

## **Shareholder Activism Impact on Efficiency in Brazil**

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### **Structured Abstract**

**Purpose:** To investigate the long-term impact of shareholder activism on Brazilian listed companies.

**Method:** Uses a sample of 194 companies in 2010, 2012 and 2014 and employs a two-stage data envelopment analysis model to generate an efficiency ranking based on corporate governance, ownership structure, and financial characteristics of companies. In the second stage, applies a bootstrap truncated regression to identify whether there is a relationship between the efficiency scores of the companies and a company-level activism index.

**Findings:** The empirical results show a negative correlation between the efficiency scores and the activism index, suggesting that activist shareholders tend to target less efficient companies. A time analysis of efficiency according to the intensity of activism in previous years reveals an increase in efficiency for the groups of companies in which activist events were detected. There was no efficiency increase for the companies that did not present activist events.

**Practical implications:** Shareholder activism contributed to improve the long-term performance of Brazilian companies.

**Originality/value:** The two-stage nature of the procedure employed in the analysis ascertains that this result is not spurious, assuring data separability between productive resources and contextual variables. This study contributes to the scarce literature on activism in emerging markets.

**Keywords:** shareholder activism, corporate governance, efficiency, data envelopment analysis.

### **Introduction**

Shareholders have many ways to manifest their dissatisfaction. In most cases they will simply sell their shares and walk away. Some may prefer to engage

management, perhaps because selling their stake is not so easy or there is a potential gain from this engagement (Gillan and Starks, 2000). This engagement is labeled activism. Activist shareholders can: request representation on the board of directors (BOD); reject proposals presented for voting during general meetings; directly negotiate with management; use the media to inform other shareholders about the current situation of the company and needed improvements, among other actions (Gillan and Starks, 2007). Activism is becoming an important corporate governance (CG) mechanism and enables shareholders to bring about change, improve performance and create value without a change in control (Gillan and Starks, 2000, 2007; Renneboog and Szilagyi, 2011).

Research about shareholder activism may be more prolific for the United States and Europe but Latin American evidence is scarce, especially in its largest economy, Brazil (Crisóstomo and González, 2006). High ownership concentration may contribute to the rare cases of shareholder activism in Brazil, and possibly Latin America (Judge *et al.*, 2010; Punsuvo *et al.*, 2007; Shleifer and Vishny, 1997). Brazilian ownership concentration, however, has moderately decreased with the emergence of hybrid ownership structures, in which a few large shareholders associate by means of an agreement to exert control since the privatization process in the 1990's, and the creation of special stock exchange listing segments that require that companies list only voting stock. It has also been possible to observe an increase in active participation of institutional shareholders in the Brazilian domestic market (Crisóstomo and González, 2006).

The goal of this study, then, is to assess the long-term impact of shareholder activism among Brazilian companies. A data envelopment analysis (DEA) model generated an efficiency ranking for a sample of 194 public Brazilian companies for the years 2010, 2012 and 2014. This efficiency ranking was based on the CG structure of the companies and some of its financial indicators. In a second stage, a bootstrap truncated regression of an activism score, also estimated herein, on the efficiency rankings assesses whether activist shareholders tend to target less efficient companies. Finally, a non-parametric test checks for increases in the efficiency of targeted companies two and four years after the activist event, contributing to the literature about the impacts of shareholder activism. The two-stage DEA procedure was selected due to the well-known endogeneity problems that are common in CG causality studies (Silveira *et al.*, 2010). Controlling for endogeneity in CG means choosing an

input/output set that is completely separable from the contextual variable set (Bădin, Daraio and Simar, 2012; Daraio, Simar and Wilson, 2010; Kourtesi, Fousekis and Polymeros, 2012), in the sense that the latter could be thought as completely exogenous, that is, they affect efficiency scores while not being affected by them in a reverse causation process.

Research on the long-term impact of shareholder activism is not undisputed. Fox and Lorsch (2012) and Cremers *et al.* (2015) claim that activist shareholders seek short-term profitability and end up eroding long-term company value. On the other hand, Bebchuk *et al.* (2015), for example, found no evidence for long-term underperformance and Nesbitt (1994) suggested that there is an improvement in the long-term performance of targeted companies. Crisóstomo and González (2006) indicated minor improvements in the performance of targeted companies whereas Punsuvo *et al.* (2007) and Oliveira *et al.* (2012) do not confirm positive effects of institutional shareholding, but not necessarily activism, in Brazil. The scarcity of Brazilian and emerging market research on activism and these controversial findings, as well as the recent institutional changes in Brazil, motivated this investigation, which is also justified by the growing importance of many of these markets.

The descriptive findings confirm that the average percentage of shares owned by the largest shareholder is decreasing over time, suggesting that overall concentration of ownership is decreasing, while the average number of independent board members increased. Additionally, the average activism index score is increasing over time. These findings indicate that companies improved their CG practices at the same time that the number activist events increased in Brazil. The size of the company and the proportion of non-voting shares are positively associated to the number of activist events.

The main results reveal a negative correlation between efficiency scores and activism and that companies that were targets of activism displayed an increase in efficiency in the two or four years after the event. Activist shareholders tend to target less efficient companies and their action may lead to greater efficiency even in the high ownership concentration structure of Brazil. This study offers a rare glimpse into activism in a large emerging market.

## **Literature Review**

## *Recent Brazilian corporate governance developments*

CG practices in Brazil has been driven by initiatives that marked the quality of CG in Brazil, such as: (1) the first edition of the Brazilian CG code in 1999, now in its fifth edition; (2) the creation of BM&FBovespa's special listing segments that require sounder CG standards from the companies that voluntarily join them; (3) the enactment of the new corporation law in 2001 that brought about new rules to improve minority shareholders rights; (4) a new regulation for pension funds that tied investment limits to CG practices of the investees; (5) the introduction of regulation by the Securities Commission with more thorough transparency requirements and facilitating shareholder participation (Silveira and Saito, 2009; Leal *et al.*, 2015). Black, Carvalho and Sampaio (2014) highlight that minority shareholder rights improved as a consequence of many companies listing in the special listing segments, such as: (1) a larger percentage of them assuring that minority common shareholders will receive the economic value of their shares in the case of acquisitions or tender offers; (2) more companies granting minority shareholders greater mandatory bid rights than the legal requirement; and (3) arbitration of shareholder disputes for a faster conflict resolution.

Leal *et al.* (2015) show that their Brazilian CG practices score increased from 2004 to 2013. They computed a corporate governance index (CGI) based on public data of Brazilian companies listed on the Securities, Merchandise, and Futures Exchange (BM&FBovespa). They also suggest a positive relationship between the quality of CG practices and company size.

There was a decrease in the use of non-voting shares in Brazil between 2004 and 2013 (Leal *et al.*, 2015). Sternberg *et al.* (2011) advocate that this reduction has happened mainly due to a *Novo Mercado* listing requirement of issuing only voting shares. *Novo Mercado* is the most demanding of the special listing segments in BM&FBovespa. Companies first listing in *Novo Mercado* and those migrating from other listing segments structured their equity capital in order to have only voting shares. Even though an improvement took place, there is still a considerable concentration of voting rights with the largest shareholders, which is lower in the *Novo Mercado* segment, and the wedge between voting and cash flow rights remains high among companies listed in the other segments of the exchange (Leal *et al.*, 2015; Sternberg *et al.*, 2011).

## *Shareholder activism*

Activism may be financially or socially motivated. Financially motivated activism targets poorly performing companies and pressures management to restructure CG mechanisms such as executive pay and the BOD composition (Goranova and Ryan, 2014). Socially motivated shareholders often include non-governmental organizations is generally concerned with social issues, such as environmental impact and employee welfare. There are conflicting views that suggest that social and financial activism may collide (Gillan and Starks, 2007) or converge (Cespa and Cestone, 2007). CalPERS, maybe the most famous activist institutional shareholder, is both financially and socially driven (Judge *et al.*, 2010). The number of shareholder proposals derived from social activism that have been implemented is still small (Thomas and Cotter, 2007).

The origin of a national legal system may facilitate financially-driven activists as well as the enactment of legal changes and technological advances, such as those facilitating communication between shareholders and participation in shareholder's assemblies (Judge *et al.*, 2010; Goranova and Ryan, 2014). Poor financial perform is naturally a motivation to target a company. Financially driven shareholders will also likely target smaller companies because the cost to engage them is lower and they are not too resourceful to resist (Judge *et al.*, 2010). Goranova and Ryan (2014), contrastingly, allege that there is evidence that activists target larger companies because their shareholders have more difficulties to monitor management and hence they are more exposed to agency conflicts.

Companies displaying greater ownership concentration may be a less likely target of activism because there will be closer owner monitoring (Judge *et al.*, 2010). Goranova and Ryan (2014) believe that large executive ownership decreases the likelihood of shareholder activism because managers suffer the consequences of their actions but potential failures in the incentive mechanisms may increase the odds of activism.

Fox and Lorsch (2012) claim that activist shareholders seek profitability in the short-term and end up eroding long-term value and labeled them myopic-activists. Bebcuk *et al.* (2015) found no evidence supporting such claim in their analysis of the operational and stock performance in the five-year period following the announcement of an activist intervention. Nesbitt (1994) and Opler and Sokobin (1995) report

analogous findings but Cremers *et al.* (2015) found that the value of the target firm deteriorates in comparison to non-target firms with a similar previous performance in the year following a hedge fund activist effort. There may be private benefits generated by powerful activists at the expense of other shareholders, which are often the result of self-dealing transactions and insider trading (Goranova and Ryan, 2014). Thus, the long-term impact of activism is still subject to debate.

Company improvements resulting from activism are usually measured by means of financial indicators, such as Tobin's Q, return on equity (ROE), stock price, operating and net income. Nonfinancial indicators are also used, such as changes in the composition of the BOD, improvements in executive compensation, CEO turnover, reduction in managerial entrenchment, and elimination of antitakeover measures (Goranova and Ryan, 2014).

A few Brazilian studies analyzed the presence of institutional investors among shareholders. Crisóstomo and González (2006) document an increase in institutional investor ownership of voting shares in Brazil during the 1995-2002 period. They also point out that the majority of their performance indicators had a larger average in 2002 for the companies that had a pension fund among the top five shareholders. Punsuvo *et al.* (2007) investigated whether pension fund ownership influences CG quality of Brazilian companies. They reveal a negative relationship between these variables, indicating that a greater share ownership may lead to a lower CG quality. Oliveira *et al.* (2012) performed an analogous investigation for the three largest pension funds in Brazil with no significant correlation with CG scores. This evidence may be the result of high ownership concentrations in Brazil. The potential recent increase in activist events, the scarce evidence of activism effects and the possible negative effects of pension fund ownership motivates this study about shareholder activism and its outcomes in Brazil.

#### *DEA, endogeneity and CG*

Empirical research in finance commonly seeks for causality. A study, for instance, may try to understand the effects of CG measures on the share price of the company. However, it is often not clear if the variable related to CG affects the financial performance indicators or if the financial performance indicators affect CG variables, or if both are actually affected by an omitted variable. This problem is labeled as

endogeneity and may be caused by omitted variables; covariate measurement errors and/or simultaneity (reverse causality) (Roberts and Whited, 2013; Silveira *et al.*, 2010). Roberts and Whited (2013) discuss several methods to address this problem. This study takes a different approach and applies a two-stage DEA model. This model uses a variable in the second stage that consists of a contextual characteristic that may affect the result of the efficiency scores obtained in the first stage of the DEA, while not simultaneously being affected by them in a reverse causation. Hence, it is possible to suggest that the methodology applied herein mitigates the endogeneity problem due to its two-stage nature.

Bogetoft and Otto (2011) state that efficiency consists of incurring the smallest possible costs to provide different output levels, or producing more outputs with the same level of costs and, ultimately, the combination of both of them, producing the maximum possible output incurring the smallest costs. Several studies point out the existence of a relationship between efficiency and value creation, as the seminal work of Jensen and Meckling (1976), that related efficiency to value creation for shareholders in their article about the theory of the firm. Alam and Sickles (1998) found an association between stock market return and efficiency, suggesting that efficiency is directly related to value creation for shareholders.

Studies that apply DEA in the financial sector include the evaluation of the banking sector efficiency (Avkiran, 2011) and investment fund returns (Morey and Morey, 1999). Applications in the Brazilian financial sector include, for example: the selection of stock market investment portfolios (Lopes *et al.*, 2008); the relation between corporate efficiency and CG practices (Sonza and Kloeckner, 2014); efficiency in insurance companies (Wanke and Barros, 2016); and financial distress in banks (Wanke *et al.*, 2015).

One of DEA main advantages is to allow the creation of an efficiency ranking based on multiple inputs and outputs without *a priori* considering the relative importance of a specific input or output parameter (Morey and Morey, 1999). Additionally, when using DEA, input and output parameters can be multidimensional, allowing the use of many indicators, such as revenues, Tobin's Q, return on assets (ROA), and so on, as long as the parameters are represented by ordinal numbers (Lopes *et al.*, 2008; Charnes *et al.*, 1978). DEA is considered a flexible non-parametric technique that does not make any *a priori* assumption about the production function (Avkiran and Rowlands, 2008). Therefore, the model offers more freedom for a

researcher to consider a varied set of existent data, including both accounting and financial information of companies.

Destefanis and Sena (2007) applied DEA to study patterns of CG in the Italian manufacturing industry and concluded that the percentage of shares owned by the largest shareholder and belonging to a pyramidal group have a positive impact on technical efficiency. Zheka (2005) researched the effects of different ownership structures and of the quality of CG on Farrell measure of efficiency applying DEA in a set of Ukrainian public companies. He concluded that domestic ownership enhances efficiency whereas managerial ownership is detrimental. Lehman *et al.* (2004) showed that efficiency scores were significantly related to company profitability. Sonza and Kloeckner (2014) investigate the influence of several CG aspects on the efficiency of Brazilian listed companies.

These studies applied a two-stage DEA to analyze CG issues, in the same way that it will be done herein. The reason for using a two-stage DEA is to analyze the relationship between the activism of shareholders and the efficiency of Brazilian listed companies. As in Lehmann *et al.* (2004), CG measures are inputs of the model and represent prevailing conditions of Brazilian listed companies. Moreover, as in Sonza and Kloeckner (2014), Tobin's Q is used as an output of the model.

## **Methodology**

### *Hypotheses*

The literature review resulted in two research hypotheses. In a first stage, this investigation verifies whether activist shareholders tend to target companies presenting poor results, addressing one of the possible motivations for activism (Gillan and Starks, 2007; Judge *et al.*, 2010). Later on, this investigation tries to evince if shareholder activism improved the performance of companies, possibly corroborating Bebchuk *et al.* (2015) who state that activist interventions improve operating performance. Therefore, the hypotheses are: (H1) Shareholder activism targets less efficient companies more frequently; (H2) Shareholder activism improves the performance of companies.

This study applies a sequence of three methods in order to test these hypotheses. First, the DEA model is employed to generate a company efficiency ranking. Next, a



truncated-regression method is used to evaluate the immediate relationship between activism and company efficiency, hence testing H1. Finally, a non-parametric test is applied to analyze the impact of activism on the future efficiency of companies, thus testing H2.

### *Data and sample*

Data was collected from the Economática, Comdinheiro and Bloomberg databases. The sample comprises public Brazilian companies listed on the local stock market from 1 January 2010 onwards and that have publicly available information to compute the inputs, outputs and contextual variables. There were 339 public Brazilian companies listed on BM&FBovespa on 1 January 2010. This study uses the activism index computed in Vargas *et al.* (2017) for 195 companies in 2010 and 2012 and updated it for 2014. One company was removed from the sample because it no longer exists. Therefore, the final sample contains 194 companies present in each of the three years. The average value of a variable was used when it was missing for a company, instead of discarding the observation from the sample. This affected an average, for the set of variables, of 2% of the observations in 2010, 4% in 2012 and 7% in 2014. The sample represented 89.5% of the total market capitalization of US\$ 1214 billion on the first trading day of 2010.

Original input and output variables, such as the ROA and EBITDA, may contain negative numbers. Adler and Berechman (2001) proposed a transformation in those cases because DEA only accepts positive data. This transformation consists of finding the minimum negative value among the range of the variable and adding the absolute value of the minimum number plus one to all data units, converting all the numbers to positive data.

A DEA model requires the definition of specific parameters, which are: decision making units (DMU), input and output variables. A contextual variable will also be required in a second stage because the goal is to identify the relationship between the efficiency of companies and the level of shareholder activism. Those variables should be analyzed simultaneously to prevent partial evaluations (Bogetoft and Otto, 2011). DMUs are managed entities (Charnes *et al.*, 1978). A DMU is the entity that is able to convert inputs into outputs. Each one of the 194 samples companies in each year is a DMU. There are 582 DMUs in the pooled analysis.

Table 1 depicts the main inputs. The percentage of non-voting shares in the equity capital represents a deviation between cash flow and voting rights and possible conflicts of interest (Jensen and Meckling, 1976). The total equity capital proportion owned by the larger shareholder represents the ownership structure (Shleifer and Vishny, 1997). Total assets proxies for company size and is a factor associated to activism (Judge *et al.* 2010). The number of independent directors may be associated to the quality of CG (Hermalin and Weisbach, 2003). The total debt ratio represents lender monitoring (Triantis and Daniels, 1995; Jensen and Meckling, 1976). Table 1 also shows the definition for Tobin's Q, which is the main output variable. Alternate output variables were the return on assets (ROA), earnings before interest, taxes, depreciation and amortization (EBITDA), EBITDA margin and earnings per share (EPS) in some trial runs of the model. More details on the definition of alternate outputs and trial runs may be obtained from the authors.

\*\*\*\*\* Insert Table 1 about here

#### *The activism index (ACT)*

The contextual variable is an index representing the level of shareholder activism (ACT). This index was proposed and calculated by Vargas *et al.* (2017) for the years 2010 and 2012 and updated for 2014 in this study. Its methodology consists of computing a score for the level of shareholder activism for each company in the sample. This index is the sum of the scores for 9 affirmations relative to the minutes of ordinary and extraordinary general shareholders meetings, one about activist news published in the online version of Valor Econômico, the main daily business newspaper in Brazil, and one about the existence of complaints filed with the Brazilian Securities Commission or *Comissão de Valores Mobiliários* (CVM).

The minutes of ordinary and extraordinary general shareholders meetings were obtained from the CVM website. For each of nine topics one point is added to the index score of the company if present in the minutes collected in a year. Topics included proposal rejection, opposition or modification, proposal presentation before or during meetings, request for board representation, institution of a fiscal board, cumulative voting and to record opinions in the minutes. The index score of a company increased by one if a search performed on Valor Econômico online for each sampled year about activism related topics turned out articles concerning the company. The index score of a

company increased another point if the company was the object of complaints with CVM in the year. Vargas *et al.* (2017) provide the details about the search, selection and scoring procedures. The final index score for a company is the sum of these 0 or 1 scores for each one of the 11 individual items and ranges between 0 and 11, with 11 signifying the highest measured level of activist activity. Therefore, three annual company-level index scores for the 194 sampled companies were created.

Taking 2014 as an example, there were 431 activist events reported on 240 minutes of shareholders' meetings, 47 companies from the sample were subject of complaints reported to CVM from a total of 79 complaints, and 22 companies had been the subject of news on Valor Econômico reporting shareholder activism, from a total of 1,703 news items analysed. More detailed information about the results can be obtained with the authors.

#### *Generating the efficiency ranking (DEA model)*

DEA generates a ranking based on the relative efficiency of a group of DMUs, which is a company-year herein, and offers an efficiency frontier based on the efficient DMUs (Charnes *et al.*, 1978). The relative efficiency score is calculated based on a measure of efficiency for each DMU, which is obtained as a ratio between weighted outputs and weighted inputs (Wanke, 2012). The group of input variables is composed of resources and costs that represent entries in a transformation process. Output variables are products, services and revenues that represent the final result of the transformation process (Bogetoft and Otto, 2011).

There are two types of models regarding returns to scale. Charnes *et al.* (1978) consider constant returns to scale in which an increase or a decrease in the inputs generates an equally proportional increase or decrease in the outputs whereas this will not be the case under variable returns to scale (Banker *et al.*, 1984). This study uses the latter variant because it is reasonable to assume that an increase in the input does not necessarily generate a proportional increase in the outputs in a shareholder activism situation.

The DEA model can be input or output-oriented (Bogetoft and Otto, 2011). DEA minimizes inputs preserving outputs at their original levels in the input-oriented version, while it maximizes outputs preserving the inputs at their original level in the output-

oriented version. This study employs the output-oriented model because the objective is to maximize financial performance based on the current CG metrics of a company. It used the DEA package of the R software.

The BCC output-oriented DEA model can be represented as the following linear programming problem (Zhu, 2003), depicted in Model (1), which aims to maximize the efficiency scores.

$$\begin{aligned}
 & \max \phi - \varepsilon \left( \sum_{i=1}^m s_i^- + \sum_{r=1}^s s_r^+ \right) \\
 & \text{s.t.: } \sum_{j=1}^n \lambda_j x_{ij} + s_i^- = x_{i0}, \forall i \\
 & \sum_{j=1}^n \lambda_j y_{rj} - s_r^+ = \phi y_{r0}, \forall r \\
 & \lambda_j \geq 0, \forall j \\
 & \sum_{j=1}^n \lambda_j = 1
 \end{aligned} \tag{1}$$

Where  $x_{ij}$  = *inputs matrix*

$y_{rj}$  = *outputs matrix*

$\varepsilon$  = *infinitesimal non – Arquimedian*

$s_i^-$  = *input slack*

$s_r^+$  = *output slack*

$\phi$  and  $\lambda_j$  = *parameters to be solved by the model*

$i = 1, 2, \dots, m$  (*quantity of inputs*)

$r = 1, 2, \dots, s$  (*quantity of outputs*)

$j = 1, 2, \dots, n$  (*quantity of weights*)

The optimal solution is represented by  $(\phi^*, \lambda_j^*)$ , where  $\phi^*$  is the relative efficiency score for each DMU and  $\lambda_j^*$  is the given weight for each input and output of each DMU.

*Truncated regression with bootstrap to test H1*

Simar and Wilson (2007) attest that many studies have been using a two-stage approach, in which efficiency is estimated in a first stage and a regression on contextual variables, which are contextual characteristics that may affect the process of transformation of input to output, takes place in a second stage (Bogetoft and Otto, 2011). Simar and Wilson (2007) also prove, using Monte Carlo simulation, that bootstrap is an adequate method to use in the second stage regression. Bootstrap application consists of sampling observations with replacements from the original dataset and creating a new random dataset of the same size. Thus, when the average and the variance of the real distribution are required and it is difficult to be determined, it is possible to use the statistics from the empirical bootstrapped distribution, which are easier to obtain. Moreover, bootstrap makes possible the direct generation of the confidence interval for the analyzed parameter (Bogetoft and Otto, 2011).

As a first stage of the bootstrap truncated regression, the model tests the following regression (Simar and Wilson, 2007):

$$\delta_i = \alpha + Z_j \beta + \varepsilon_j \quad (2)$$

Where:

$\delta_i$  = efficiency scores

$\alpha$  = constant

$Z_j$  = vector of contextual variable observations

$\beta$  = vector of parameters to be calculated by the model

$\varepsilon_j$  = statistical noise

$i = 1, 2, \dots, m$  (quantity of efficiency scores)

$j = 1, 2, \dots, n$  (quantity of contextual variables)

Considering that  $\varepsilon_j \gg 1 - \alpha - Z_j \beta$ , as long as 1 is the maximum possible value to represent an efficiency score, and assuming that the statistical noise has the behavior of a normal distribution with average equal to zero, unknown variance and left-truncated, the equation may be rewritten as follows, replacing the efficiency scores by their estimators:

$$\hat{\delta}_j \approx \alpha + Z_j \beta + \varepsilon_j \quad (3)$$

Where:

$\varepsilon_j \sim N(0, \sigma_\varepsilon^2)$ , such that  $\varepsilon_j \gg 1 - \alpha - Z_j \beta$ ,  $j = 1, \dots, n$

In this case, the efficiency estimators are calculated by the maximum likelihood estimation in relation to  $(\beta, \sigma_{\varepsilon}^2)$ . Considering the contextual variables appropriate to this research, the final equation is written below:

$$(8) \quad \delta_i = \beta_0 + \beta_1 \cdot \text{ACT}_i$$

Where:

$\delta_i$  = efficiency scores, dependent variable

$\beta_0$  = constant to be estimated

$\beta_1$  = coefficients to be estimated

$\text{ACT}_i$  = activism index, contextual variable

Therefore, it is possible to draw conclusions about the relationship between the efficiency index of companies and the level of activism faced by these companies.

## Results

Panel A of Table 2 contains descriptive statistics pooled for 2010, 2012, and 2014. The largest shareholder owns an average of 46 percent of the total equity capital, which is made up, on average, of 23 percent of non-voting preferred stocks. Ownership concentration remains high in Brazil and control enhancement by means of non-voting stocks is still present in many companies. The average number of independent directors is little less than 2 but many companies still have none. The largest shareholder average percentage of shares decreases over time while the average number of independent board members increases, suggesting that companies improved their CG practices in the period. The average activism score is very low at 1.9 out of 11 points possible but increased over time. Detailed year-by-year statistics are available with the authors.

The input and output variables depicted in Panel A of Table 2 were regressed individually on the activism index score. Total assets, the number of independent directors, and the percentage of non-voting shares present positive and significant slope coefficients at the ten percent level suggesting that these variables may reveal or be correlated with company characteristics that induce activism.

Panel B of Table 2 shows descriptive statistics of the efficiency index obtained in the first stage of the DEA model in each year as well as for the pooled sample. The most efficient DMU attains 1. The average efficiency increases over the years. The second stage of the model is a truncated regression with bootstrap of the efficiency

index on the activism index with one regression per year as well as one pooled regression. Panel B of Table 2 digests the results. All coefficients are negative and there is significance at the ten percent level for the pooled sample and for 2010 and 2012. This evidence suggests that activist shareholders tend to target less efficient companies and confirms H1. Minutiae about all the univariate regressions are available with the authors.

\*\*\*\*\* Insert Table 2 about here

Table 3 shows mean differences among company groups. Companies were divided into three groups in 2010 according to their activism index score. These groups were maintained in 2012 and 2014 to verify its efficiency index progress by means of differences in its average efficiency index. A similar procedure was carried out in 2012 to check for efficiency in 2014. A Shapiro-Wilks normality test, available with the authors, indicated that all but one group do not present a normal distribution, which led to the use of a non-parametric test. Table 3 reveals that the mean efficiency indexes of the groups in which activist events were detected are significantly greater two or four years after the event. There was no significant increase in the mean efficiency index for the groups of companies without activist events detection. H2 stated that activism improves company performance and these results support it. Readers should recall that the activism index was exogenously defined with respect to the input and outputs used in the first stage of the computation of the efficiency scores. Testing in different time frames also assure that contextual variables (the variables that form the activism index) and the input/output vector are not only exogenous but also separable, in a sense that contextual variables impact efficiency scores but not the other way around.

Alternate versions of the analysis with the ROA, EBITDA, EBITDA margin, and EPS as output variables led to similar results and are available with the authors.

\*\*\*\*\* Insert Table 3 about here

## **Conclusion**

Ownership concentration decreased while the number of independent directors and of activism events increased in Brazil between 2010 and 2014. An index of activist events is positively associated to company size, the proportion of non-voting shares, and the number of independent directors, suggesting that corporate governance and ownership structure may be activist drivers. This descriptive evidence is consistent with

the conjectures in Crisóstomo and González (2006) for Brazil, and the international literature (Gillan and Starks, 2007).

Activist shareholders tended to target less efficient Brazilian companies, supporting the first hypothesis formulated herein, consistently with the international literature (Goranova and Ryan, 2014; Judge *et al.*, 2010; Gillan and Starks, 2007). Activism seems to lead to efficiency improvement two to four years after activist events, sustaining the second hypothesis advanced herein and consistently with the international literature about the positive long-term impact of activism on company performance (Bebchuk *et al.*, 2015; Opler and Sokobin, 1995; Nesbitt, 1994).

Future studies could take the year that an active shareholder acquired shares in the target company in order to understand if this precedes or succeeds the announcement of poor financial results. This might identify shareholders that act to recover poor performance losses from those that see a poor performing company as an opportunity to gain from performance reversals. Future research could also broaden the range of inputs of the DEA model using CG variables such as executive compensation, board characteristics and CG scores or rankings as well as try to identify financial and socially motivated activists.

## References

- Adler, N. and Berechman, J. (2001), "Measuring airport quality from the airlines' viewpoint: an application of data envelopment analysis", *Transport Policy*, Vol. 8 No. 3, pp. 171–181.
- Alam, I. M. S. and Sickles, R. C. (1998), "The relationship between stock market returns and technical efficiency innovations : Evidence from the US airline industry", *Journal of Productivity Analysis*, Vol. 9 No. 1, pp. 35–51.
- Avkiran, N. K. (2011), "Association of DEA super-efficiency estimates with financial ratios: Investigating the case for Chinese banks", *Omega*, Vol. 39 No. 3, pp. 323–334.
- Avkiran, N. K. and Rowlands, T. (2008), "How to better identify the true managerial performance: State of the art using DEA", *The International Journal of Management Science*, Vol. 36 No. 2, pp. 317–324.
- Bădin, L., Daraio, C. and Simar, L. A. (2012), "How to measure the impact of environmental factors in a nonparametric production model", *European Journal of Operational Research*, Vol. 223 No. 3, pp. 818-833.



Banker, R. D., Charnes, A. and Cooper, W. W. (1984), "Some models for estimating technical and scale inefficiencies in data envelopment analysis", *Management Science*, Vol. 30 No. 9, pp. 1078–1092.

Bebchuk, L. A., Brav, A. and Jiang, W. (2015), "The long-term effects of hedge fund activism", *Columbia Law Review*, Vol. 115 No. 5, pp. 1085–1156.

Black, B. S., Carvalho, A. G. and Sampaio, J. O. (2014), "The evolution of corporate governance in Brazil", *Emerging Markets Review*, Vol. 20 No. 1, pp. 176–195.

Bogetoft, P. and Otto, L. (2011), *Benchmarking with DEA, SFA and R*, Springer, New York, NY.

Cespa, G. and Cestone, G. (2007), "Corporate social responsibility and managerial entrenchment", *Journal of Economics & Management Strategy*, Vol. 16 No. 3, pp. 741-761.

Charnes, A., Cooper, W. W. and Rhodes, E. (1978), "Measuring the efficiency of decision making units", *European Journal of Operational Research*, Vol. 2 No. 6, pp. 429-444.

Charnes, A., Cooper, W. W., Golany, B., Seiford, L. and Stutz, J. (1985), "Foundations of data envelopment analysis for Pareto-Koopmans efficient empirical production functions", *Journal of Econometrics*, Vol. 30 No. 1-2, pp. 91–107.

Cremers, K. J. M., Giambona, E., Sepe, S. M., and Wang, Y. (2015), "Hedge fund activism and long-term firm value", available at: <http://dx.doi.org/10.2139/ssrn.2693231> (accessed 27 May 2017).

Crisóstomo, V. L. and González, E. V. (2006), "Possível estratégia de ativismo de fundos de pensão no Brasil", *Revista de Economia Contemporânea*, Vol. 10 No. 1, pp. 139-155.

Daraio, C., Simar, L. and Wilson, P. W. (2010), "Testing whether two-stage estimation is meaningful in nonparametric models of production", Discussion Paper 1031, Institut de Statistique Biostatistique et Sciences Actuarielles (ISBA), Université Catholique de Louvain, Louvain-la-Neuve, available at: [http://sites.uclouvain.be/IAP-Stat-Phase-V-VI/PhaseVI/publications\\_2011/TR/TR11021.pdf](http://sites.uclouvain.be/IAP-Stat-Phase-V-VI/PhaseVI/publications_2011/TR/TR11021.pdf)

Destefanis, S. and Sena, V. (2007), "Patterns of corporate governance and technical efficiency in Italian manufacturing", *Managerial and Decision Economics*, Vol. 28 No. 1, pp. 27-40.

Fox, J. and Lorsch, J. W. (2012), "What good are shareholders?", *Harvard Business Review*, Vol. 90 No. 7/8, pp. 48-57.

Gillan, S. L. and Starks, L. T. (2000), "Corporate governance proposals and shareholder activism: the role of institutional investors", *Journal of Financial Economics*, Vol. 57 No. 2, pp. 275–305.

Gillan, S. L. and Starks, L. T. (2007), "The evolution of shareholder activism in the United States", *Journal of Applied Corporate Finance*, Vol. 19 No. 1, pp. 55-73.

Goranova, M. and Ryan, L. V. (2014), "Shareholder activism: A multidisciplinary review", *Journal of Management*, Vol. 40 No. 5, pp. 1230–1268.

Hermalin, B. E. and Weisbach, M. S. (2003), "Boards of directors as an endogenously determined institution: A survey of the economic literature", *Economic Policy Review*, Vol. 9 No. 1, pp. 7-26.

Jensen, M. C. and Meckling, H. (1976), "Theory of the firm : Managerial behavior, agency costs and ownership structure", *Journal of Financial Economics*, Vol. 3 No. 4, pp. 305-360.

Judge, W. Q., Gaur, A. and Muller-Kahle, M. I. (2010), "Antecedents of shareholder activism in target firms: Evidence from a multi-country study", *Corporate Governance*, Vol. 18 No. 4, pp. 258-273.

Kourtesi, S., Fousekis, P. and Polymeros, A. (2012), "Conditional efficiency estimation with environmental variables: evidence from Greek cereal farms", *Scientific Bulletin - Economic Sciences, University of Pitesti*, Vol. 11 No. 1, pp. 43-52.

Leal, R. P. C., Carvalhal, A. L. and Iervolino, A. P. (2015), "One decade of evolution of corporate governance practices in Brazil", *Revista Brasileira Finanças*, Vol. 13 No. 1, pp. 134-161.

Lehmann, E., Warning, S. and Weigand, J. (2004), "Governance structures, multidimensional efficiency and firm profitability", *Journal of Management and Governance*, Vol. 8 No. 3, pp. 279-304.

Lopes, A., Lanzer, E., Lima, M. and N. Costa Jr. (2008), "DEA investment strategy in the Brazilian stock market", *Economics Bulletin*, Vol. 13 No. 2, pp. 1-10.

Morey, M. R. and Morey, R. C. (1999), "Mutual fund performance appraisals: a multi-horizon perspective with endogenous benchmarking", *Omega*, Vol. 27 No. 2, pp. 241-258.

Nesbitt, S. L. (1994), "Long-term rewards from shareholder activism: a study of the 'CalPERS' effect", *Journal of Applied Corporate Finance*, Vol. 6 No. 4, pp. 75-80.

Oliveira, R. M., Leal, R. P. C. and Almeida, V. S. (2012), "Large pension funds and the corporate governance practices of Brazilian companies", *Corporate Ownership and Control*, Vol. 9 No. 2, pp. 76-84.

Opler, T. C. and Sokobin, J. (1995), "Does coordinated institutional activism work? An analysis of the activities of the Council of Institutional Investors", Ohio State University and Southern Methodist University working paper.

Punsuvo, F. R., Kayo, E. K. and Barros, L. A. B. C. (2007), "O ativismo dos fundos de pensão e a qualidade da governança corporativa", *Revista Contabilidade & Finanças*, Vol. 18 No. 45, pp. 63–72.

Renneboog, L. and Szilagyi, P. G. (2011), "The role of shareholder proposals in corporate governance", *Journal of Corporate Finance*, Vol. 17 No. 1, pp. 167–188.

Roberts, R. and Whited, T. M. (2013), "Endogeneity in empirical corporate finance", in Constantinides, G. M., Harris, M. and Stulz, R. M., *Handbook of the Economics of Finance*, Vol 2A Corporate Finance, Elsevier, Amsterdam, pp. 493-572.

Shleifer, A. and Vishny, R. W. (1997), "A survey of corporate governance", *The Journal of Finance*, Vol. 52 No. 2, pp. 737-783.

Silveira, A. M. and Saito, R. (2009), "Corporate governance in Brazil : landmarks, codes of best practices, and main challenges", *The IUP Journal of Corporate Governance*, Vol. 8 No. 2, pp. 20-39.

Silveira, A. M., Leal, R. P. C., Carvalhal da Silva, A. L. and Barros, L. A. B. C. (2010), "Endogeneity of Brazilian corporate governance quality determinants", *Corporate Governance – International Journal of Business in Society*, Vol. 10 No. 2, pp. 191-202.

Simar, L. and Wilson, P. (2007), "Estimation and inference in two-stage, semi-parametric models of production processes", *Journal of Econometrics*, Vol. 136 No. 1, pp. 31-64.

Sonza, I. B. and Kloeckner, G. O. (2014), "Does corporate governance influence the efficiency of Brazilian companies?", *Revista Contabilidade & Finanças*, Vol. 25 No. 65, pp. 145-160.

Sternberg, L., Leal, R. P. C. and Bortolon, P. M. (2011), "Affinities and agreements among major Brazilian shareholders", *International Journal of Disclosure and Governance*, Vol. 8 No. 3, pp. 213-228.

Thomas, R. S. and Cotter, J. F. (2007), "Shareholder proposals in the new millennium: Shareholder support, board response and market reaction", *Journal of Corporate Finance*, Vol. 13 No. 2, pp. 368-391.

Triantis, G. G. and Daniels, R. J. (1995), "The role of debt in interactive corporate governance", *California Law Review*, Vol. 83 No. 4, pp. 1073-1113.

Vargas, L. H. F., Bortolon, P. M., Barros, L. A. B. C. and Leal, R. P. C. (2017), "Recent activism initiatives in Brazil", Relatórios Coppead 432, working paper, The Coppead Graduate School of Business at the Federal University of Rio de Janeiro, Rio de Janeiro.

Wanke, P. F. (2012), "Socio-economic planning sciences capacity shortfall and efficiency determinants in Brazilian airports: Evidence from bootstrapped DEA estimates", *Socio-Economic Planning Sciences*, Vol. 46 No. 3, pp. 216-229.

Wanke, P. and Barros, C. P. (2016). "Efficiency drivers in Brazilian insurance: A two-stage DEA meta frontier-data mining approach", *Economic Modelling*, Vol. 53 No. 1, pp. 8-22.

Wanke, P., Barros, C. P. and Faria, J. R. (2015), "Financial distress drivers in Brazilian banks: A dynamic slacks approach", *European Journal of Operational Research*, Vol. 240 No. 1, pp. 258-268.

Zheka, V. (2005), "Corporate governance, ownership structure and corporate efficiency: the case of Ukraine", *Managerial and Decision Economics*, Vol. 26 No. 7, pp. 451-460.

Zhu, J. (2003), *Quantitative models for performance evaluation: Data envelopment analysis with spreadsheets and DEA Excel solver*. Springer, New York, NY.