

Corporate governance index and market performance: evidence in the Brazilian stock market

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ABSTRACT

This study aimed to build a corporate governance index for Brazilian companies with stocks traded by the Brazil Stock Exchange and Over-the-Counter Market (Brasil, Bolsa, Balcão [B3]) to evaluate the effect of the best governance practices on their market performance, between the years 2010 and 2020. Despite the different governance indexes created for Brazilian companies, most of the empirical studies used proxies based on B3's Differential Corporate Governance Levels (DCGLs). This scenario is mainly due to difficulty in collecting data and operationalizing these indexes. This article proposes a corporate governance index that is simple to use and, therefore, more accessible when compared to other indexes documented in the literature. The creation of an effective index for assessing corporate governance quality in Brazilian companies is key, given that the influence that governance has on the financial decisions made by these companies is greater in countries with weak legal protection for investors, such as Brazil. Investors see that well-governed companies are less risky, thus they have a better chance of recouping their investments. Thus, the proposed index stands out as a major instrument of financial assessment. The proposed governance index has been supported by previous studies pointing out the most efficient mechanisms in reducing agency problems. As measures of market performance, Tobin's Q and Firm Value were used. Finally, the analysis was performed using ordinary least squares (OLS) models, panel data, and regression models using the instrumental variables approach. The proposed index proved to be a good measure of governance, given the unanimous results among the models. In all estimations, the relationship between corporate governance and market performance was positive, attesting the market confidence associated with the corporate governance quality expressed by the index.

Keywords: corporate governance, governance indexes, market performance, Tobin's Q, agency theory.

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1. INTRODUCTION

From the 2000s on, after a series of accounting and financial scandals in companies such as Enron, Alstom, HealthSouth, Parmalat, Worldcom and others, there was an expansion through the search for better corporate governance practices by companies (Terra & Lima, 2006; Wu, 2021). This quest for good governance is explained by Claessens and Yurtoglu (2013), who point out that deficiencies in corporate governance can lead to serious financial crises in companies.

Corporate governance, through a set of mechanisms, aims to increase the probability that resource providers obtain a return on their investment (Antounian et al., 2021, Kitagawa & Ribeiro, 2009). For this reason, the implementation of good corporate governance practices can improve company performance and protect the interests of shareholders (Ali et al., 2022). Ali et al. (2022) point out that governance is different in each country, due to their economic, political, and other local structures and this has become a predominant debate, especially in developing economies.

Particularly in Brazil, companies have been urged to increase transparency in their decisions and to take measures capable of reducing agency conflicts (Jensen & Meckling, 1976). The Brazil Stock Exchange and Over-the-Counter Market (Brasil, Bolsa, Balcão [B3]), for instance, created in the 2000s the Differential Corporate Governance Levels (*Níveis Diferenciados de Governança Corporativa* – NDGC), special listing segments for companies that spontaneously adopt better governance practices. The purpose was to provide a trading environment that might excite investors and raise the valuation of companies traded in these segments.

In view of this, the importance of governance and its popularization led to an exponential growth in research on the subject (Ribeiro & Souza, 2021; Wu, 2021), mainly those aimed at creating proxies capable of assessing governance quality and its effect on financial and economic company performance (Bhat et al., 2018). Studies aimed at the Brazilian market, such as Carvalhal-da-Silva and Leal (2005), Correia et al. (2011), Santos (2018), Silveira (2004), among others, were produced for this purpose.

Silveira (2004) created a governance index using 20 objective questions, in which each positive answer receives 1 point and governance quality was given by the sum of these points. The author has based the questions especially on the study by Klapper and Love (2004) and they have been formulated with various governance mechanisms

as a basis. Analogously to the study by Silveira (2004), Carvalhal-da-Silva and Leal (2005) used 15 objective questions, formulated to represent the mechanisms Disclosure, Board of Directors, Ownership Structure, and Shareholders' Rights to build their governance index. The purpose was building an index that reflected various governance attributes regarded as 'good practices' by international standards.

With a similar purpose, Correia et al. (2011) built a governance index based on a set of efficient mechanisms, according to the authors, in reducing agency problems, such as the composition of the board of directors, incentives for managers, ownership and control structure, and transparency of published information. The index was built by using Principal Component Analysis (PCA), an econometric method that resorts to weighted average of the components affected by governance mechanisms. Inspired by these authors, the index proposed by Santos (2018) also used the PCA in its construction and tested the relationship between governance and financial and market performance, after the new accounting standards.

Despite the various governance indexes created through different techniques, Ribeiro and Souza (2022) point out that only 17.5% of the total number of Brazilian national empirical studies analyzed by the authors used governance indexes in their approaches. According to the authors, the other 82.5% used governance proxies created through B3's DCGLs. This scenario, in the authors' view, is due to difficulty in collecting data and operationalizing these indexes.

In this sense, given the relevance of corporate governance for companies and the development of the capital market as a whole, as well as the importance of creating metrics capable of adequately assessing governance quality, the following question arises: Is it possible to create a corporate governance index that is easy to use and understand, and efficient in reducing agency problems? That is, what demonstrates the positive effect of the best governance practices in creating firm value?

From this angle, this study seeks to build a corporate governance index for Brazilian companies with stocks traded by B3 to assess the effect of the best governance practices on their market performance, between the years 2010 and 2020.

As a scientific contribution, this study proposes a corporate governance index that is simple to use and, therefore, more accessible when compared to other indexes

documented in the Brazilian literature. The simplicity of operationalizing the index proposed herein is mainly due to the reduction of variables needed to obtain it. Previous indexes proposed by the literature have questions that are not necessary today, e.g. whether companies adopt the international accounting standard, since publicly-held companies are required to adopt international accounting standards in their complete form since 2010 (Lourenço & Branco, 2015). Furthermore, validation tests show that the index is an effective instrument to analyze governance

quality in Brazilian companies. In this regard, this study also contributes to companies that aim to attract investors, given that the proposed index is a considerable resource for financial assessment. The creation of an effective index for assessing corporate governance quality in Brazilian companies is key, given that the influence that corporate governance has on the financial decisions of these companies is greater in legal systems providing investors with weak legal protection, such as the Brazilian (Catapan et al., 2013; La Porta et al., 1998).

2. THEORETICAL FRAMEWORK

The literature on corporate governance has predominantly been supported by agency theory (Simões & Souza, 2020), which deals with conflicts of interest between principal (owners) and agent (managers) (Fama & Jensen, 1983; Jensen & Meckling, 1976). By presenting the bases of agency theory, Jensen and Meckling (1976) argue that, to reduce divergences regarding their interests, the principal can establish adequate incentives for the agent to seek the maximization of shareholders' wealth and act in accordance with the interests of the latter.

From the perspective of agency theory, several studies have analyzed which governance mechanisms have the most impact on reducing agency conflicts (Assunção et al., 2017). Black et al. (2020), for instance, point out the mechanisms of board structure, ownership structure, shareholder rights, financial disclosure, and control of transactions with related parties as important in reducing agency conflicts, with positive impact on firm's market value.

The board of directors monitors company performance and, in Jensen's (1993) view, this is a key mechanism of a company's internal control system, which sets the rules of the game for managers. Regarding the characteristics of the board of directors. Apriliyanti and Randøy (2019), Bhat et al. (2018), and I. D. F. Brandão et al. (2019) show that attributes such as size, frequency of meetings, and independence, among others, can have a positive relationship with firm value.

Regarding ownership concentration and market performance, studies like Demsetz and Villalonga (2001) and Fahlenbrach and Stulz (2009) point out a significant and positive relationship between the two variables. In turn, the main rights for due protection of minority shareholders include the rights to participate in meetings and new subscriptions, to receive dividends on predetermined dates, to have the same rights as

controllers concerning company sale, among others (Demsetz & Villalonga, 2001). Empirical evidence, both in international studies such as those by Doidge et al. (2009), Kang and Shivdasani (1995), and La Porta et al. (1998), as in national ones, such as I. F. Brandão and Crisóstomo (2015), Caixe and Krauter (2014), and Correia et al. (2011), point out that ownership concentration and due protection of investor rights, especially minority shareholders, is a major corporate governance mechanism.

On the other hand, incentives for managers represent a mechanism for aligning interests, which will only be efficient if they allow minimizing agency problems and, as a consequence, lead to maximizing shareholder value (Carvalho-da-Silva & Leal, 2005). To do this, these incentives can take the form of ownership of company stock options or cash remuneration, commissions, and bonuses, among others (Shleifer & Vishny, 1997). Other major corporate governance mechanisms, disclosure and transparency of information, and the quality of financial information disclosed by the company (disclosure) (Garcia et al., 2018), favor the reduction of information asymmetry between internal and external investors and, for this reason, can lead to a reduction in agency conflicts (Bushman & Smith, 2003).

Supported by agency theory, national research has shown that corporate governance can have direct effects on company market performance. Silveira (2004), for instance, analyzed the relationship between corporate governance and market performance using its governance index and Tobin's Q. The results did not show a significant influence of good governance practices on company performance, since the direction of the relationship between the variables was not identical in the various econometric approaches tested. As for governance mechanisms, Silveira (2004) showed that information disclosure and transparency stood out as

more efficient to assess corporate governance quality than ownership and control structure and the structure of the board of directors. Also, the author identified, in addition to the traditional governance mechanisms, the issuance of American Depositary Receipt (ADRs), the nature of the operation, adherence to B3's DCGLs (New Market, Level 1, and Level 2), the sector of activity, and the payout index as determinants of corporate governance quality.

Carvalho-da-Silva and Leal (2005), using their index, exposed the positive effect of corporate governance on company performance, both market, measured by Tobin's Q, and financial - return on assets (ROA). However, the authors did not document statistical significance in the models estimated with governance index and Tobin's Q. In their time, Lameira and Ness (2007) verified whether better corporate governance practices, measured by means of dummy variables representing the DCGLs and company participation in ADR programs, influence market performance, measured by Tobin's Q. To do this, the authors studied a sample of 64 companies with the most liquid shares listed by B3, such as a multiple linear regression. The results expressed a positive and significant relationship between governance and Tobin's Q, i.e. the authors demonstrated that companies that adopt better corporate governance practices have greater value.

Correia et al. (2011) compared, using panel data and their governance index, the market performance of Brazilian companies traded by B3 between 1997 and 2006. The results showed a positive and significant relationship between the governance index and Tobin's Q, demonstrating that good governance has market value. Furthermore, Catapan et al. (2013) verified the effect of corporate governance on the financial and market performance of Brazilian companies traded by B3 between 2008 and 2010. To do this, the authors used the corporate governance index proposed by Carvalho-da-Silva and Leal (2005) in a sample of 111 companies from various sectors and a panel data model. The results obtained indicated a positive and statistically significant impact of the corporate governance index on company market performance.

In turn, Lima et al. (2015) analyzed the effect of listing at the different levels of B3's corporate governance on the increase in the market value of 182 companies listed on the New Market, Level 1, and Level 2. The authors obtained evidence that companies listed at the higher governance levels have better economic performance, measured in terms of average change in market value.

Like Correia et al. (2011), Santos (2018) analyzed the association of their governance index, created via PCA through a set of mechanisms capable of reducing agency problems, with the market performance of Brazilian companies. To do this, the author used a sample consisting of 116 listed companies traded by B3 between the years 2010 and 2016. The results, obtained through regression with panel data, pointed out a positive, but not significant, relationship between the governance index and Tobin's Q.

In turn, Pinheiro et al. (2019) analyzed the relationship between shareholding concentration and corporate governance and firm value. The authors used the PCA to create the corporate governance index and used regression analysis with panel data with a sample of 250 companies traded between 2012 and 2015. The results showed a negative and non-significant relationship between the corporate governance index and firm value.

Recently, Caixe and Rodrigues (2022) examined the association between corporate governance, use of financial derivatives, and firm value in the Brazilian context. Using longitudinal data from 241 companies traded by B3 over the period from 2006 to 2017, the authors used the DCGL as a measure of governance and Tobin's Q as a measure of firm value. The results, obtained through the clustered ordinary least squares (OLS) method, point out a positive and significant association between governance and Tobin's Q, i.e. this relationship suggests the presence of a governance premium for the Brazilian companies analyzed.

Based on these findings, it can be seen that the results found regarding the relationship between corporate governance and company market performance do not lead to unison conclusions. In view of this, it is considerable that more studies seek to fill this gap in the literature, given the importance of the subject.

3. METHODOLOGICAL PROCEDURES

3.1 Sample and Data Collection

This study seeks to build a corporate governance index for Brazilian companies and assess the effect of adopting better governance practices on the market performance of these companies. To do this, the target population of this study consists of companies with stocks traded by B3 between the years 2010 and 2020. To obtain the sample, some criteria were considered: (i) exclusion of companies with canceled registration; (ii) exclusion of companies from the financial sector, since the nature of companies in this sector is quite peculiar, especially with regard to the financial structure; (iii) exclusion of companies that had a negotiability index less than or equal to 0.001, given that companies with low negotiability tend to have a large number of missing data (Correia et al., 2011); (iv), finally, the last sample selection criterion was the exclusion of companies with negative equity.

After all these procedures, the study sample consisted of 118 companies. To collect the economic-financial data needed for the analyses, the Economatica® platform was used. As for the data for creating the governance index, they were obtained via documents that must be submitted to the Brazilian Securities and Exchange Commission (Comissão de Valores Mobiliários [CVM]), being public and available on the websites of the CVM and the companies themselves.

3.2 Corporate Governance Indexes

To meet the first part of the objective of this study, a corporate governance quality index (IGOV) has been built for the 118 companies in the sample. In addition, variations of the IGOV were tested, in order to offer alternatives for measuring the best corporate governance practices in Brazil, which, in this study, is addressed as independent variable in the models estimated.

The variables in the IGOV were chosen in accordance with the recommendations contained in the codes of best corporate governance practices of the Brazilian Institute of Corporate Governance (Instituto Brasileiro de Governança Corporativa [IBGC]), as well as in the

literature on agency theory, expressed by Al-Najjar and Al-Najjar (2017), Carvalhal-da-Silva and Leal (2005), Jensen and Meckling (1976), Silveira (2004), among others. The creation of the IGOV took place through the sum of the positive answers of 10 objective binary questions, in which each positive answer received one point and, in this sense, the IGOV had a value expressed between 0 and 10. The preparation of questions considered five corporate governance mechanisms: Board of Directors, Ownership and Control Structure, Disclosure and Transparency, Incentives for Managers, and Level of Disclosure.

In addition to the IGOV index, three other derived indexes were analyzed in the study. The first of them, the IGOV8, is a variation of the IGOV, obtained through the sum of the answers to the 7 questions that comprise the mechanisms Disclosure and Transparency, Incentives for Managers, and Level of Disclosure, plus the variable representing the sector of activity (+1 point for industrial companies). Thus, the IGOV8 had a value expressed between 0 and 8 and obtaining it is simpler than the IGOV, since it requires fewer variables (inputs). In turn, the second derived index, the IGOV12, is formed by the 10 questions that comprise the IGOV, added to the sector of activity (+1 point for industrial companies) and the payout value given in decimal numbers.

Such variations of the IGOV were tested since, according to Silveira (2004), sectors of more regulated activities, such as the industrial sector, can influence the corporate governance quality of these companies when they are required to adapt to better governance practices. Silveira and Barros (2008) claim that companies with better governance practices tend to have higher payout levels. Furthermore, Correia et al. (2011), Santos (2018), and Silveira (2004) showed that, in the Brazilian context, information disclosure and transparency are more efficient in assessing corporate governance quality than ownership and control structure and the structure of the board of directors. Table 1 presents the variables that comprise the governance indexes analyzed, their definitions, the governance mechanism to which they are related, and the source of data collection.

Table 1*Variables that comprise the governance indexes*

Variables	Questions	Data source
Board of Directors	(1) Does the Board of Directors have between five and nine members?	RI
Ownership and Control Structure	(2) Do controlling shareholders own less than 50% of voting shares?	RI
	(3) Does the company have more than 25% of its shares in free-float?	RI
Disclosure and Transparency	(4) Does the company publish relevant facts and announcements to the market?	RI and CVM
	(5) Does the company have dividend statements available to shareholders?	RI and CVM
Incentives for Managers	(6) Do managers have profit sharing?	RI
	(7) Does the company have a stock option plan?	RI
	(8) Does the company have stock-based compensation?	RI
Disclosure	(9) Does the company participate in the DCGLs?	B3
	(10) Is the company issuing ADRs?	JPMorgan
Sector	(11) Is the company from the industrial sector?	Economática®
Payout	(12) Payout amount	Economática®

Source: Prepared by the authors.

Finally, the listing of companies in the DCGL of B3 was also analyzed as a measure of governance, since according to Ribeiro and Souza (2022), it is the most used form when it comes to empirical studies on governance in Brazil. Therefore, the proxy DCGL received a value of 1, when the company at stake is listed in one of B3's

governance levels (New Market, Level 1, and Level 2) and 0 when it is listed in the traditional market. Table 2 displays the governance proxies used as independent variables in the models estimated herein, their methods of obtaining, and their possible values.

Table 2*Independent variables (corporate governance quality metrics)*

Variables	Estimation method	Possible values
IGOV	Sum of questions 1 to 10	Between 0 and 10
IGOV8	Sum of questions 4 to 11	Between 0 and 8
IGOV12	Sum of questions 1 to 12	Between 0 and 12
DCGL	Dummy: 0 for traditional market, 1 for DCGL	0 or 1

Source: Prepared by the authors.

3.3 Dependent and Control Variables

To meet the second part of the objective of this study, i.e. to evaluate the relationship between the adoption of the best governance practices in the market performance of Brazilian companies, Tobin's Q (QTOBIN) and Firm Value (FV) were used as performance metrics (dependent variables), obtained from the Economática® database. Tobin's Q and Firm Value are value metrics used in several studies, such as those by Coletta and Lima (2020),

Correia et al. (2011) and Silveira (2004). In addition to the dependent variables, some control variables were used, such as Company Size (*Tamanho da Empresa* [TAM]), Return on Equity (ROE), Indebtedness (*Endividamento* [END]), Current Liquidity Ratio (*Índice de Liquidez Corrente* [ILC]), and Growth (*Crescimento* [CRES]). The choice of these variables was supported by the empirical literature on the subject. Table 3 displays the independent and control variables, as well as their calculation formulas and theoretical support.

Table 3
Dependent and control variables

Variables	Formula	Theoretical support
<i>VF</i>	$\frac{\text{Firm Value}}{\text{Total Assets}}$	Beuren et al. (2020); Silveira (2004)
Dependent		
<i>QTOBIN</i>	$\frac{\text{Market Value of Shares} + \text{Debt Capital}}{\text{Total Assets}}$	Coletta and Lima (2020); Correia et al. (2011); Tobin (1958)
<i>TAM</i>	$\ln(\text{Total Assets})$	
<i>ROE</i>	$\frac{\text{Net Profit}}{\text{Equity}}$	
Control		
<i>END</i>	$\frac{\text{Current Liabilities} + \text{Non-Current Liabilities}}{\text{Total Assets}}$	Aguiar and Pimentel (2017); Beuren et al. (2020); Caixe and Krauter (2014); Correia et al. (2011); Coletta and Lima (2020)
<i>ILC</i>	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	
<i>CRES</i>	$\frac{\text{Sales}_t - \text{Sales}_{t-1}}{\text{Sales}_{t-1}}$	

Source: Prepared by the authors.

3.4 Estimated Models

To verify the relationship between corporate governance and company performance, regression models were estimated using the OLS method, panel data with fixed effects (FE), and regression models using the instrumental variables (IV) approach (using the procedure EC2SLS). The application of different econometric approaches and in increasing order of complexity has the purpose of giving consistency to the results of the relationship between corporate governance quality and market performance. The combination formed by these 3 estimation methods along with the 4 governance proxies and the 2 market performance metrics, resulted in the estimation of 24 different regressions. The general specifications of the models employed are described in Equation 1:

$$DM_{it} = \beta_{0it} + \beta_{1it}GC_{it} + \beta_{2it}VC_{it} + e_{it} \quad \mathbf{1}$$

where: DM_{it} represents the dependent variables (VF_{it} and $QTOBIN_{it}$); GC_{it} are the independent variables and represent the corporate governance proxies analyzed in the study (IGOV, IGOV8, IGOV12, and DCGL); VC_{it} represents the control variables; β_0 refers to the intercept parameter; β_1 and β_2 refer to the coefficients corresponding to each of the model's explanatory variables; and e_{it} refers to the idiosyncratic error, since it varies randomly for all companies and periods.

Initially, regressions were estimated via OLS, one of the most used statistical methods in applied social research (Krueger & Lewis-Beck, 2008). When estimating the models via OLS, coefficients are obtained that make the values estimated by the model close to the observed data, since it focuses on the measure of central tendency in these data (Krueger & Lewis-Beck, 2008).

In turn, the analysis of regressions via panel data is one of the most used methods in research on corporate governance in Brazil, like Correia et al. (2011), Silveira and Barros (2008), and Santos (2018). As highlighted by Wooldridge (2010), regressions using panel data can be estimated in three ways: (i) pooled model (stacked data); (ii) random effects model; and (iii) fixed effects model. Identification of the most appropriate model for the study data depends on performing statistical tests. Thus, Chow's tests were used to compare the pooled model and the fixed effects model, the Breusch-Pagan test to compare the random effects model and the pooled model, as well as the Hausman test to the comparison between the fixed effects model and random effects.

Such tests pointed out that estimation using FE was more appropriate for the data. In the FE model, there is heterogeneity between the groups, however, with invariant characteristics over time. Thus, in the FE model, it is assumed that each group has a different intercept, which is constant over time (Wooldridge, 2010).

Wooldridge (2010) points out, however, that one of the assumptions of panel data models is strict exogeneity, i.e. if the corporate governance index used in the study is endogenous in nature, the estimation using panel data becomes spurious. In this sense, regression models were used through the panel instrumental variables (IV) approach, which considers the corporate governance proxies as endogenous variables. To do this, we opted for the EC2SLS procedure, proposed by Baltagi and Li (1992), which generates standard errors smaller than those of the conventional two-stage generalized least squares (G2SLS) (Baltagi & Li, 1992).

Silveira et al. (2006) claim that the use of IV is a solution to all endogeneity problems, therefore the instruments must have a null correlation with the error term of

the original equation, even if they are correlated with independent variables (Larcker & Rusticus, 2010). Thus, as instrumental variables, the lags ($t-1$) of control variables were used, a procedure employed by Edwards, Soares and Lima (2013), Larcker and Rusticus (2010), and O'Connor and Rafferty (2012), for instance.

After highlighting the models, tests were carried out in order to verify whether their assumptions were met; such as tests for normality of residuals, multicollinearity, homoscedasticity, and autocorrelation. The Jarque-Bera test, used to test normality of residuals, rejected the null hypothesis of normal distribution in all models. However, Wooldridge (2010) points out that if sample size is large enough, by the central limit theorem, statistical inference is not invalidated.

In turn, the Breusch-Pagan and Breusch-Godfrey tests indicated issues with homoscedasticity and autocorrelation, respectively. Therefore, it was decided to estimate the FE regressions with Robust Standard Errors (Heteroskedasticity Autocorrelated Consistent – HAC). Such a procedure, proposed by Newey and West (1987), is a single solution for both problems. The MQO

and IV regressions were also estimated robustly (*vce (robust)*). Finally, values lower than 10 were obtained in the variance inflation factor (VIF), thus indicating, according to the literature, that there were no collinearity issues (Wooldridge, 2010).

The estimation of models in order to evaluate the relationship between the proxies governance and performance is a way of externally validating the IGOV proposed herein, since it verifies the index's power to indicate the possible governance quality premium in the Brazilian capital market (Correia et al., 2011). In addition to this, another external validation was carried out, comparing the IGOV index with the QTOBIN and the FV through mean value tests. The sample was structured into three groups due to IGOV growth, then the results of the t and F tests were analyzed, which aim to analyze whether there is a difference between the mean values and variances (respectively) in two groups of mean values, as well as an analysis of variance (ANOVA) took place, which compares the mean values of three or more groups (Wooldridge, 2010). The regressions and tests performed in this study were estimated using the software *Stata*.

4. ANALYSIS AND DISCUSSION OF RESULTS

In this section, the results concerning the corporate governance proxies are presented, as well as the results of the regressions estimated and the discussion about these results. Table 4 displays descriptive statistics for the governance indexes as well as the proxy DCGL. The IGOV index had an average of 6.11 and a median of 6, i.e. 50% of the companies analyzed had a corporate governance quality above 6 points (60.00%). Likewise, the IGOV12 index had an average of 6.51 and a median of 6.44.

On the other hand, the IGOV8 index showed an average of 4.40 and a median of 4.00, i.e. in this case, as the index varies from 0 to 8.50% of the companies showed good governance quality while the remaining 50% showed below average governance. Finally, by the coefficient of variation, it is observed that the data regarding governance quality showed medium dispersion, except for the proxy DCGL, which showed more heterogeneous data, considering that it is a dummy variable.

Table 4
Descriptive statistics of governance proxies

Variables	Average	Median	Standard deviation	C. V.
IGOV	6.1128	6.0000	1.6048	26.25%
IGOV8	4.4013	4.0000	1.2028	27.33%
IGOV12	6.5170	6.4479	1.7244	26.46%
DCGL	0.90879	1	0.28815	31.71%

Source: Prepared by the authors.

Before estimating the regressions, an additional external validation of the main index of this study (IGOV) was carried out, comparing it, via mean tests, with QTOBIN and FV. IGOV observations were divided

into three groups, so that the first group consisted of IGOV between 0 and 4 ('Low' governance quality), the second group consisted of IGOV between 5 and 7 ('Medium' governance quality), and finally the third group comprised

IGOV from 8 to 10 ('High' governance quality). It was then verified whether the mean values of QTOBIN and FV are statistically different between the three IGOV groups. The results of the mean comparison tests (*t* test, *F* test, and ANOVA) are shown in Table 5.

By the *t* test, which compares the mean of two groups of samples, the null hypothesis was rejected when comparing the groups 'Low' × 'Medium' and 'Low' × 'High' quality of governance in the averages of QTOBIN, as well as when comparing the groups 'Medium' × 'High' and 'Low' × 'High' quality of governance in the averages of FV. By the *F* test, structured to gauge the variation in the average between two groups, the null hypothesis was

rejected in the comparison between the groups 'Low' × 'High' quality of governance in the averages of QTOBIN and in the comparison between the groups 'Average' × 'High' and 'Low' × 'High' quality of governance in FV averages.

Finally, by analysis of variance (ANOVA), which determines whether there is a significant difference in the mean between three or more groups, the null hypothesis was rejected both for the QTOBIN means and for the FV means. These rejections of the null hypotheses showed that the means of the groups differ significantly, showing that well-governed companies tend to present a better market performance.

Table 5

Average test results

Average tests	QTOBIN				FV			
	<i>t</i>	<i>P value</i>	<i>F</i>	<i>P value</i>	<i>t</i>	<i>P value</i>	<i>F</i>	<i>P value</i>
'Low' × 'Medium'	-2.071	0.0405**	1.1603	0.1800	-1.5834	0.1139	1.0278	0.4219
'Medium' × 'High'	-1.095	0.2748	1.1248	0.2160	-2.3177	0.0208**	1.2470	0.0692*
'Low' × 'High'	-2.582	0.0100***	1.3051	0.0875*	-3.1746	0.0017**	1.2816	0.0931*
ANOVA	F = 3.6278		<i>P value</i> = 0.0272**		F = 4.9663		<i>P value</i> = 0.0073***	

Note: Asterisks indicate significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Prepared by the authors.

In order to verify the effect of corporate governance quality on the market performance of companies, as well as to externally validate the IGOV and its variants (IGOV8 and IGOV12), regression models were estimated via MQO, FE, and IV, containing the QTOBIN and FV as dependent variables and IGOV, IGOV8, IGOV12, and DCGL as corporate governance proxies. By analyzing the overall significance of models (*F* test for the MQO and FE models and Wald Chi-Squared test for the IV models), the null hypotheses were strongly rejected (p value = 0). Thus, it can be stated that, jointly, the independent variables are significant as explanatory variables for the models estimated. Table 6 displays the results of estimates that have the IGOV as an explanatory variable.

Regarding the coefficient of determination in the models, in the regressions estimated by OLS, the variables analyzed are able to explain about 18.95% of the total variation in QTOBIN and 15.24% of the total variation in

FV. According to the FE model, the variables considered are able to explain about 18.73% of the total variation in QTOBIN and 6.43% of the total variation in FV. Finally, through IV estimations, the variables existing in the models explain about 18.09% of variation in QTOBIN and 5.75% of the total variation in FV. This result indicates that there are other characteristics influencing the market performance of companies, such as the macroeconomic scenario, for instance.

The regressions estimated point out a positive and significant relationship between the IGOV and the QTOBIN and between the IGOV and the FV in all models. This association suggests that the better the corporate governance quality, the greater the market performance of the companies analyzed. This result is consistent with those documented in the literature, like Caixe and Rodrigues (2022) and Correia et al. (2011), for instance.

Table 6
Relationship between IGOV and market performance

IGOV	QTOBIN			FV		
	MQO	FE	IV	MQO	FE	IV
Constant	580.24***	1322.46*	667.26***	336.15***	765.98	747.05**
IGOV	21.21***	22.96*	21.36**	21.49***	19.81*	20.29**
TAM	-1.55*	-49.00	-8.97	1.34	-12.86	2.24
ROE	3.52***	2.81***	2.96***	3.17***	2.25***	2.50***
END	-2.81***	-5.22***	-4.19***	4.00***	0.25	1.85**
ILC	24.07**	15.73	17.51	2.35	-4.47	-4.53
CRES	-0.04	0.12***	0.07**	-0.06	0.17***	0.11***
R ²	0.1895	0.1873	0.1809	0.1524	0.0643	0.0575

Notes: (i) Asterisks indicate significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) The F test and Wald's χ^2 tests of all models showed p value = 0; (iii) R² refers to Adjusted R² for models estimated via OLS and R² within for models estimated via FE and IV.

Source: Prepared by the authors.

As for estimates containing the IGOV8 index as a governance quality metric, Table 7 shows the results, in which it is observed that, unlike the IGOV index, the results of the IGOV8 index showed a positive and significant relationship at 1% between corporate governance quality and market performance of the companies analyzed, regardless of whether measured via QTOBIN or FV. In this sense, the result of estimations with IGOV8 were more robust and strengthen the findings provided by Caixe and Rodrigues (2022), Correia et al. (2011), and Pinheiro et al. (2019), showing that the better the company is governed, the greater its market performance.

By the coefficient of determination in the models, it

is observed that in the regressions estimated by OLS, the independent variables explain about 20.63% of the total variation in QTOBIN and 16.61% of the total variation in FV. According to the FE model, the variables analyzed are able to explain about 19.60% of the total variation in QTOBIN and 7.58% of the total variation in FV. Finally, through IV estimations, the variables can explain about 19.1% of the total variation in QTOBIN and 6.89% of the total variation in FV. This result is superior to that observed in the models with the IGOV as governance metric and indicates that, when the IGOV8 is used along with the control variables, the explanatory power of the models exceeds those estimated with other governance metrics.

Table 7
Relationship between IGOV8 and market performance

IGOV8	QTOBIN			FV		
	MQO	FE	IV	MQO	FE	IV
Constant	584.43***	1266.65*	687.52***	346.66***	716.99	485.77**
IGOV8	39.25***	40.83***	39.25***	37.90***	39.67***	38.85***
TAM	-13.77**	-47.74	-12.85	-1.80	-12.86	-1.34
ROE	3.39***	2.69***	2.86***	3.04***	2.12***	2.39***
END	-2.83***	-5.33***	-4.24***	3.99***	0.13	1.78**
ILC	27.42**	16.55	19.00	5.62	-3.7	-3.11
CRES	-0.02	0.12***	0.08**	-0.04	0.17***	0.12***
R ²	0.2063	0.1960	0.1901	0.1661	0.0758	0.0689

Notes: (i) Asterisks indicate significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) The F and Wald χ^2 tests of all models showed p value = 0; (iii) R² refers to Adjusted R² for models estimated via OLS and R² within for models estimated via FE and IV.

Source: Prepared by the authors.

Below, Table 8 reports the results of estimates with the IGOV12 index as an explanatory variable. As for the IGOV and IGOV8, the results of the IGOV12 index showed a positive relationship between corporate governance and market performance, however, this relationship was significant only in the models estimated via MQO. Thus, it can be pointed out that the results of the estimations with IGOV12 were less robust than the estimations with IGOV and IGOV8. Despite this, direct relationship between market performance and

corporate governance is notorious, a result similar to the findings provided by Lameira and Ness (2007) and Santos (2018).

Regarding the coefficient of determination in the models, the results for the models estimated with the IGOV12 as a governance proxy are lower than those observed in the models with the IGOV and IGOV8 as governance metrics and indicate that the IGOV12 explains less about the variations of company market performance than predecessor indexes.

Table 8
Relationship between IGOV12 and market performance

IGOV12	QTOBIN			FV		
	MQO	FE	IV	MQO	FE	IV
Constant	564.84***	1301.84*	714.68***	338.25***	752.45	514.88**
IGOV12	17.35***	10.58	11.53	15.55***	10.76	11.21
TAM	-8.55	-46.4	-8.53	3.04	-8.90	2.88
ROE	3.47***	2.86***	2.98***	3.12***	2.28***	2.51***
END	-2.82***	-5.20***	-4.15***	4.00***	0.26	1.87**
ILC	24.35**	15.71	17.57	2.70	-4.53	-4.45
CRES	-0.04	0.12***	0.08**	-0.06	0.16***	0.11***
R ²	0.1851	0.1830	0.1772	0.1448	0.0616	0.0551

Notes: (i) Asterisks indicate significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) The *F* and Wald χ^2 test of all models showed p value = 0; (iii) R^2 refers to Adjusted R^2 for models estimated via OLS and R^2 within for models estimated via FE and IV.

Source: Prepared by the authors.

Finally, the relationship between corporate governance and market performance was tested using B3's Differentiated Levels of Governance as a proxy for governance quality. Through the results shown in Table 9, it is possible to observe that this relationship, unlike the indexes created in this study, was not homogeneous between the estimated regression models. The relationship between DCGL and QTOBIN, for instance, was significant at 1% when estimated via OLS. In the other regressions, no statistical significance was observed. In the models estimated via OLS and VI, a negative association was documented between governance and market performance, a result contrary to that observed in the FE models. This result, contrary to the findings provided by Caixe and Rodrigues (2022) and Catapan et al. (2013), corroborates Pinheiro et al. (2019), who also documented a negative and non-significant relationship between corporate governance and firm value.

Moreover, by the determination coefficients in the

models, it is observed that the proxy DCGL, along with control variables, has less explanatory power of the variations in companies' market performance than the indexes created in this study. In the regressions estimated via OLS, for instance, the variables analyzed are able to explain about 17.87% of the total variation in QTOBIN and 13.55% of the total variation in EV. According to the FE model, the variables considered explain about 18.02% of the total variation in QTOBIN and 5.98% of the total variation in FV. Finally, through IV estimations, the independent variables can explain about 17.39% of the variation in QTOBIN and 5.12% of the total variation in FV.

In this sense, the results do not point out the use of a dummy variable created through the DCGL as a good governance proxy for Brazilian companies, since its relationship with performance changes from one econometric model to another. Despite this, this is the metric most used by Brazilian national empirical research on the subject (Ribeiro & Souza, 2022).

Table 9
Relationship between DCGL and market performance

DCGL	QTOBIN			FV		
	MQO	FE	IV	MQO	FE	IV
Constant	815.73***	1243.39*	894.54***	524.63***	670.50	640.10***
DCGL	-78.15***	53.81	-42.33	-39.76	93.98	-3.69
TAM	-13.65**	-38.59	-13.23	-0.61	-4.66	-0.42
ROE	3.37***	2.91***	3.02***	3.07***	2.32***	2.56***
END	-2.52***	-5.21***	-3.95***	4.20***	0.19	1.98**
ILC	25.44**	16.09	18.01	3.52	-4.07	-4.15
CRES	-0.03	0.11***	0.08**	-0.06	0.14***	0.11***
R ²	0.1787	0.1802	0.1739	0.1355	0.0598	0.512

Notes: (i) Asterisks indicate significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) The F and Wald Chi² test of all models showed p -value = 0; (iii) R² refers to Adjusted R² for models estimated via OLS and R² within for models estimated via FE and IV.
Source: Prepared by the authors.

In short, Table 10 shows a summary of the results obtained in this research, regardless of the relationship between corporate governance and market performance. Out of the 6 models estimated, the IGOV showed a positive relationship with market performance in all of them. This relationship occurred at 1% of significance in 2 models, 5% in 2, and 10% in 2. When governance was gauged via IGOV8, all 6 models estimated show a positive relationship with performance at 1% of significance. This finding strengthens the results provided by Caixe and Rodrigues (2022) and Correia et al. (2011) and agrees with Pinheiro et al. (2019). In turn, all models estimated with the IGOV12 also exhibited a positive relationship with performance, at 1% of significance in 2 models, and non-significant in 4. Finally, when the variable DCGL

was used as a governance proxy, the relationship with performance was positive in 2 out of the 6 models tested and negative in the others. These relationships showed 1% of significance in only 1 model, and the others were non-significant.

In this sense, the IGOV8, obtained through the sum of the eight questions that comprised the mechanisms Disclosure and Transparency, Incentives for Managers, Level of Disclosure, and the Sector, stood out due to the 1% of significance observed in all models estimated. This evidence suggests, therefore, that these mechanisms may be the most important to define corporate governance quality in Brazil. Furthermore, the IGOV8 index may be the most appropriate proxy to capture corporate governance quality in Brazilian companies.

Table 10
Summary of results found in estimated regressions

Governance metrics	QTOBIN			FV		
	MQO	FE	IV	MQO	FE	IV
IGOV	+	1%	+	10%	+	5%
IGOV8	+	1%	+	1%	+	1%
IGOV12	+	1%	+	n.s.	+	n.s.
DCGL	-	1%	+	n.s.	-	n.s.

Note: Non-significant (n.s.) coefficient.

Source: Prepared by the authors.

As for the control variables, their relationship with performance variables was not unanimous among the estimated models. TAM, for instance, when compared with QTOBIN, showed a negative relationship with market performance in all estimated models, however, this relationship was significant only in the MQO model, estimated with IGOV, IGOV8, and DCGL as governance

metrics. When the FV variable was used as a market performance metric, no statistical significance was documented. Although the predominance of statistical significance in the negative association between size and market performance estimated via MQO corroborates the findings provided by Caixe and Rodrigues (2022), Catapan et al. (2013), and Santos (2018), the discrepant

results observed in the other estimates suggest that it is not possible to state, based on the findings, that company size influences its market value.

ROE, on the other hand, showed a positive and significant relationship at the 1% level with market performance in all estimated models. This result, contrary to that observed by Correia et al. (2011) and in line with the findings provided by Caixe and Krauter (2014) was expected and suggests that companies with higher return on equity tend to show better market performance, i.e. company efficiency level in applying resources to generate value and profit is a factor considered important by investors.

Regarding the END, it showed a negative and significant relationship with the QTOBIN in all models analyzed. On the other hand, when it comes to the FV, the relationship with the END was positive, with significance observed in the MQO and IV models. This result suggests that more indebted companies tend to have lower QTOBIN and higher EV, which strengthens the results of Correia et al. (2011) and Silveira (2004). Correia et al. (2011) observed a negative and significant association between QTOBIN and END. On the other hand, Silveira (2004) documented a positive relationship

between debt and EV, a result that may be linked to the tax benefit arising from the deductibility of debt interest in the form of financial expenses, which, from the market perspective, could increase company value (Caixe & Krauter, 2013).

In turn, the ILC showed a positive relationship with the QTOBIN in all models analyzed. However, statistical significance was observed only in the OLS model. The regressions estimated with the FV as dependent variable showed a positive relationship between ILC and market performance in the MQO model and a negative relationship in the FE and IV models, but not significant in all cases. The result suggests that companies with better liquidity ratios tend to have better market performance when measured by QTOBIN, i.e. a company's ability to settle its short-term debts is a major factor for the market.

As for CRES, the relationship with market performance was predominantly positive, exception for models estimated via MQO, which showed a negative and non-significant association between growth and performance. Silveira (2004) observed a negative and non-significant relationship between CRES and QTOBIN, evidence identical to that observed in the MQO models, contrary, however, to the other estimates.

5. FINAL REMARKS

This study aimed at building a corporate governance index for Brazilian companies with stocks traded by B3 to assess the effect of the best governance practices on their market performance, between the years 2010 and 2020. The index was supported by previous studies that indicate the most efficient mechanisms in reducing agency problems. As an external validation, we chose to compare them with the variables Firm Value and Tobin's Q in various econometric models and in tests of differences in means and variances (*t* test, *F* test, and ANOVA).

In addition to the main index (IGOV), formed by the sum of the ten responses associated with the mechanisms Board of Directors, Ownership, and Control Structure, Disclosure and Transparency, Incentives for Managers, and Disclosure Level, two other variations were tested. The IGOV8, obtained through the sum of the eight questions that comprised the mechanisms Disclosure and Transparency, Incentives for Managers, Level of Disclosure, and Sector; and the IGOV12, formed by the 10 IGOV questions, added to the sector of activity and the payout value, given in decimal numbers. The three indexes were compared to the proxy DCGL, a dummy variable representing companies listed on B3's corporate

governance segments, one of the most used metrics in empirical governance studies.

The proxy DCGL did not show to be an efficient metric to assess governance quality, given the discrepant results of models, both with regard to the direction of the relationship with performance and the significance observed. The IGOV, IGOV8, and IGOV12 indexes, on the other hand, proved to be good governance measures, given the unanimous results between the estimated regression models. In all models, the relationship between corporate governance and performance was positive, attesting the market confidence strongly associated with the corporate governance quality expressed by the indexes.

The IGOV8 stood out for its 1% significance observed in whatever the estimated models are, as well as for the determination coefficients superior to those observed in the estimated regressions with the other indexes, thus evidencing the mechanisms Disclosure and Transparency, Incentives for Managers, Level of Disclosure, and the sector of activity, as the most important to governance quality. This result suggests that the IGOV8 index may be the most adequate proxy to capture corporate governance quality in Brazilian companies and attests that good governance is

valued by the market, i.e. the governance quality measured by the IGOV8 index is an aspect weighted by the investors when choosing their assets. Thus, it can be concluded that investors see that well-governed companies are less risky, therefore they have greater chances of recouping their investments.

As for the relationships between control variables and market performance, various results were documented depending on the model estimated. However, most of these results corroborate previous findings in the literature.

It is worth emphasizing that the indicators formulated are based on binary responses of adherence or non-adherence to governance mechanisms. Due to this fact, the averages obtained from a binary score that considers the presence or absence of an attribute may not be the most appropriate approach for determining a metric. Despite this limitation, this study provides significant contributions.

The corporate governance index proposed herein is one of the simplest to obtain when compared to other indexes documented in the Brazilian literature on the subject, since it depends on fewer qualitative variables and

its value is calculated by the simple sum of the objective questions formulated, not demanding, therefore, more complex statistical metrics. The IGOV8 index, which has only eight qualitative variables in its construction, proved to be the most efficient, thus companies that aim at attracting investors can invest in improving the mechanisms associated with these issues. This result, which is in line with most of the previous findings on the subject, corroborates the agency theory assumptions by demonstrating that the corporate governance mechanisms employed in the building of the indexes are efficient in reducing agency problems, with a positive impact on company market value. In this sense, the IGOV and especially the IGOV8 have shown to be a major instrument for financial assessment.

Finally, it is worth noticing that this study was dedicated to analyzing the impact of corporate governance quality on the variables that represent company market value and, hence, it is suggested that further studies analyze, through the governance indexes proposed herein, the influence of corporate governance quality on other major aspects of companies, such as financial performance and capital structure, for instance.

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