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ARTICLE

The Impact of Academic Titles of Board Member and Directors Over the Performance of Companies Traded at B3

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ABSTRACT

Previous studies show that the academic qualification of directors affects the performance and risk of companies. However, such evidence is based on a restricted set of information regarding the academic background and scientific output of directors. In this paper we investigate whether the academic titles of directors and board members impact the performance of publicly traded companies. The sample comprises 133 non-financial companies, from 2010 to 2018, consolidating information extracted from the financial exchange and the Lattes platform. Our results show that academics are more common on large boards of publicly controlled companies. Overall, the estimation results do not provide convincing evidence for the impact of academics over corporate performance. However, particularly, we see that only the presence of doctors with degrees obtained abroad affects positively the profitability and negatively the risk of the studied companies. Other academic attributes of the board impacted companies' risk but not their profitability.

KEYWORDS

corporate governance, board composition, academic qualifications, financial performance

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1. INTRODUCTION

In a company, the top level of managers is responsible for the main strategic decisions. According to the upper echelons' theory, executives act based on their own interpretations of the strategic situations they face and these perceptions are a function of their experiences, values and personalities (Hambrick & Mason, 1984; Hambrick, 2007, p. 334). Also according to these authors, if we want to understand the choices made in the context of organizations or why they achieve a certain performance, we need to consider the biases and inclinations of their most important actors: their top executives.

According to Hambrick and Mason (1984), some observable characteristics of managers, such as age, tenure, education, etc., are indicators of elements from which they form their perceptions about an administrative situation. These characteristics are, therefore, determinants of strategic choices and, through them, of organizational performance (Hambrick & Mason, 1984, p. 197).

Regarding formal education, the focus of this study, Gottesman and Morey (2006) state that several studies suggest that the educational level of the executive president (CEO) is directly related to his ability to process information, innovate, and use sophisticated management methodologies. Therefore, these factors should contribute to improving the economic performance of organizations managed by highly educated executives. Jiang and Murphy (2007, p. 32) put forward a series of reasons why professors and academics could properly carry out the functions of senior executives and, thus, contribute to the performance of companies. For example, these authors argue that a good theoretical background allows teachers to understand and transcend the limits of their skills and to better understand relationships of cause and effect. Also, the scientific method helps to identify errors and learn from them.

At the same time, the corporate arrangement of companies and the separation of ownership and control create potential agency conflicts. Controlling agents - CEOs and directors - can take advantage of a scenario of low monitoring to take financial advantage of the company to which they were hired, at the expense of shareholders (Jensen & Meckling, 1976; Fama & Jensen, 1983). One of the main mechanisms to mitigating agency conflict and aligning the interests of executives with those of shareholders is the formation of a board of directors that is independent and works to ensure that the interests of shareholders are being taken into account in corporate decisions (Devos et al., 2009).

The ability of groups like these, such as the board of directors, to oversee and minimize the agency's costs, relies on the qualification and independence of its members. As pointed out by Fedaseyeu et al. (2018) and Güner et al. (2008), the Sarbanes-Oxley law, an international reference for corporate governance, requires the independence of the members of the audit committee of companies, as well as the need to include a person with knowledge in finance or explain why not.

In Brazil, the CVM (Securities and Exchange Commission) guidance on the rules for the composition of the board is bland. The legal view, via circular letter 02/2016, is to seek guidance in the IBGC (Brazilian Institute of Corporate Governance) manual. This issues the following recommendation for best governance practices in the composition of the board:

> *"The board of directors must be composed in view of the diversity of knowledge, experiences, behaviors, cultural aspects, age and gender. It must ensure that the board establishes and disseminates policies that provide equal opportunities for women to access senior leadership positions within the organization."* (IBGC, 2016, p.42).

Note that no specialized training is explicitly suggested. The focus is strictly on the diversity of the board's components. Going further and looking at the specific listing requirements at the differentiated levels of corporate governance defined by B3, the most restricted setups for the composition of the board are for the Novo Mercado and Level 2, with a minimum of 3 to 5 members, of which at least 20% must be independent with a unified term of office of up to 2 years. It is also remarkable that, unlike the Sarbanes-Oxley Act, no indication of technical training is explicitly required. Therefore, the regulating and guiding organizations of the Brazilian market do not require or recommend any type of academic instruction for the members of the board and management, meaning there is a gap concerning international practices (Rabelo & Vasconcelos, 2002; Black et al., 2010).

At the same time, universities and research centers are institutions focused on scientific production and communication. Academy members, university professors, and researchers are typically taught to think critically and objectively. Moreover, the academic career tends to attract and reward individuals with high intellectual capacity. Bowman (2005) and Charnov and Payne (1987) go further and argue that university professors are perceived by society as people of greater ethical behavior.

Given that the managers' cognitive ability is essential for making assertive strategic decisions, and the board's independence and ability to control the situation is imperative and a requirement for good company governance. Professors and researchers can offer their technical and impartial views on companies' projects (Audretsch & Lehmann, 2006; Francis et al., 2015; Fedaseyeu et al., 2018). Empirical data from the American market confirm the adherence of this argument to corporate practice: Gottesman and Morey (2006) show that, in a sample of American firms, 32.6% have CEOs with an MBA and 9.8% have CEOs with even more advanced levels of academic education (master's and doctor's degree). Francis et al. (2015) and Cho et al. (2017) report that approximately 40% of companies in the SP500 index had at least one full professor on their boards.

In Brazil, there are no studies, to the best of our knowledge, focusing on the presence of academics on companies' boards and directorships, therefore raising a range of puzzles: In comparison to the North American market, does the lack of guidance from regulators regarding the profile of directors and officers lead Brazilian companies to hire fewer academics? Is the presence of academics on the boards and directorships evenly distributed among Brazilian companies or are there specific characteristics of companies that favor hiring academics for their positions? Do companies whose boards and directorships have a higher number of seats filled by academics outperform their peers? Finally, does this merger, between companies and universities, have the potential to contribute to the performance of the former? The present study intends to provide answers to these questions. A broad investigation with real data from Brazilian companies allows us to explore this issue in the sense of bringing solid arguments about the presence of academics on the boards and directorships and their true impact on the companies' financial performance.

Given the national context, the development of a study on the presence of academics on the boards and directorships of Brazilian companies gets even more relevant. The national capital market is characterized by high ownership concentration, with a clear distinction between majority and minority shareholders (Leal et al., 2002; Crisóstomo & Brandão, 2016). In this scenario, conflicts of interest are more likely to occur between controlling shareholders/managers with minority shareholders. On the subject, the Brazilian Institute of Corporate Governance (IBGC) reports that the board of directors is the main component of corporate governance, acting in

the best interests of the organization, behaving precisely as a bridge between management and the company's shareholders.

Hence, given its notorious importance, different market players have expectations about the profile and technical education of members of the boards of directors and executive boards. However, in Brazil, the educational system (specifically that of post-graduation) is still very incipient when compared to more developed nations. According to a report by the Organization for Economic Cooperation and Development (OECD), in 2019 about 0.8% of people between 25 and 64 years old had a master's degree in Brazil - against 13% on average in OECD member countries. In other words, these countries have about 16 times more masters. This fact denotes a deficit of these professionals, both in the academic and professional fields.

Given this hurdle, our objective with this research was to study the impact of the presence of academics in boards and directorships roles on the performance of Brazilian companies. Specifically, we verify the impact of academic training and scientific production on the profitability and risk of publicly traded companies traded on B3. The study is a pioneer in national literature and reveals the frequency with which the seats on the boards and directorships are filled by members with academic training, as well as it drafts a profile of the companies that usually hire these academics. This study, therefore, can provide empirical evidence for a possible reformulation of public policy concerning the qualification of the participating members of the main decision-making groups in companies.

It is important to highlight that, although we recognize that the executive board and the board of directors play different roles, the former being responsible for the main strategic decisions, while the latter is seen as an internal corporate governance mechanism whose main function is to safeguard the interests of shareholders (including minority shareholders), we treat the presence of academics jointly in these two groups; that is, we do not differentiate between them. This approach is justified for at least three reasons. First, as our results suggest, the presence of academics on the boards and boards is still relatively low in Brazil. If we chose to separate data from boards and directorships, the presence of academics on the executive board would be restricted to a small number of companies and we would have difficulty finding any statistically significant effect.

Second, based on the literature review, we understand that academic training has positive effects on the performance of both groups, which would lead to a better performance of the companies that hire these professionals, either for the board and/or the board when compared to other companies. Third, since this is the first study to address this issue in the Brazilian context, our focus is to explore the relationship between the academic education of members of the top echelons of company management on the economic performance of firms. There is no intention here to separate the effects on management (directorship) and governance (board). We understand that a separate analysis can be conducted by other studies to come, as more data becomes available.

Due to access to data from the Lattes Platform, a repository of Brazilian curricula, the research goes beyond the current national and international literature and has the potential to add knowledge to the ongoing theoretical-empirical framework. In relation to this literature, previous studies, such as Güner et al. (2008); Custodio and Metzger (2014); Francis et al. (2015), focus on the performance of the university professor and not on his scientific production or training. That is, the empirical method of previous works involves categorizing the data based only on the professional position of the members of the boards and directorships, completely ignoring the role of their academic education and scientific production.

In the national setting, we can highlight the related studies by Fraga e Silva (2012), Brugni (2012) and Pacheco (2019). The first two analyze the members of the board of directors and the last the members of the executive board. There is no joint analysis of the two steering groups, as done in this study. The data on the training of these members were extracted from the reference forms (available in CVM) and annual reports, being less detailed than those captured on the Lattes platform. In our case, when accessing this platform, we had access to academic productivity and were able to identify the university from which a specific title was achieved. This allowed us to take a deeper look at the relationship between academic training and corporate performance. Finally, our database is much broader than those used in the aforementioned studies, both in terms of the number of companies and the number of years studied, which allows us to generalize the results with greater precision.

Our research makes contributions both for academia and for market practitioners. Brazil still has a long way to go in appraising the work and intellectual potential of researchers and university professors. Research shows, for example, that teachers and researchers do not live in ivory towers and can contribute to solving real corporate problems. Moreover, the study may motivate changes in policies and guidelines by the CVM and the IBGC. As previously highlighted, there is no definition or formalization of the educational history of the board and executive officers. The closest is the IBGC's orientation towards technical diversity, without specifying the educational or academic degree of its members.

2. LITERATURE REVIEW AND HYPOTHESES

According to the theory of upper echelons, the performance of organizations in terms of strategies and effectiveness is a reflection of the values and cognitive bases of their main actors: the executive board (Hambrick & Mason, 1984). Still, according to these authors, the managers' perception of a given situation combined with their values provides the basis for strategic choice. At the heart of this theory, the characteristics of high-ranking members (age, tenure, education, socioeconomic backgrounds, etc.) influence their perceptions and values and, thus, determine strategic choices and, therefore, the performance of organizations (Hambrick & Mason, 1984). According to Hambrick (2007, p. 335), performance will be more sensitive to the characteristics of high-ranking members the greater the discretion (freedom of action) of these organizational actors, which, in turn, is a function of environmental conditions, organizational factors, and the nature of the executives themselves.

Gottesman and Morey (2006) highlight the role of the CEOs' education in the firm's performance. According to these authors, CEOs with higher education quality have a greater ability to process information, innovate, and use sophisticated management methods and techniques. This greater management capacity would translate into better economic performance for firms. Besides, Gottesman and Morey (2006) argue that education is an indicator of social prestige and status and, therefore, of a company's social capital and network. Thus, the education of the CEO could also affect the performance of the firm through the social capital of its chief executive.

The empirical evidence regarding the relationship between the academic background of directors and the performance of firms is not robust enough to allow us to conclude that it is a positive relationship, as suggested by the theory. Gottesman and Morey (2006), drafted one of the pioneering studies in this area and, involving a sample of North American firms, show that firms managed by CEOs with higher degrees (MBA) do not achieve superior performance than their peers. Jiang and Murphy (2007), in turn, in a study involving 215 North American companies, bring evidence that companies whose main executives were former professors at business schools

generated higher revenue per worker than their counterparts without ex-professors among its executives. This effect was even greater when the former professors occupied the vice presidencies and when they left the academic career earlier.

In a survey involving 392 CFOs of American and Canadian firms, Graham and Harvey (2001) show that firms whose CEOs have MBAs are more likely to use the NPV in the analysis of investment projects and the CAPM model in determining the firm's cost of capital. These results indicate that academic training favors the use of more sophisticated financial management techniques, which, in turn, can result in better economic performance.

Custodio and Metzger (2014) present evidence that US non-financial firms managed by CEOs with experience in finance keep fewer cash resources, borrow more, and repurchase shares more frequently. Moreover, these authors show results consistent with the hypothesis that these managers are more aware of financial theory and are more financially sophisticated. The authors argue that this evidence supports the belief that finance expertise is relevant to firms' financial policies.

King et al. (2016), in a study involving 172 American banks, showed that banks managed by CEOs with an MBA received from one of the best universities achieve a higher level of profitability (ROA) than their peers without this quality. This effect is even greater when banks led by CEOs pursue innovative and riskier business models and when adequate incentives (remuneration structure) are provided. Similar results are not found, however, when they analyzed the presence of CEOs with PhDs in the best universities.

Finally, in a recent study with Chinese companies, Shen et al. (2020) show that 57.6% of the upper echelons analyzed have members with some academic experience. These authors present evidence that academic experience at the highest-level promotes innovation. More specifically, companies whose top executives have some academic experience tend to invest more in R&D and have more registered patent applications.

Concerning the board of directors, its main function is to ensure proper governance and transparency in corporate decisions. The independence and technicality of the board members is a fundamental aspect of this group's quality regarding its main objective. However, empirical evidence does not support this argument robustly. Baysinger and Butler (1985) and Bhagat and Black (2001), for example, showed that board independence and corporate performance of North American companies have no significant relationship. Other studies, Devos et al. (2009) and Barnhart and Rosenstein (1998), for example, found a negative result, with corporate performance declining as the board's independence increases.

Concerning technicality and, more specifically, academic training, Francis et al. (2015) argue that academics (professors/researchers) have unique characteristics that can favor the performance of these professionals on the companies' boards of directors, both in the supervisory function and in the advisory function. Among these characteristics, the authors cite a high reputation in society, training focused on critical and independent thinking, and the fact that they are specialists in their areas of expertise. Pang et al. (2020) reinforce this point of view by suggesting that, in terms of supervision, teachers have strong incentives to monitor managers, as they intend to maintain their valuable reputation. In terms of advisory, also according to Pang et al. (2020), academics are usually recognized as experts in their fields and able to provide valuable advice to managers.

On the other hand, these same authors point out that the hiring of these professionals can also have negative impacts on the advisory and control functions of the board of directors since professors may have low exposure to the business environment and their areas of expertise may not be adherent to the real business world. Furthermore, the presence of academics on the board can increase coordination costs (Francis et al. (2015), Pang et al. (2020)).

The effects of greater technicality among board members were also the subject of the previous empirical literature. DeFond et al. (2005) use an event study and found a positive reaction from stock prices when a new member with experience in finance and accounting is added to the audit committee. In this same study, such a positive association is not found for the entry of new members who do not have experience in finance and accounting. On the other hand, Güner et al. (2008) studied how the presence of directors with experience in finance affects business decisions. The results show that when bankers join the board, external financing increases and the investment's sensitivity to cash flow decreases.

Given the mixed results in previous studies regarding the profile of a good member of the company's board, the literature sought to better detail what a technical member would be, starting with the topic of the presence of academics on the boards, and not just professional experience. The recent work by Francis et al. (2015) shows a positive relationship between the company's performance and the presence of academics on its board. This relationship, however, only applies to academics without administrative positions at their universities. The results show that companies with the participation of academics on their boards make more acquisitions and create a greater number of patents. The authors conclude that academics are valuable advisers and effective monitors of the interests of shareholders.

Similarly, Swift (2018) assesses the impact of the presence of scientists with a Ph. D. title on the innovation performance of companies. The results show that companies with a greater number of scientists on the board generate greater innovation and are more efficient in corporate monitoring. Besides, the authors also find evidence that those scientists with larger professional networks are more valuable members of the board.

More specific to the case of accounting academics, Huang et al. (2016) investigate the quality of financial reporting by companies with advisers from this particular field of study. As in the previous case, the authors found that companies with accounting academics on their boards disclose higher quality financial information to the market.

Looking at the national literature, some studies relate the academic background of the managers (upper echelon) to earnings management (Sprenger et al., 2017) and economic performance (Pacheco et al., 2019), while others addressed the relationship between the academic background of the board members and economic performance (Fraga & Silva, 2012; Brugni, 2012). In these studies, there is no specific focus on academic education, and several characteristics of the managers or members of the board of directors are analyzed together. The data comes from reference forms (FREs) and Annual Reports (IAN), which are much less detailed than those used here and obtained from the Lattes curriculum.

Fraga and Silva (2012) studied the characteristics of the board members of a sample of Brazilian companies without majority control in the period between 2006 and 2009. The number of companies varies from 2 in the year 2006 to 30 in 2009. The evidence indicates that the diversity of academic background has a positive effect on performance, while the diversity of areas of formal education harms economic performance (in both cases as measured by Tobin's Q).

Brugni (2012) analyzed 31 characteristics of the members of the boards of directors of 314 Brazilian companies in 2010. The data on the reference forms referred to 2009 and involved 2,023 directors. Evidence suggests that the level of education of board members (a factor involving the presence of directors with a master's and doctor's degree) hurts the total and abnormal returns of the companies' stocks and has a positive effect on Tobin's Q.

Sprenger et al. (2017) analyzed the relationships between several characteristics of the CEO and earnings management. The sample comprised 162 Brazilian companies in the period between

2010 and 2015 (unbalanced panel). The results indicate that there is no relationship between the academic background of the CEO and earnings management.

Finally, Pacheco et al. (2019) studied the characteristics of the members of the executive board (upper echelon) and their relationship with the performance of firms. Based on a sample of 29 Brazilian companies in the B3 non-cyclical consumer sector from 2010 to 2016, the authors show that academic training has no statistically significant impact on the ROA of Brazilian firms.

In summary, the literature mainly points to a positive relationship between the presence of managers and directors with an academic degree and/or with expertise in the business areas on the performance and financial policies of companies. This set of evidence is consistent with the arguments that academic education and specialized knowledge are important qualities for board directors to assume their monitoring and advisory responsibilities and for managers to manage their companies effectively and efficiently. These arguments and the supporting evidence motivated us to formulate the following hypotheses for the Brazilian context:

- **H1:** The presence of academics on the board and/or on the upper echelon has a positive effect on the profitability of Brazilian firms.

In this first hypothesis, and based on the theoretical and empirical review of the relevant literature, it is understood that the reputation, technical knowledge, and intellectual capacity of academics contribute to their performance in the management of companies and in the supervisory and advisory functions of the board, which, in turn, results in superior corporate performance. In other words, the academic title serves as a sign of the management and control potential of the manager or board director.

- **H2:** The presence of academics on the board and/or on the upper echelon has a negative effect on the risk of Brazilian firms.

In line with the previous hypothesis, it is understood that corporate management becomes more efficient, less subject to errors, and with a greater capacity to deal with uncertainty with the presence of academics on the executive teams and boards of directors, thus reducing the risk perceived and, therefore, the volatility of companies' shares in the market.

As seen in the previous literature review, the relationship between corporate risk and academic qualifications of the board members has already been the subject of other studies, usually appearing as a secondary variable and not being the focus of study. Firstly, the use of more sophisticated investment analysis techniques by executives with MBA degrees would tend to reduce the company's risk, as pointed out by Graham and Harvey (2001). However, Bertrand and Schoar (2003) demonstrate that executives with MBA degrees tend to be more aggressive and to manage more financially leveraged companies, suggesting that MBA graduates try to adopt more aggressive business policies. For a sample of German banks, Berger et al. (2014) found evidence that changes in the composition of the board that increased the number of members with a doctorate were accompanied by a reduction in portfolio risk. In the same direction, the results by King et al. (2016) also support the idea that CEOs with management backgrounds are better able to manage the complexities associated with riskier business models.

- **H3:** The academic degree, the internationalization of academic formation, and the production of scientific articles by the board member or by the manager positively affect the corporate performance of Brazilian companies.

It is understood that the academic career is not homogeneous and the different aspects of the researcher's profile can differentiate individuals. Thus, the doctorate and master's degree, the place of study in the doctorate (local/international), and the scientific production of the board member or manager can positively affect the corporate performance of companies and in varying degrees. Expanding the hypothesis H1, here we seek to better understand whether different aspects of the academic career of board members and executives have the potential to affect corporate performance. It is expected that access to cutting-edge knowledge and cooperation networks at international universities and that the proficiency of the scientific production of board members and managers will have a positive impact on firms' performance.

3. DATA AND METHOD

The datasets required to carry out this study are: (1) composition of boards and directorships of companies listed on the stock exchange, (2) financial statements of companies and (3) academic curricula of directors and board members. For (1) and (2), financial statement data and composition of boards are available in B3's DFP (*Demonstrativos Financeiros Padronizados*) and FRE (*Formulário de Referência*) systems. For the present research, data from both systems was retrieved for the period between 2010 and 2018.

The data obtained in DFP and FRE is extensive and includes the entire corporate history of the company. Regarding the composition of boards and directorships, we have: full name and CPF number of the member, profession, date of birth, type of board, among other information. Financial data is also comprehensive, containing balance sheets, income statements and cash flow statements. All data, including composition of the boards and councils, are on an annual basis.

Information on academic degrees and production (3) is taken from the main academic curriculum platform, Lattes. The Lattes platform is essential in academic life, being used to verify the degree and scientific production in the most varied spheres of the profession, from scientific initiation at undergraduate studies to the competition for academic jobs. Any professional passing through the Brazilian academic system will most likely have their track record registered on the Lattes platform. A quick comparison between the databases shows that approximately 12% of the components of councils and board of director are registered on the Lattes Platform.

The two databases used in the research, DFP/FRE and Lattes, have different structures and purposes. Fortunately, they share the person's full name, which is used to integrate the information from different databases. The use of the name as an indexer of tables, unfortunately, is not perfect. Since two or more people can share exactly the same name, duplication of records is possible. However, it is expected that this error will be shared among the companies uniformly, so as not to bias the results.

We also highlight that the directors and officers are treated in a homogeneous and aggregate manner. As a test of robustness, we estimate all models of the study considering only directors or only council advisors. The results obtained are very close to the base case. Due to the number of new tables, we do not report the results of the new estimates, but they can be sent by the first author, upon request.

Regarding the statistical method, two econometric models were used to achieve the objectives of the research. The first, following Francis et al. (2015), aims to verify the characteristics of companies that adopt academics on their boards and directors using a GLM (General Linear Model) model and with the probit linkage function.

$$E(Y_{i,t}) = L(X_{i,t}) \quad (1)$$

$$X_{i,t} = \alpha + Controls \times \phi \quad (2)$$

On the left side of Equation 1, $Y_{i,t}$ is replaced by four binary variables highlighted below. Each model is independently estimated and provides specific information about the attributes of companies that attract different academic profiles. Next, Table 1, we present the academic variables used in the study and their respective descriptions.

Table 1
Definitions for Academic Variables

Varable	Type	Description
$Acad.Amplo_{i,t}$	Academic group	Dummy that indicates the presence (or not) of at least one member with a master's and/or doctorate on the board or board of directors of company *i* in year *t*;
$Acad.Estrito_{i,t}$	Academic group	Dummy indicating the presence (or not) of at least one member with a doctorate on the board or board of directors of company *i* in year *t*;
$Acad.int_{i,t}$	Academic group	Dummy that indicates the presence (or not) of at least one member with a doctorate outside the country on the board or board of directors of company *i* in year *t*;
$Acad.artigos_{i,t}$	Academic group	Dummy that indicates the presence (or not) of at least one member with a scientific article published on the board or board of directors company *i* in year *t*;

Note: All variables were calculated by authors.

Since there is no consensus in the literature as to the definition of what an academic is, we chose to use more than one definition. In the first, $Acad.Amplo_{i,t}$ we set a comprehensive definition of academics as those individuals who have a master's and/or doctorate course. In the second $Acad.Estrito_{i,t}$, we opted for a stricter definition in which academics are those who have fully completed a PhD. In the third, *Acad.inti,t* we restricted it even more and considered as academic only those individuals with a doctorate abroad. Finally, in the fourth, $Acad.artigos_{i,t}$ we are not deciding based on titles, but on the scientific production: we define academics as those with at least one scientific article published in a journal.

The choice of dependent variables also reflects the academic details of the career of the members of the boards and boards of directors. In contrast to the current literature, we use several definitions that take into account the different academic titles and the scientific production of each participant. Variable $Acad.int_{i,t}$ is original and reflects results already found in the literature on the scientific production of Brazilian researchers (Perlin et al., 2017). According to the aforementioned study, on average, professors with doctorates outside of Brazil have scientific production of greater impact. The justification for the inclusion of the variable in the research

in question is, therefore, to verify if this higher productivity is also found in the corporate world and whether the location of the doctorate is a positive sign for the potential of academics in the corporate world.

We reinforce that, unlike the traditional literature in Scientometrics (Altbach, 2015), we do not use impact factors or other measure derived from citations due to the small sample of the research. The vast majority of articles registered in Lattes are local and unregistered in the usual JCR (Clarivate) or SJR (Scimago) impact factor repositories. This implies that cases where a board member had an article with an impact factor are rare. Thus, although the existence of scientific publications is not a perfect measure of academic productivity, we understand that this signals the scientific potential of a council for the purposes of our research. As a test of robustness, we changed the dummy variable *Acad.artigos* for the average number of publications per board member/board of directors, and the final result, in terms of statistical significance, is the same as reported here.

On the right side of equation 2, *Controls* is a matrix containing company characteristics that, according to the literature, can affect the demand for academics to compose the board and the executive board. The respective definitions are found in Table 2.

Table 2
Control Variables Used in the Study

Variable	Type	Description
$Tamanho_{i,t}$	Control	*Log* do total assets for company *i*, year *t*.
$Idade_{i,t}$	Control	Log of the difference between year *t* and the year of foundation of company *i*.
$Endividamento_{i,t}$	Control	Ratio between total debts and total assets, by year and company.
$Patentes_{i,t}$	Control	Number of registered patents, per year and company.
$Tangibilidade_{i,t}$	Control	Ratio between non-current assets and total assets, by year and company.
$RD_{i,t}$	Control	Ratio between the cost of research and development cost (item 3.04.05.02 of the Income Statement) and the total revenue, by year and company.
$Independencia_{i,t}$	Control	Proportion of members of the boards or boards that were appointed by the controller, for each year and company. This is a reverse measure of independence.
$TamanhoConselho_{i,t}$	Control	Log of the number of members on boards and boards, by company and year.
$CompanhiaPrivada_{i,t}$	Control	Dummy that takes value 1 if company *i* in year *t* is privately controlled and 0 otherwise. The categorization occurs through the textual analysis of the company's shareholding composition. In this case, the terms Federal Government, Federal Union, BNDES, National Treasury and State are sought in the names of the majority shareholders. The previous list of government controllers was compiled manually from the analysis of occurrences in the data.
$SegmentoListagem_{i,t}$	Control	Matrix of dummies that indicate the listing (or not) in the different levels of corporate governance for company *i*, year *t*.
$Setor_{i,t}$	Control	Matrix of dummies indicative of the sector in which company *i* operates in year *t*.
Ano_{t}	Control	Matrix of dummies for the years.

Note: All variables were calculated by authors.

The main objective of the study is to understand the impact of the academic composition of the board, and board of directors, on the economic performance and market risk of companies. To achieve this, we opted for a simple linear model instead of panel data methods because the variables of interest have low variability over time. The literature commonly uses a panel model (Güner et al., 2008; Custodio & Metzger, 2014; Fedaseyeu et al., 2018) with index for company/year. However, this did not prove to be adequate to our data. In order to give robustness to the results, we also estimate the same panel model. The main results are very similar in terms of signs of the coefficients and significance. To save space, this result is not shown here, but it can be sent upon demand.

The estimated model is given next, Equation 3:

$$Desempenho_{i,t+1} \vee Risco_{i,t+1} = \alpha + \beta Acad_{i,t} + \theta \times Controls + \epsilon_{i,t+1} \quad (3)$$

Variables $Desempenho_{i,t}$ e $Risco_{i,t}$ are defined as follows – Table 3:

Table 3
Dependent Variables of Study

Family	Variable	Type	Description
Financial Performance	$ROE_{i,t}$	Dependent	Ratio between the Net Profit and the Equity of company *i* in year *t*;
Financial Performance	$ROA_{i,t}$	Dependent	Ratio between EBITDA and Total Assets of company *i* in year *t*.
Risk	$Risco Total_{i,t}$	Dependent	Standard deviation of stock returns adjusted to all earnings (dividends, splits, bonuses, ...). The annual standard deviation is calculated based on daily returns. For each company *i*, the total risk is calculated as the standard deviation of returns in year *t*;
Risk	$Beta_{i,t}$	Dependent	Measure of systematic risk. The angular coefficient derived from the market model ($R_t = \alpha + \beta R_{M,t} + \varepsilon_t$), calculated with daily return data and for each year / company.

Note: All variables were calculated by authors.

Following the literature (Francis et al., 2015), all explanatory variables of model 3 will lagged in one period (year) to measure the impact of the presence of academics in the future performance of companies. The control variables in 3 are exactly the same as in model 2. All standard errors are of the NW (Newey & West) type and robust to heteroscedasticity and autocorrelation.

As a test of robustness against a possible bias in data endogeneity, we will also use a sample matching methodology via propensity score matching, according to the reference literature (Francis et al., 2015). This exercise consists of separating companies according to the different profiles, *Acad.Amplo*, *Acad.Estrito, Acad.Int.* and *Acad.Articles* and, for each of these, find companies in the opposite and external group that have a shorter distance (score) in relation to different control variables used in Equation 1. The objective is to obtain companies that are quite similar, except in the variable in question, the presence of academics on the boards and boards of directors.

After the matching process, the data is filtered by keeping only the pairs of companies from the previous step. Finally, the following equation is estimated:

$$Desempenho_{i,t} \vee Risco_{i,t} = \alpha + \beta_1 Controle_{i,t} + \beta_2 Acad_{i,t} + \beta_3 Controle_{i,t}{*}Acad_{i,t} + \varepsilon_{i,t} \quad (4)$$

The term $Controle_{i,t}$ is a dummy that takes value one when company *i* belongs to the control group (academics) and zero when the company is a pair selected by minimizing the difference between scores. Variable $Acad_{i,t}$ is also a dummy and identifies the years in which company *i* had academics on its boards and boards of directors, following the different classifications: *Acad.Amplo, Acad.Estrito, Acad.Int.* and *Acad.Articles*. The coefficient of interest is β_3, which will indicate, controlling for other variables, the isolated effect of the presence of academics on the boards and boards on the performance and risk of companies.

4. RESULTS

Table 4 shows the descriptive statistics of the research variables. As we can see, 34.37% of the companies-years in the sample have at least one professional with a master's degree occupying a position on the board or board of directors. This number drops to 20.1% when we consider only academics with a doctorate. These figures reveal that the presence of academics on the boards and boards of directors of Brazilian companies is still low, especially when compared to data from the North American market, where approximately 40% of a sample of 1,500 companies in the S&P 1500 index have full professors on their boards (Francis et al., 2015; Cho et al., 2017) and approximately 10% of American companies analyzed by Gottesman and Morey (2006) have CEOs with academic degrees higher than MBA.

The typical company in the 2010-2018 period has a return on equity (ROE) of 3.43% and return on assets (ROA) of 8.37%, indicating that the debt charges negatively impacted the profitability of the shareholders of the companies in this period. Note that, while ROE is calculated from net income, ROA is constructed from EBITDA. As for risk variables, the typical company in the period presents a standard deviation of daily returns (TRisk) of 3.63% and systematic risk (Beta) of 0.579.

Analyzing first the descriptive statistics of the sample formed by companies-years that had at least one master and/or doctor on the board and/or board of directors (Acad. Amplo), that is, using a broader definition of the academic term, we can observe that only 67 companies (288 observations), out of a total of 133, are responsible for hiring academics for these positions.

When we use a stricter definition of the academic term, analyzing the group of companies-years that had at least one doctor on the board and/or board of directors (Acad. Strito), the differences between the firms that hire academics and the total sample tend to be larger. Now, only 40 companies (155 observations) are responsible for hiring academics to occupy these positions. In 96.77% of these cases there is at least one academic on the board or board of directors with an article (s) published in a scientific journal (s) and in 26.45% of the observations there is at least one doctor with a degree from abroad, against 31% and 5.32%, respectively, in the total sample.

Using an even stricter definition of the academic term (Acad. Int.), we now analyze the group of companies-years with at least one doctor with a degree abroad in the board and/or board of directors. As expected, the number of companies in this group drops considerably: 11 out of a total of 133, and the differences in relation to the total sample widen even further. Companies in this group tend (in terms of average) to be more profitable (ROE = 16.4% and ROA = 13.5% versus 3.43% and 8.37%, respectively, of the total sample), to have lower total risk (Total Risk = 2.93% against 3.63% of the total sample) and having a higher systematic risk (Beta = 0.827 against 0.579 of the total sample).

Finally, considering as academics those with articles published in scientific journals (Acad. Articles), 56 companies (239 observations) have at least one member with this characteristic on their boards or boards of directors. Companies that rely on people who have a scientific publication on these positions tend (in terms of averages) to be slightly more profitable and to have less risk.

Table 4
Descriptive statistics from Lattes

Variable	Toda Amostra	Acad. Amplo	Acad. Estrito	Acad. Int.	Acad. Artigos
Number of Companies	133	67	40	11	56
Number of Observations	771	288	155	41	239
% of Msc	34,37%	92,01%	85,16%	100,00%	76,15%
% of PhD	20,10%	53,82%	100,00%	100,00%	62,76%
% with published articles	31,00%	71,18%	96,77%	92,68%	100,00%
% with PhD abroad	5,32%	14,24%	26,45%	100,00%	15,90%
ROE	0,0343 (0,298)	0,0214 (0,311)	0,00882 (0,348)	0,164 (0,214)	0,0376 (0,289)
ROA	0,0837 (0,0816)	0,0836 (0,0808)	0,0873 (0,0763)	0,135 (0,0739)	0,0877 (0,0759)
TRisk	0,0363 (0,0305)	0,0367 (0,0326)	0,0337 (0,0302)	0,0293 (0,0239)	0,0347 (0,0304)
IRisk	0,033 (0,0277)	0,0321 (0,0281)	0,0296 (0,0269)	0,0254 (0,0221)	0,0305 (0,026)
Beta	0,579 (0,516)	0,606 (0,549)	0,634 (0,576)	0,827 (0,568)	0,577 (0,556)
Size (log)	14,5 (1,64)	15,1 (1,76)	15,4 (1,95)	16,4 (1,56)	15,1 (1,81)
Age (log)	3,86 (1,01)	3,79 (0,825)	3,85 (0,796)	3,6 (0,64)	3,93 (0,851)
Debt	0,247 (0,178)	0,27 (0,171)	0,262 (0,19)	0,391 (0,19)	0,266 (0,174)
Tangibility	0,622 (0,21)	0,636 (0,194)	0,672 (0,18)	0,699 (0,134)	0,657 (0,171)
Patents	4,55 (27,4)	9,17 (43,8)	4,28 (14,5)	3,07 (8,65)	9,17 (42,7)
Independence	0,317 (0,349)	0,356 (0,349)	0,343 (0,337)	0,166 (0,161)	0,334 (0,347)
RD	0,0262 (0,189)	0,0192 (0,0298)	0,0144 (0,0241)	0,00414 (0,00677)	0,0218 (0,032)
Size Boards (log)	2,35 (0,506)	2,6 (0,425)	2,63 (0,41)	2,73 (0,41)	2,58 (0,464)
Private Company	97,54%	94,79%	91,61%	100,00%	94,56%
% No listing in CG	34,37%	29,51%	28,39%	29,27%	30,54%
% with CG – Level 1	9,86%	9,38%	7,74%	12,20%	9,62%
% with CG – Level 2	2,85%	3,82%	7,10%	9,76%	4,60%
% with CG – Novo Mercado	52,92%	57,29%	56,77%	48,78%	55,23%

Notes: Table 4 presents the descriptive statistics of the databases used in the research, aggregating data from the Lattes platform and the FRE/B3 system (2010-2018). The companies were separated between Acad.Amplo, Acad.Estrito, Acad.int and Acad.Articles according to the academic production of the board members in each company/year.

Source and credit: Created by the authors.

After this preliminary analysis of the profile of companies that hire academics is finished, we present the results of the Probit model in Table 5, whose objective is to identify the attributes/characteristics of the companies that hire academics with different profiles to occupy seats on the board and board of directors. For this purpose, four models with different dependent variables were estimated, which are: (1) Broad Acad (2) Strict Acad, (3) Acad.Int and (4) Acad. Articles.

Table 5
Results of the Estimation of the Probit Model (Eq. 01) - Profile of companies with academics on their boards and boards of directors

	Dependent Variables (Dummies)			
	Acad. Amplo	Acad. Estrito	Acad. Int.	Acad. Artigos
	(1)	(2)	(3)	(4)
Size	-0,034	0,060	0,406***	-0,006
Age	-0,061	-0,038	-0,468***	0,112**
Debt	0,359	-0,139	2,470***	0,106
Patents	0,007	-0,049***	-0,013	0,006
RD	5,392	-12,263*	-41,871	10,974**
Independence	0,028	0,164	-1,419***	-0,054
Size board and directorship	1,292***	0,743***	0,524*	1,010***
TangibilAge	-0,070	0,518	-0,726	0,431
Private Company	-0,798*	-1,196***	4,759	-0,415
GC – Nível 1	-0,748***	-0,349	-0,672	-0,768***
GC – Nível 2	-0,985**	0,399	-0,022	-0,632
Novo Mercado	-0,258*	0,007	-0,261	-0,277*
Constant	-2,053***	-2,650***	-11,714	-3,169***
Observations	771	771	771	771
Log Likelihood	-382,350	-283,070	-86,262	-381,514
Akaike Inf. Crit.	816,699	618,139	224,525	815,027

*p<0,1; **p<0,05; ***p<0,01

Notes: Table 5 presents the results of the estimation of the Equation 01 model, which seeks to understand the relationship between the company profile and the different groupings defined by the academic production of the board members. We use a Probit model and estimated via maximum likelihood.

Source and credit: All results were prepared by the authors.

The first model, Acad.Amplo, estimates the determinants of the presence of masters and/or doctors on the board or board of directors of publicly traded Brazilian companies. It is observed that the variable *Tamanho conselho e diretoria* positively impacts the hiring of academics to occupy these seats. The coefficient for *Empresa Privada*, however, has a negative impact, indicating that, in the broad definition of academics, publicly-controlled companies tend to hire more academics. It is also observed that the listing at levels 1 and 2, and Novo Mercado, of corporate governance impacts negatively and statistically significant in the presence of masters and/or doctors on the boards and boards of directors the companies selected for the study. In contrast to the listing in the Traditional segment of the Brazilian Stock Exchange, it was expected that listing at different levels would have a positive effect on hiring academics. This last result, therefore, runs counter to our expectations.

In the second model, we estimate the determinants of the presence of doctors on the board or board of directors of Brazilian publicly traded companies. The results found demonstrate that, again, the size of the board and board of directors positively impacts the presence of these professionals, and this relationship is statistically significant. However, contrary to expectations, RD and Patentes variables have a negative impact, that is, companies with greater investments in research and patents are those that least hire members with doctoral titles for their boards

and boards of directors. The fact that the company has private control, in turn, negatively and significantly affects the hiring of academics. This evidence confirms previous studies (Francis et al., 2015).

In the third model, whose dependent variable is indicative of the presence of doctors with degrees abroad, the explanatory factors with statistically significant coefficients are almost all different from those found in the other models. In fact, this is the model with the largest number of significant relationships for the variables of interest (and not control). It is observed that the variable *Tamanho do conselho e diretoria* continues to positively impact the presence of this profile in Brazilian companies. *Endividamento* and *Tamanho* have a positive impact, while *Idade* and *Independência* have a negative impact. In summary, large, young companies, more indebted with a low proportion of directors appointed by the controllers are those that tend to hire more doctors with degrees abroad for their boards and boards of directors.

In the last model, the presence of academics with articles published in scientific journals on the boards and boards of directors in Brazilian companies, we find the expected result that *Idade*, *RD*, *Tamanho do conselho e diretoria* positively affect the presence of board members and directors with scientific publication, that is, the profile of contractors is older companies, with larger boards and with significant investment in research.

In summary, the four models presented similar results for the variable *Tamanho do conselho e diretoria*. This variable has coefficients with a positive sign, denoting that companies with a greater number of directors and board members would be more likely to hire professionals with an academic profile. One explanation could be that firms with a large number of these professionals are more complex and demand technically more qualified directors and board members.

In order to continue the analysis, Table 6 shows the results of our model number 3. Unlike the results found by Francis et al. (2015), in general, the compiled results do not provide statistically significant and majority evidence that the unrestricted presence of doctors, masters and members with published scientific article can affect the profitability and risk of the companies studied. Thus, in our sample, we did not obtain sufficient evidence to allow us to confirm our first hypothesis (H1). The only case with a positive sign and statistical significance was for Acad. Int, which will be discussed shortly after, in our hypothesis H3.

Regarding the impact on risk, H2, Table 7, there is a negative and significant effect only in the models related to total risk (Trisk). For example, as shown in Table 7, the entry of a member with an international doctorate (Acad. Int) would reduce TRisk by 0.01. For the other cases, we found low significance or positive values. In general, the results for the signs of the coefficients are dispersed and do not mostly indicate a single direction.

Regarding the last hypothesis, it is important to note in Table 6 that the variable that measures the presence of members with a doctorate held abroad presented statistical significance and expected sign for all performance and risk indicators (except for Beta). From the joint analysis of Tables 6 and 7, the entry of a member with a doctorate abroad in the board or management of a company that previously did not have members with a doctorate abroad would increase ROA by 0.051 and ROE by 0.193 and reduce TRisk by 0.01. On the other hand, the presence of a doctor with a degree abroad in the board of directors or board is associated with a systematic risk (Beta) 0.178 higher, when compared to firms that do not have academics with a doctorate abroad in their boards and councils.

The previous result reinforces our argument that the international academic experience represents a differential in relation to the doctoral degree. These results provide evidence to support our third research hypothesis - H3. It is possible to relate these results to those found in the research by Swift (2018), with regard to the value of academics on the board with the largest professional networks. In addition, considering the low number of companies that have at least one doctor with a degree from abroad on their board or boards (as shown in Table 1), this study can be used as an input for discussing public policies to encourage the internationalization of academics (Perlin et al, 2017).

Table 6

Result of the Estimation of the Linear Model (Eq. 03) - Impact of academic titles and scientific production on profitability

	Dependent Variables							
	ROA				ROE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acad. Amplo	-0.005				-0.017			
Acad. Estrito		0.003				-0.044		
Acad. Int.			0.051***				0.193***	
Acad. Artigos				-0.0001				0.007
Size	0.0001	-0.00000	-0.001	0.0001	0.027***	0.029***	0.022**	0.027***
Age	-0.004	-0.004	-0.003	-0.004	-0.003	-0.003	0.001	-0.003
Debt	-0.015	-0.015	-0.024	-0.015	-0.291***	-0.294***	-0.325***	-0.293***
Tangibility	-0.054***	-0.054***	-0.053***	-0.053***	-0.143***	-0.139***	-0.143***	-0.143***
Private Company	0.036**	0.039**	0.036*	0.038**	0.145	0.135	0.142	0.151
Patents	0.00003	0.0001	0.0001	0.00002	-0.001	-0.002	-0.001	-0.001
Independence	-0.028***	-0.028***	-0.024**	-0.028***	-0.020	-0.019	-0.004	-0.020
RD	0.655**	0.649**	0.677**	0.646**	1.163	1.067	1.253	1.112
Size Boards	0.025***	0.023***	0.020**	0.024***	0.015	0.016	-0.003	0.007
GC – Nível 1	-0.015	-0.014	-0.009	-0.014	0.015	0.015	0.036	0.021
GC – Nível 2	-0.011	-0.010	-0.015	-0.010	0.070	0.079	0.054	0.076
Novo Mercado	-0.0003	0.00001	0.003	0.00004	0.021	0.022	0.036	0.023
Constant	0.060	0.062	0.088**	0.061	-0.343*	-0.357*	-0.239	-0.337*
Observations	753	753	753	753	770	770	770	770
R^2	0.107	0.106	0.122	0.106	0.095	0.097	0.111	0.094
Adjusted R^2	0.075	0.074	0.091	0.074	0.063	0.065	0.080	0.063

*p<0.1; **p<0.05; ***p<0.01

Notes: Table 6 presents the results of the estimation of the OLS model in Equation 03 with ROA and ROE as the dependent variable. Asterisks indicate statistical significance at 1%, 5% and 10%, respectively.

Source and credit: All results were prepared by the authors.

Table 7
Result of the Estimation of the Linear Model (Eq. 3) - Impact of academic titles and scientific production on risk

	Dependent Variables							
	Beta				TRisk			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acad. Amplo	0.036				0.004*			
Acad. Estrito		0.041				-0.003		
Acad. Int.			0.178**				-0.010***	
Acad. Artigos				-0.025				-0.001
Size	0.066***	0.065***	0.061***	0.066***	-0.005***	-0.005***	-0.005***	-0.005***
Age	-0.013	-0.014	-0.010	-0.013	-0.001	-0.001	-0.001	-0.001
Debt	0.116	0.121	0.088	0.120	0.010	0.010	0.012*	0.010
Tangibility	0.122	0.117	0.121	0.123	0.024***	0.025***	0.024***	0.024***
Private Company	0.145*	0.149*	0.127	0.132	0.005	0.002	0.004	0.003
Patents	0.004	0.005	0.005	0.004	-0.0004**	-0.0004**	-0.0004**	-0.0004**
Independence	0.053	0.052	0.068	0.053	0.0005	0.001	-0.0003	0.001
RD	-2.544**	-2.416*	-2.367*	-2.393*	-0.030	-0.027	-0.029	-0.019
Size Boards	-0.053	-0.047	-0.052	-0.033	0.003	0.005*	0.005*	0.005
GC – Nível 1	0.125	0.121	0.134*	0.112	-0.009*	-0.011*	-0.011**	-0.011*
GC – Nível 2	0.047	0.034	0.020	0.034	-0.019***	-0.019***	-0.019***	-0.020***
Novo Mercado	0.104**	0.101**	0.113**	0.099*	-0.020***	-0.021***	-0.021***	-0.021***
Constant	-0.526**	-0.517**	-0.437*	-0.544**	0.094***	0.092***	0.088***	0.093***
Observations	761	761	761	761	761	761	761	761
R^2	0.160	0.160	0.164	0.160	0.234	0.232	0.236	0.231
Adjusted R^2	0.130	0.130	0.135	0.130	0.207	0.205	0.208	0.204

*p<0.1; **p<0.05; ***p<0.01

Notes: Table 7 presents the results of the estimation of the OLS model in Equation 03 with the risk of companies, Beta and TRisk, as the dependent variable. Asterisks indicate statistical significance at 1%, 5% and 10%, respectively.

Source and credit: Created by the authors.

Table 8 presents the result of the estimation of model 4 for data paired via PSM (propensity score matching) and using profitability variables (ROE and ROA) as a reference, as described in the methodology section. As can be seen, the coefficients for the coefficient β_3 (Control*Academic) are predominantly positive and have statistical significance for *Acad. Int.* and *Acad. Artigos*. In particular, and corroborating with previous results, the Acad. Int. group was the one with the highest ROA value. In general, the results in Table 07 corroborate the previous results, again indicating the effect found on the international qualification of the board members and executive boards in corporate practices.

Table 8

Result of the Estimation of the Linear Model (Eq. 4) for Paired Data - Impact of academic titles and scientific production on profitability

	Dependent Variables							
	ROE	ROA	ROE	ROA	ROE	ROA	ROE	ROA
	Acad. Amplo		Acad. Estrito		Acad. Int		Acad. Art.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control	0.035	0.021	-0.044	-0.006	0.006	-0.047***	-0.096**	-0.011
Academic	-0.002	0.009	-0.092**	-0.024*	-0.065	-0.035*	-0.107***	-0.025**
Control* Academic	-0.074	-0.032**	0.078	0.024	0.163	0.087***	0.143***	0.032*
Constant	0.053	0.079***	0.069**	0.086***	0.059	0.126***	0.098***	0.091***
Observations	746	746	464	464	134	134	622	622
R^2	0.007	0.007	0.012	0.014	0.049	0.090	0.012	0.017
Adjusted R^2	0.003	0.003	0.005	0.008	0.027	0.069	0.007	0.012

*p<0.1; **p<0.05; ***p<0.01

Notes: Table 8 presents the results of the estimation of the OLS model in Equation 04 with the profitability of the companies as a dependent variable. Asterisks indicate statistical significance at 1%, 5% and 10%, respectively.

Source and credit: All results were calculated by the authors.

In the results presented in Table 9, regression with paired data and with risk measures as dependent variables, it appears that the coefficients are mostly negative, but only one out of eight with statistical significance. In general, the results in Table 9 also confirm the previous results, but to a lesser extent.

Table 9

Result of the Estimation of the Linear Model (Eq. 4) for Paired Data - Impact of academic titles and scientific production on risk

	Dependent Variables							
	TRisk	Beta	TRisk	Beta	TRisk	Beta	TRisk	Beta
	Acad. Amplo		Acad. Estrito		Acad. Int		Acad. Art.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control	-0.004	-0.024	0.0004	0.193**	0.011	0.247*	-0.005	0.128
Academic	-0.001	0.062	-0.002	0.120	0.002	0.293***	-0.009	0.042
Control* Academic	0.003	0.025	-0.005	-0.202*	-0.011	-0.258	0.003	-0.148
Constant	0.037***	0.538***	0.037***	0.534***	0.029***	0.556***	0.045***	0.577***
Observations	746	746	464	464	134	134	622	622
R^2	0.001	0.003	0.010	0.010	0.020	0.053	0.012	0.002
Adjusted R^2	-0.003	-0.001	0.004	0.004	-0.002	0.031	0.008	-0.002

*p<0.1; **p<0.05; ***p<0.01

Notes: Table 9 presents the results of the estimation of the OLS model in Equation 04, having the risk of the companies as a dependent variable. Asterisks indicate statistical significance at 1%, 5% and 10%, respectively.

Source: All results were calculated by the authors.

5. DISCUSSION OF RESULTS

The data show that the percentage of companies-years in the sample that have at least one doctor on the board or board of directors is 20.1%, which is a proportion much lower than that found in studies in the North American market. Regarding the profile, the probit model pointed out that companies with more numerous boards are more likely to hire professionals with an academic profile. In particular, we also find the result that young companies, of large size and indebtedness, tend to hire researchers with doctorates obtained abroad.

Possibly, the lack of clear guidance from public institutions regarding the technicality of the components of the boards and boards of directors can explain our results. Likewise, the lack of connection and negotiation between the corporate world and the Brazilian academy also explains this result. Unlike other countries, Brazil still lacks greater interactions between companies and universities.

In general, the results of the econometric models do not indicate that the presence of doctors, masters and the presence of a member with published scientific article would affect the profitability and risk of the studied companies. The main result of the research in the sense of impact on performance is on the positive effect of the place of the degree, in this case international doctorate. In general terms, we find the robust result that councils and directorships with members who have a doctorate abroad tend to have higher profitability on total assets (ROA) and shareholders' equity (ROE).

In relation to our research hypotheses, these results contrast with what we expected. The expectation was that the title of doctor or master, obtained at a local university or abroad, would already signal better corporate practices and greater management capacity and, consequently, impact on profitability and risk. However, it is known that the doctorate abroad is a strong indicator of performance in scientific production, either by the bias of selection of candidates or by higher training by international scientific centers. When we restrict the analysis to academics with this background, our results are in line with expectations (H3) and are in line with evidence reported in foreign literature (see, for example, Francis et al., 2015; King et al., 2016 and Swift, 2018).

From the point of view of public policy, this result further motivates the creation and maintenance of initiatives for the greater international insertion of professors and researchers in Brazil. Not only will there be an impact on the quality of scientific production, but there will also be a potential impact on companies' performance. This research reinforces the importance of academic partnerships with major international institutions.

On the corporate side, research shows that the location of the doctorate can serve as a strong signal for hiring academics on the boards of companies, possibly increasing their profitability and having a positive impact on the economy in general, whether in the possible greater supply of jobs, or in increasing government revenue through taxes.

6. CONCLUSIONS

This research sought to investigate the impact of the presence of academics on the boards and boards of directors on the performance of Brazilian publicly traded companies listed on B3. It was possible to present an analysis of the penetration and impact of academics on the boards and boards of directors in Brazilian companies. The consolidation of economic and financial data with the information available on the Lattes platform proved to be efficient in terms of research strategy.

Regarding the research hypotheses, although we did not find a positive and significant result in relation to the impact of the degree itself on corporate performance and risk, one of the main results of the research is the relevance of the academic title obtained abroad. This had a positive and significant effect on the profit margins (ROA and ROE) of companies and a negative and significant effect on the total risk (TRisk). This evidence is consistent with our expectations (H3) and with much of the international literature on the subject.

The absence of significant effects when using more comprehensive measures of the presence of academics on the boards and boards may have several reasons. We will list here two of them that we believe to be the most promising. First, according to the theory of the upper echelons (see especially Hambrick, 2007), the ability of executives to change strategic directions and impact organizational performance can be limited by a series of formal and informal constraints on the external and internal environment. As in the Brazilian capital market there is still a predominance of firms with concentrated, or family, control and, as these companies tend to be more conservative, the space for changes on the part of board members and directors with higher academic training can be quite limited. In this line, the trend of young firms, therefore, is to be more dynamic, more receptive to innovation, and with greater freedom of action for their executives. Hiring academics with a doctorate degree from abroad could also explain the positive effect on profitability found when we adopted this measure more restricted from the presence of academics. For future research, we suggest that the effect of academic training on performance is moderated by variables that capture the discretion of managers and advisors.

Second, the quality of education matters and not just the degree. If training abroad has higher quality, we should expect positive differences in the performance of organizations managed and advised by professionals with foreign training (as was the case with us). Perhaps other measures of training quality, such as publications with an impact factor, for example, are also relevant to explain differences in the performance of firms. In other words, the title of doctor abroad may be capturing the quality of academic training and other measures, possibly more accurate, would present results possibly even more robust. Finally, it is worth mentioning that we do not expect results different from those found if we had analyzed the board and board of directors separately. In fact, unreported results involving this exercise show that our results are maintained. As a suggestion for future studies, it may be interesting to analyze whether our results would be different if we had used longer-term measures of performance such as Tobin's Q, for example.

The message of this survey is clear. Academics can contribute to corporate performance, but not in a homogeneous and unconditional way. Through this research, we show evidence of the benefit of greater internationalization in the training of Brazilian academics, not only in terms of improving the quality of research carried out in higher education institutions, but also for improving performance and corporate governance.

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LEGAL WARNING

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CONTRIBUTIONS

All authors contribute equally to the research.