

A Work Project, presented as part of the requirements for the Award of a Master Degree in
Finance from the Nova – School of Business and Economics

CORPORATE GOVERNANCE AND FIRM VALUATION IN BRAZIL

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Abstract

This paper investigates the relationship between the quality of a firm's corporate governance and firm valuation, as measured by Tobin's Q, for Brazilian firms listed on the BM&FBovespa from 2010 to 2014. A corporate governance index is constructed from a set of five sub-indices which were compiled from publicly available information. The indices have been used to determine how corporate governance practises have evolved over the period. The results of the study show a positive and significant relationship between firm value and greater overall corporate governance in Brazilian listed firms, as well as the component sub-indices.

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Introduction

This study will investigate the relationship of firm value and the level of corporate governance in Brazil, where the market has undergone substantial development in the past 20 years. Significant studies on this relationship has been carried out in the US markets, but very little has been done in Brazil – especially in recent years.

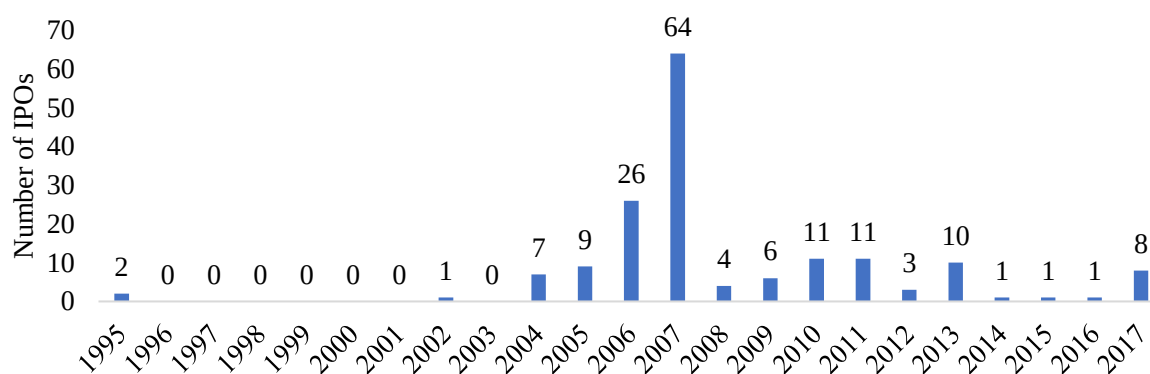
The theory of the agency problem and agency costs is well known, as are the control mechanisms that can be employed to alleviate these problems between the shareholders, stakeholders and managers of firms, known as corporate governance. The mix of the various internal and external corporate governance mechanisms vary from firm to firm, the United States and other developed markets have an established set of minimum standards through government regulations, market listing requirements, extensive analyst and media coverage and corporate governance organizations encompass the external control mechanisms. However, what is known about the effects of corporate governance on firm valuation, especially in emerging markets is still limited. Previous studies, mainly focused on the US market, have shown corporate governance structures directly influence the efficiency of the market for corporate control and may have a positive impact on firm valuation and performance (Gompers, Ishii, & Metrick, 2003) (Ferreira & Laux, 2007) (Cremers & Nair, 2005). Simply put, good corporate governance makes firms look more attractive to investors by decreasing their monitoring and auditing costs, thus are valued more highly in the market.

The evolution of corporate governance has varied from market to market according to Gompers, Ishii and Metrick (2003) who noted that the rise of the junk bond market in the 1980s led to more firms adding anti-takeover provisions, along with states passing anti-takeover provisions giving less power to the shareholders, for example. These anti-takeover provisions are a primary internal control mechanism (Easterbrook & Fishel, 1991) (Kaplan &

Minton, 1994) (Gorton & Schmid, 1999). These provisions along with other drivers, such as the Sarbanes-Oxley Act and strong listing requirements in the US markets have shaped much of the US corporate governance structures as we see it today. However, for the Brazilian market the development has looked much different.

In the past few decades, Brazil's economy has become more open, becoming more attractive for foreign investment, experienced strong economic growth (prior to the recent economic crisis) (The World Bank, 2016) and privatizations which have all gone to increase the governance standards in Brazil. Black, Carvalho & Sampaio (2014) and Silva & Leal (2005) have outlined the drivers that led to the changes in corporate governance standards in Brazil, along with its evolution. In 1997, Brazil ranked 24th for investor rights, 43rd for enforcement of corporate law and 40th for accounting standards among a survey of 49 countries (Nenova, 2003). In 1999, the "Code of Best Practices" was first published by the Brazilian Institute of Corporate Governance¹ (IBGC), which is the non-profit independent organisation which was founded in 1995 as the country's corporate governance reference (Viegas, 2008). Most notably, in 2000 the Brazilian stock market experienced a loss in trading volume to other markets which led the exchange to create three new listing types on the BM&FBovespa – Novo Mercado, Level I and Level II, which led to a huge increase in IPOs.

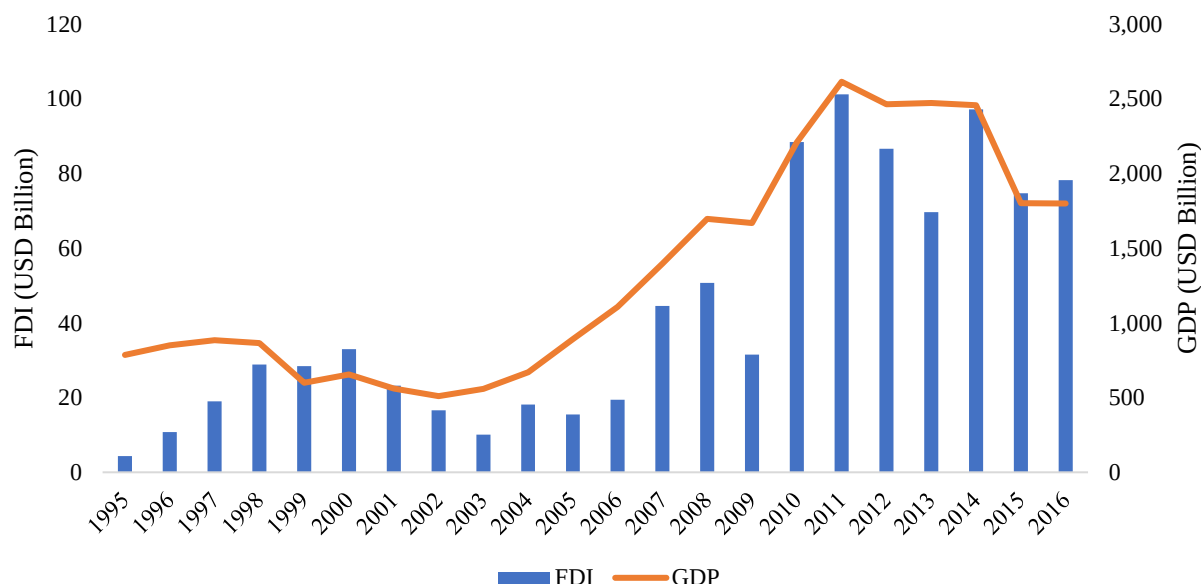
Chart 1 - Number of IPOs on the BM&FBovespa



¹ Instituto Brasileiro de Governança Corporativa in Portuguese

Finally, in 2001, the “New Law of Corporations” was passed which reduced the maximum amount of non-voting shares from 66% to 50% of total capital for firms that go public after October 2001 and for new corporations formed after this date.

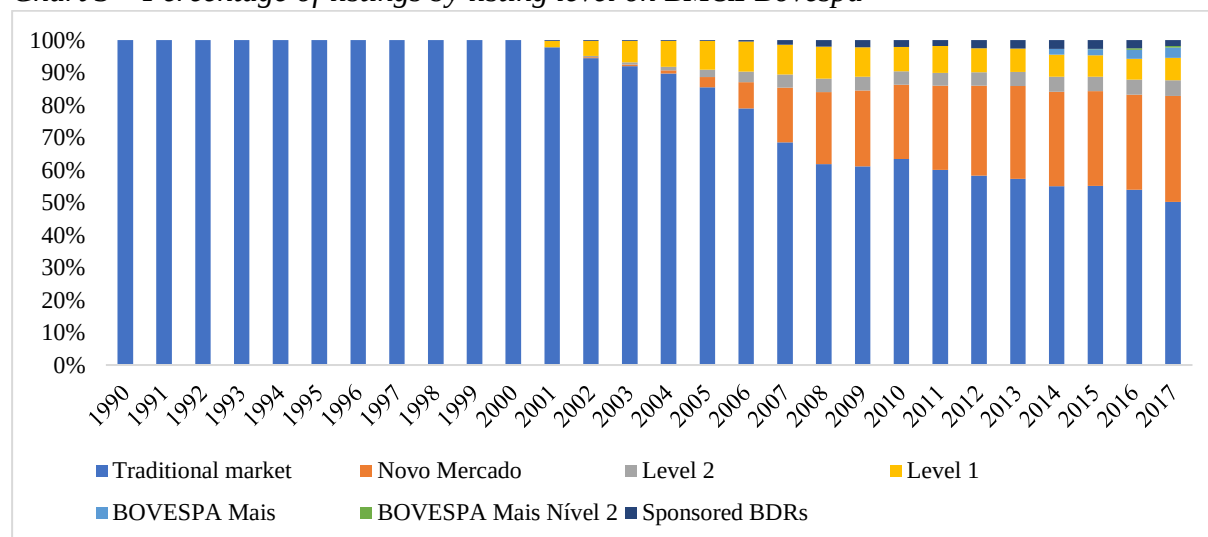
Chart 2 – Brazilian Economy and Openness



For firms to be able to be listed on the BM&FBovespa Novo Mercado, Level II or Level I, they must meet the specific corporate governance regulations. Novo Mercado, the highest corporate governance listing only allows the issuance of common stock, with at least 25% free float, a minimum five board of directors with at least 20% being independent and a term of up to two years, financial statements are published in English, annual public meetings and a mandatory calendar of corporate events are some of the main requirements. The Level II listings a slightly less strict, allowing for preferred stock. Finally, the Level I listings are the lowest corporate governance listing in the Novo Mercado, allowing for preferred stock, a minimum of only three members of the board of directors but no regulation on the percentage of independent directors, language of financial statements only required to be published as per the legislation (BM&FBovespa, 2016). While this is not an exhaustive list, it is some of the main requirements by the exchange.

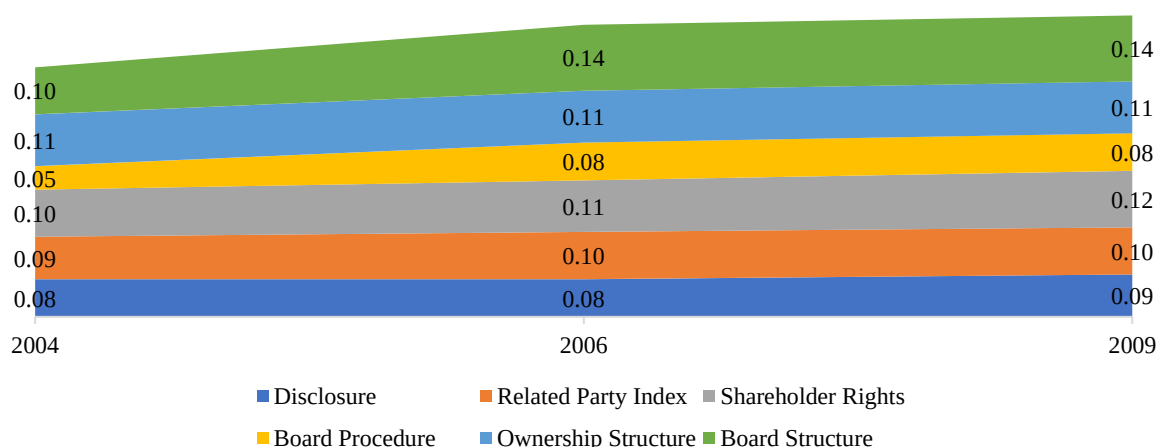
As of November 2017, there are over 402 listed firms on the BM&FBovespa with 35% (139 firms) listed on the Novo Mercado, 5% (19 firms) with Level II listings and 7% (27 firms) with Level I listings (BM&FBovespa, 2017).

Chart 3 – Percentage of listings by listing level on BM&FBovespa



Black, Carvalho & Sampaio (2014) recorded the changes in the corporate governance standards in Brazil in 2005, 2007 and 2009, mapping the changes. Data was collected using extensive surveys covering five broad areas of corporate governance (board structure, ownership, board procedures, shareholders rights and disclosure), with each area having sub-elements, forming sub-indices. Raw averages of the sub-indices are used to calculate the overall Brazilian corporate governance index (BCGI). Overall, 116 firms in 2004, 172 in 2006 and 177 in 2009 responded to the surveys. The graph below shows the changes in the indices over the period, with the increase in the BCGI significant at the 1% significance level.

Chart 4 – BCGI changes over time



The sources of the increase in BCGI were also examined in the Black, Carvalho & Sampaio (2014) study to find which aspects have been driving the improvement over this period. Results showed that which aspects of the sub-indices drove the improvement for each. In the board structure sub-index, greater board independence was found statistically significant. In the board procedure index, the adoption of CEO and other board member evaluations and an implemented a code of ethics drove the increase for this index. In the ownership structure sub-index, the fraction of voting shares in the capital structure and a drop in the fraction of common shares held by the largest shareholder helped to drive increases in this index. Minority shareholder rights increases came from a higher proportion of firms ensuring that minority common shareholders receive the economic value of their shares in future freeze out offers² and greater takeout rights than the legal minimum. Lastly, the disclosure index increases were mainly driven by firms opting to publish financial statements in English and using IAS or US GAAP and providing an annual agenda of corporate events (all of which are required by the Novo Mercado/Level 2 listings).

There have been very few studies, compared to the US and other developed markets, that examine the relationship between firm value and corporate governance in Brazil. One

² When a firm's majority shareholders pressure minority shareholders to sell their stake

study from Silva and Leal (2005) studied this relationship by constructing a corporate governance index through the collection of publicly available information from 1999 to 2002. Their index was less robust than that of the Black, Carvalho and Sampaio (2014) study, covering only four broad categories with a total of 15 aspects. This study covers the market before the introduction of the Novo Mercado listings, and their results show that of a total of 131 firms, which made up about 71% of the total BM&FBovespa market capitalization in 2002, only 4% had “good” corporate governance. Using Tobin’s Q as an indicator of firm valuation and performance, they found a positive relationship between Tobin’s Q and higher corporate governance index scores as well as return on assets, however their results were not statistically significant.

A more recent study on the relationship of firm valuation and corporate governance was conducted by Black, Carvalho & Sampaio (2014), based on their findings of the changes in index values over the three years. Since most of the drivers of corporate governance change came from the elements required by the Novo Mercado and Listing II level, they also investigated if it were these elements or the others included in their surveys which influence firm value, as measured by Tobin’s Q. The results show that a one standard deviation increase in the BCGI predicts an increase of about 14% in the Tobin’s Q. When looking at the Novo Mercado and non-Novo Mercado elements of their index, non-Novo Mercado elements were found to have no predictive value in Tobin’s Q and Novo Mercado elements have strong, positive statistically significant coefficients.

The purpose of this paper is to analyse the relationship between corporate governance and firm valuation of Brazilian companies from a constructed corporate governance index of publicly available information. It will attempt to update previous studies, as corporate governance standards have evolved and been more widely adopted by the market and, instead, use an index constructed of publicly available information, rather than a survey based index to

avoid biased results. The remainder of the paper will go as follows: the next section will describe the data and the methodology used and the empirical results obtained, followed by closing the paper with the conclusions of the study.

Data and Methodology

Corporate Governance Index

While previous studies have used a single mechanism, such as the antitakeover defence as a corporate governance standard, this study is more concerned with the effect on firm valuation by the overall corporate governance level. Therefore, following the structure of previous studies, a Corporate Governance Index (CGI) is constructed using publicly available information of companies listed on the BM&FBovespa for the years 2010 to 2014. This index follows a similar structure of the Black, Carvalho and Sampaio (2014) paper. There are five sub-indices within the index covering board independence (four components), audit committee & fiscal board (three components), board procedures (six components), minority shareholder rights (seven components) and disclosure (eleven components). The companies are scored with a one if they have the governance feature and a zero if they do not. The total index is the raw average of the sub-indices. The full descriptions of the corporate governance sub-index components can be found in the appendix.

Board Independence Sub-index

Board independence is an important aspect of corporate governance. As board members are responsible for monitoring the performance of the firm, members must be able to balance the responsibility while preventing any conflict of interest to arise (OECD, 2015). Klein (2002) suggests that more independent boards leads to greater effectiveness in the corporate financial accounting process.

Audit Committee & Fiscal Board Sub-index

Auditing committees were first introduced in the US in the 1930s, resulting from the McKesson & Robbins, Inc. scandal of 1938. However, it was not until 1974 when the Securities and Exchange Commission (SEC) required companies in the US to disclose to shareholders whether an audit committee existed and its composition with the Accounting Series Release (ASR) No. 165. In 1978, the New York Stock Exchange (NYSE) officially made it requirement for listed companies to establish an independent audit committee with the directive in ASR No. 165. Audit committees are optional for all levels of the BM&FBovespa, however, on 2 January 2018 the BM&FBovespa will begin to require Novo Mercado level listings to maintain an audit committee that meet regulatory requirements, which stated it must have at least three members, with only one having to be independent (BM&FBovespa, 2017). As Black, Carvalho and Sampaio (2014) note, in Brazil, the “fiscal board” plays a role in the financial oversight. Therefore, a separate sub-index is included.

Board Procedure Sub-index

The OECD’s “Principles of Corporate Governance” suggest that boards should regularly carry out evaluations of board members and even engage in training to ensure they continue to possess the right competences (2005). This index includes whether performance measures are in place and if a code of ethics and bylaws exist.

Minority Shareholder Rights Sub-index

Takeout rights has been the focus of many similar corporate governance studies, particularly in the US (Gompers, Ishii, & Metrick, 2003) (Ferreira & Laux, 2007). These studies found stronger shareholder rights have higher firm value, profits and sales growth. The OECD (2015) has found that these “devices may be a serious impediment to the functioning of the market for corporate control”. They also suggest that the corporate governance framework treat all shareholder equitably and provide the utility to obtain reparation for violation of shareholder rights. This sub-index contains five components:

annual election of all directors, takeout rights on sale of control exceed legal minimum, arbitration of disputes with shareholders, whether firm has no authorized capital or provides pre-emptive rights, and free float ≥ 25 % of total shares.

Disclosure Sub-index

The last sub-index deals with disclosure, which has been found to be associated with higher market value (Durnev & Kim, 2005). OECD Principal Administrator, Richard Frederick stated that “disclosure is an effective tool for improving investor protection” (2000). Investors with good, transparent information can reduce their perception of risk which reduces the cost of capital, impacting the entire economy. Moreover, it helps lead to better management of the firm, as management are also given greater transparency (Frederick, 2000).

Sample Data

Financial data was collected from Thomson Reuters Eikon of firms listed on the BM&FBovespa from 2010 to 2014. Firms that do not have complete information were excluded from the sample, for a total of 152 firms to give a balanced panel dataset, covering over 50% of the total BM&FBovespa market value for 2014. The corporate governance index data was collected from publicly available information.

Model Specification

To analyse the relationship of the CGI and firm valuation and performance, Tobin's Q^3 is used to measure of relative value of firms. Control mechanisms are also included in the model that are not captured in the CGI but may have an influence on the calculated Tobin's Q . Leverage ratio (Leverage), size as measure by the natural log of total assets (LSize), return on assets⁴ (ROA) are included as identified in previous studies (Silva & Leal, 2005) (Klapper

³ Computed as (book value of debt + market value of shares)/book value of assets

⁴ Measured by net income after taxes over total assets

& Love, 2004) and (Black, Jang, & Kim, 2003), return on equity (ROE) and book-to-market ratio (B2M). These variables have been used by other researchers to control for endogeneity in the model.

$$Eq. 1 \quad Tobin's Q_{i,t} = \alpha_i + \beta_1 CGI_{i,t} - \beta_2 Leverage_{i,t} + \beta_3 LSize_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ROE_{i,t} + \beta_6 B2M_{i,t} + \epsilon_{it}$$

Empirical Results

Table 1 shows the averages of each of the sub-indices included in this analysis. The average Tobin's Q decreased from 1.87 in 2010 to 1.42 in 2014, while the CGI average increased from 0.49 in 2010 to 0.62 in 2014. Note that the lowest scoring firm during the period was a 0.1 in 2010, with a maximum of 1 in 2013, meaning this analysis covers a wide range of levels of corporate governance.

Table 1 – Average value of indices over time

	Board Independence	Audit Committee & Fiscal Board	Board Procedure	Minority Shareholder Rights	Disclosure	Total CGI	Tobin's Q
2010	0.33	0.48	0.41	0.49	0.73	0.49	1.87
2011	0.37	0.54	0.52	0.52	0.79	0.55	1.47
2012	0.41	0.52	0.61	0.50	0.81	0.57	1.52
2013	0.45	0.57	0.53	0.59	0.79	0.59	1.55
2014	0.41	0.65	0.63	0.59	0.81	0.62	1.42
Total	0.39	0.55	0.54	0.54	0.79	0.56	1.57

Table 2 – Difference of average value of indices over time

	Board Independence	Audit Committee & Fiscal Board	Board Procedure	Minority Shareholder Rights	Disclosure	Total CGI
2010-11	0.04	0.06*	0.11***	0.03	0.06**	0.06***
2011-12	0.04	-0.02	0.09**	-0.02	0.02	0.02
2012-13	0.04	0.03	-0.08*	0.09***	-0.02	0.02
2013-14	-0.04	0.08**	0.10**	0.00	0.03	0.03
*, **, *** indicates significance at the 10%, 5% and 1% level respectively						

Table 1 also shows the evolution of the sub-indices of the CGI. While an overall increase in the CGI was seen over the period, there was a drop in 2014 in the Board

Independence sub-index. In 2012, there was a drop in the Audit Committee and Minority Shareholder Rights sub-indices. Finally, 2013 had a drop in the Board Procedure and Disclosure sub-indices, demonstrating, that while the overall corporate governance has improved, some firms have drop some elements.

Using a nonparametric, Wilcoxon signed ranked test, table 2 shows which years had a significant change in means for each of the sub-indices. The CGI average change was only significant in 2010 to 2011.

Chart 5 – Percentage of firms analysed by Bovespa listing level

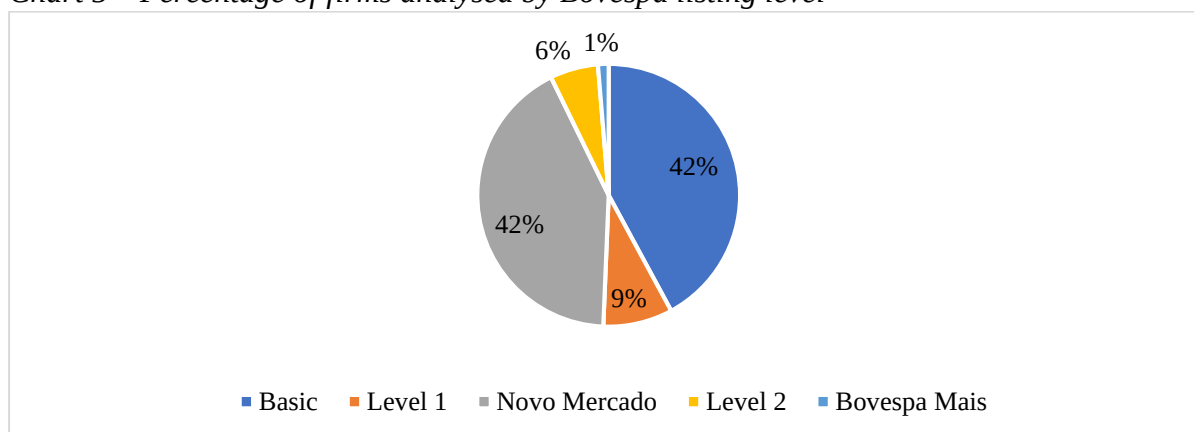


Chart 5 demonstrates the analysed firms' listing levels, showing the representation of the market in this study. While, Novo Mercado, Level 1 and Level 2 will have higher corporate governance standards as required, some basic and Bovespa Mais level listed companies have adopted some of the corporate governance standards not required of them by the exchange.

Table 3 – Average value of indices by exchange listing level

	Board Independence	Audit Committee and Fiscal Board	Board Procedure	Minority Shareholder Rights	Disclosure	Total CGI	Tobin's Q
Basic	0.21	0.45	0.36	0.37	0.66	0.41	1.33
Bovespa Mais	0.58	0.20	0.13	0.40	0.71	0.40	16.19
Level 1	0.34	0.69	0.62	0.46	0.85	0.59	1.15
Level 2	0.51	0.58	0.57	0.61	0.84	0.62	1.08
Novo Mercado	0.57	0.64	0.72	0.72	0.90	0.71	1.51
Total	0.39	0.55	0.54	0.54	0.79	0.56	1.57

Table 3 gives a first look at the various CGI of each of the listing levels. As expected, the highest average CGI over the entire period is the Novo Mercado listed firms, with Level 2 and Level 1 with slightly lower averages. This is to be expected. However, table 3 also shows a higher average Tobin's Q for the Bovespa Mais listing level. The Bovespa Mais listings are intended for smaller, targeted share offerings on the market. Companies are gradually required prepare their business for a full IPO on the BM&FBovespa exchange over the course of seven years.

There also seems that the gap in the listing levels between each sub-index. In the Bovespa Mais level, the Board Independence is highest, where as the gap between the Novo Mercado, Level 1 and Level 2 listings with non-corporate governance listings is quite large for the Board Procedure sub-index. Black, Carvalho and Sampaio (2014) noted that private equity and venture capital backed companies had greater board procedures in place, compared to companies who were not backed. Private equity may impose their own corporate governance practices on investee companies that stick once they exit, with the Bovespa Mais listing to most popular for IPOs. Overtime, the Bovespa Mais listings had the highest CGI score in 2010 while all other listing levels have increased on average over the period. Strong evidence was found for a difference in the CGI and sub-indices among the BM&FBovespa listing levels using a Welch test.

Also looking at the sectors, table 4 shows energy had the highest average CGI and sub-indices scores except for the Minority Shareholder Rights Index, for which technology had the highest average score. Healthcare and Industrials in second place. Using a Welch test, there is strong evidence that the means of each of the sub-indices and the CGI are significantly different.

Table 4 – Average value of indices by economic sector

	Board Independence	Audit Committee and Fiscal Board	Board Procedure	Minority Shareholder Rights	Disclosure	Total CGI	Tobin's Q
Basic Materials	0.40	0.52	0.55	0.53	0.80	0.56	0.88
Consumer Cyclical	0.36	0.47	0.46	0.57	0.77	0.53	2.26
Consumer Non- Cyclical	0.37	0.54	0.47	0.53	0.77	0.54	1.08
Energy	0.65	0.77	0.75	0.64	0.90	0.74	1.69
Financials	0.40	0.48	0.60	0.58	0.83	0.57	0.91
Healthcare	0.45	0.49	0.67	0.55	0.81	0.60	8.88
Industrials	0.43	0.58	0.58	0.61	0.78	0.60	1.07
Technology	0.50	0.63	0.53	0.76	0.83	0.65	1.82
Telecommunications Services	0.26	0.73	0.44	0.40	0.73	0.51	1.32
Utilities	0.39	0.65	0.53	0.41	0.77	0.55	1.22

First, a fixed effect model and a random effects model will be run. A Hausman test is then conducted to determine which is a more appropriate model. The Hausman test shows that there is strong evidence to reject the null hypothesis. Therefore, the fixed effect model is more appropriate.

The fixed effect model shows the CGI is significant at the 5% level, with a positive effect on firm value as measured by Tobin's Q, and a one standard deviation increase in the CGI predicts an increase of about 35% increase in Tobin's Q, all else remaining equal.

Next, Tobin's Q is tested against each sub-index to understand the connections between them. In this instance, the book-to-market ratio is used to control for endogeneity. A

pooled OLS regression, random effects and fixed effects models are estimated for each sub-index. Table 5 shows the regression results.

Table 5 – Sub-index effects on Tobin's Q

	Board Independence	Audit Committee and Fiscal Board	Board Procedure	Minority Shareholder Rights	Disclosure
Pooled OLS	2.77*** (7.91)	2.00*** (7.32)	1.86*** (6.94)	2.19*** (7.54)	1.79*** (8.44)
Random Effects	1.09 (1.59)	0.33 (0.53)	-0.26 (-0.43)	-0.67 (-0.85)	-0.55 (-0.57)
Fixed Effects	1.49 (1.62)	0.91** (1.97)	-0.05 (-0.06)	-0.80 (-0.77)	-0.40 (-0.34)
*, **, *** indicates significance at the 10%, 5%, and 1% level					

The results show that Board Independence has a higher effect on firm value than the other sub-indices, with each having a positive significant effect on Tobin's Q.

Conclusions

This paper furthers the study of the effect of the level of corporate governance on firm value for publicly listed Brazilian firms. Using a corporate governance index constructed of publicly available information, this investigation shows how corporate governance practices have evolved from 2010 to 2014. Despite the limited time period, this study updates and confirms previous studies' conclusions that corporate governance has an impact on firm value. The data shows more firms have adopting more of the elements that are included within the indices.

Parametric and non-parametric tests show that the differences in the indices levels are significantly statistics by year and by the market listing level. While this is expected, it is important to note that not all elements of the indices are required by the Novo Mercado. This demonstrates that firms listed at the highest corporate governance level are also implementing further "good" corporate governance practices.

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Appendix

Table 6 – Brazilian CGI and sub-index components

Below is a list of the sub-indices and elements of the sub-indices that make-up the full Brazilian CGI. If a company has the feature, they received a one, then the raw average was used to get the index score. * indicates the element is required by the Novo Mercado, Level II, or Level I listings

Board Independence Sub-Index
Board includes at least 1 independent director*
Board has at least 30% independent directors
Board has at least 50% independent directors
CEO is NOT chairman of the board
Audit Committee and Fiscal Board Sub-Index
An audit committee exists* (only applying to Novo Mercado after 01/01/2018)
The fiscal board is permanent or semi-permanent
The fiscal or audit committee includes a minority shareholder representative
Board Procedure Sub-Index
Firm had >4 board meetings in fiscal year
Firm has way to evaluate CEO performance
Firm has way to evaluate other executive performance
Board receives meeting material ahead of meetings
Firm has a code of ethics
Specific bylaws exist to govern the board
Minority Shareholder Rights Sub-index
Director elections held annually
Minority shareholders elect directors
Freezeout offer to minority shareholders based on shares' economic value*
Takeout rights on sale of control exceed legal minimum*
Arbitration of disputes with shareholders*
Firm has no authorised capital or provides pre-emptive rights
Free float is greater than 25% of total shares*
Disclosure Sub-index
Related party transaction disclosed to shareholders
Management has regular meetings with analysts
Firm discloses annual agenda of corporate events*
Financial statements offered in English*
Financial statements include the statement of cash flows*
Quarterly financial statements are consolidated*
US GAAP or IAS financial statement adjustments*
MD&A discussion in financial statements
Annual financial statements available on firm website
Quarterly financial statements available on firm website
Auditor does not provide non-auditing services to firm

Table 7 – Fixed effects model

Dependent Variable: TOBINS_Q
 Method: Panel Least Squares
 Sample: 2010 2014
 Periods included: 5
 Cross-sections included: 152
 Total panel (balanced) observations: 760

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	76.26439	8.113983	9.399131	0.0000
CGI	3.210514	1.484435	2.162785	0.0310
LEVERAGE	-6.12E-07	0.000216	-0.002840	0.9977
LSIZE	-3.589561	0.385231	-9.317956	0.0000
ROA	4.307162	0.373598	11.52888	0.0000
ROE	0.010929	0.059914	0.182410	0.8553
B2M	0.007239	0.006921	1.045904	0.2960
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.664699	Mean dependent var		1.559950
Adjusted R-squared	0.577253	S.D. dependent var		4.560049
S.E. of regression	2.964899	Akaike info criterion		5.194292
Sum squared resid	5291.957	Schwarz criterion		6.157534
Log likelihood	-1815.831	Hannan-Quinn criter.		5.565219
F-statistic	7.601270	Durbin-Watson stat		2.154238
Prob(F-statistic)	0.000000			

Table 8 – Random effects model

Dependent Variable: TOBINS_Q
 Method: Panel EGLS (Cross-section random effects)
 Sample: 2010 2014
 Periods included: 5
 Cross-sections included: 152
 Total panel (balanced) observations: 760
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.99203	2.581762	4.257570	0.0000
CGI	2.523811	1.035047	2.438355	0.0150
LEVERAGE	-1.35E-05	0.000205	-0.065546	0.9478
LSIZE	-0.526991	0.130081	-4.051248	0.0001
ROA	4.408987	0.291011	15.15057	0.0000
ROE	-0.006527	0.057403	-0.113710	0.9095
B2M	-0.005204	0.004405	-1.181277	0.2379
Effects Specification				
		S.D.	Rho	
Cross-section random		2.221968	0.3596	

Idiosyncratic random		2.964899	0.6404
Weighted Statistics			
R-squared	0.263055	Mean dependent var	0.799377
Adjusted R-squared	0.257183	S.D. dependent var	3.604221
S.E. of regression	3.106364	Sum squared resid	7266.073
F-statistic	44.79763	Durbin-Watson stat	1.806724
Prob(F-statistic)	0.000000		
Unweighted Statistics			
R-squared	0.299154	Mean dependent var	1.559950
Sum squared resid	11061.23	Durbin-Watson stat	1.371300

Table 9 – Hausman test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	79.570570	6	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CGI	3.210514	2.523811	1.132227	0.5187
LEVERAGE	-0.000001	-0.000013	0.000000	0.8463
LSIZE	-3.589561	-0.526991	0.131481	0.0000
ROA	4.307162	4.408987	0.054888	0.6638
ROE	0.010929	-0.006527	0.000295	0.3091
B2M	0.007239	-0.005204	0.000029	0.0198

Table 10 to 15 – Welch tests

Test for Equality of Means of CGI
Categorized by values of LEVEL3
Sample: 2010 2014
Included observations: 760

Method	df	Value	Probability
Welch F-test*	(4, 57.628)	215.3454	0.0000

Test for Equality of Means of Board Independence
 Categorized by values of LEVEL3
 Sample: 2010 2014
 Included observations: 760

Method	df	Value	Probability
Welch F-test*	(4, 55.6264)	98.81960	0.0000

Test for Equality of Means of Audit Committee & Fiscal Board
 Categorized by values of LEVEL3
 Sample: 2010 2014
 Included observations: 760

Method	df	Value	Probability
Welch F-test*	(4, 56.5822)	28.38317	0.0000

Test for Equality of Means of Board Procedure Index
 Categorized by values of LEVEL3
 Sample: 2010 2014
 Included observations: 760

Method	df	Value	Probability
Welch F-test*	(4, 59.6789)	87.58064	0.0000

Test for Equality of Means of Minority Shareholder Rights
 Categorized by values of LEVEL3
 Sample: 2010 2014
 Included observations: 760

Method	df	Value	Probability
Welch F-test*	(4, 55.8815)	133.8743	0.0000

Test for Equality of Means of Disclosure
 Categorized by values of LEVEL3
 Sample: 2010 2014
 Included observations: 760

Method	df	Value	Probability
Welch F-test*	(4, 55.0803)	114.2416	0.0000

*Test allows for unequal cell variances