respective companies. Numbers replace the names of members and companies, to better visualize the corporate interrelations, since the network is complex and dense.

Figure 1 - Networks of directors and companies analyzed



Source: Research data

In Figure 1, where the circles represent the advisors and squares their respective companies, the connections between such agents are revealed. Santos and Silveira (2007) mention that any example of mapping is limited because the connections extend beyond what can be described in an illustrative way. Thus, traces of relationships and a considerable level of interconnections between the analyzed companies and their respective managers, relations between themselves and relationships restricted to the companies themselves are evidenced.

Although quantitative studies of social networks have a long history, literature has shown growth in analyzes of networks and many different networks. We analyze not only small-scale networks, such as sociology and social anthropology, but also large networks, such as the internet. Among the analyzes of networks, we highlight the analysis of networks of authors themselves, of food networks, in the field of ecology, the dynamics of static networks or the dynamic development of specific network structures.

5 CONCLUSIONS

The intercompany connection, known as Board Interlocking, can be explained when a member of the Board of Directors takes over a position in more than one Board concurrently. Thus, analyzing the composition of these interlinked Councils provides results on determining factors of the phenomenon. Some questions on the subject are in the initial phase of investigation and, in order to complement the existing literature on the practice of Board Interlocking in Brazil, this study sought to deepen in the companies that practice the phenomenon to, then, recognize what characteristics of board members explain the occurrence of the practice.

In this study, it was found evidence on how the characteristics of the members correlate and their influence on performance indicators. In applying the Mann-Whitney test, it was found that, at the 1% level of ROA and at the 5% level of Tobin's Q and Market-to-Value, performance averages were different for companies with members above and below average ages. However, no significance was found for the independent variables Expertise and Positions.

It was concluded that the average age of the members of the Board of Directors, 54, is congruent with the study by Hallock (1999), but differs from the findings of Farrell and Whidbee (2003) and Bezemer *et al*. (2010), as they were slightly higher. The results on Expertise, measured by the member's experience within the current company, indicated an average of 10.5 years, which is in line with the study conducted by Aier *et al.* (2005). It is highlighted, however, that only 42 of the 171 members had more than 10.5 years of experience in the company, which suggests a practice of renewal of the members.

The duality of positions was also investigated. Assuming that there was no duality, the study concluded that only 17 members served in more than one position within the Board of Directors. Ong and Wan (2001) point out that the duality of positions occurs when an individual is, for example, a manager of the company and member of the board of directors. It is noteworthy that, depending on the number of positions held by a board member, it may be more difficult to dedicate more time to the company and, therefore, a reduction in performance may occur.

The Market-to-Value performance indicator was correlated with the Total Asset variable, with the variable Tobin's Q and with the Age of members. The dependent variable Tobin's Q was correlated with the variables Total Asset and Return on Asset. The independent variable Age correlated with Tobin's Q and Asset Profitability. And the dependent variable Position correlated at the significance level of 5% with Expertise.

In the application of the regression model, it was possible to analyze the influence of the variables on the performance, as measured by Market-to-Value, ROA and Tobin's Q. The Total Asset control variable had a significant positive influence on the three independent variables, and the independent variables explained in 36% the variations of the Tobin's Q performance indicator. It is evidenced that the size of the company can influence the level of intercorporative connections, which is in line with what some authors (LEAL; OLIVEIRA, 2002; SANTOS; SILVEIRA, 2007) found in their studies that the larger the company, the greater the number of members in the Board of Directors and, consequently, the greater the Board Interlocking. It is also in line with the study conducted by Fich and White (2001), who found a positive association between Tobin's Q and Board Interlocking. This may denote that the company has opportunities for growth and is valued in the market.

This research on the Board Interlocking phenomenon in companies listed in the *Novo Mercado* segment of BM&FBovespa, although it did not find consistent evidence of what characteristics of the practitioners influence Board Interlocking, found positive correlations between the variables. In this way, new research opportunities are opened, since the research has concentrated on analyzing the performance of companies with Board Interlocking in relation to compa-

nies that do not practice the phenomenon. Future research, together with the results presented here, can broaden the understanding of this event and its reflection in the corporate world, since it points out deficiencies related to the theme, which still needs to be deepened.

Regarding the composition of the Board of Directors, both the professional characteristics, such as academic training and expertise, and the personal, such as age, personality and independence, can vary. This heterogeneity makes it difficult to standardize or define a profile, while revealing that different individual traits require attention. Baysinger and Butler (1985) warned that the most suitable composition, although variable from company to company, includes a mixture of several types of directors. The corporate governance reform movement suggests that "the proportion of independent directors appearing in large corporate companies is a potentially important performance variable" (BAYSINGER; BUTLER, 1985, p. 121).

The results of the research support that the variables Age, Positions and Expertise do not significantly affect the performance of the companies analyzed. These findings cannot be generalized, however, they serve as a presupposition that there are other variables that possibly explain the influence of the members of the board on the economic-financial performance of the companies. Future research may consider as a sample selected publicly-held companies, but not limited to Brazilian companies, taking into account the variations that emerging countries claim to experience. The absence of various information in the databases consulted, which is a limiting factor of the research, can instigate research with other forms of data collection as well as analysis.

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Contribution	[Author 1]	[Author 2]	[Author 3]
1. Definition of research problem	√	√	√
2. Development of hypotheses or research questions (empirical studies)	√	√	√
3. Development of theoretical propositions (theoretical work)	√	√	√
4. Theoretical foundation / Literature review	√	√	√
5. Definition of methodological procedures	√	√	√
6. Data collection	√	√	√
7. Statistical analysis	√	√	√
8. Analysis and interpretation of data	√	√	√
9. Critical revision of the manuscript	√	√	√
10. Manuscript writing	√	√	√
11. Other (please specify)			