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What is the Value of Corporate  
Social Responsibility? An answer  
from Brazilian Sustainability  
Index

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# What is the Value of Corporate Social Responsibility? An answer from Brazilian Sustainability Index

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## Abstract

This paper analyzes using a sample of non-financial Brazilian companies from 2005 to 2007 whether corporate social responsibility has an impact on firm value. Using companies' Tobin's Q as a proxy for their market value, the paper finds that firms that compose the Bovespa Corporate Sustainability Index (ISE) are traded with a premium compared to the other publicly traded firms. The result is robust to the inclusion of a set of control variables and the method of estimation. In addition, after controlling for self-selectivity, the results confirm that policies that focus corporate sustainability add value to the firm. The paper indicates that the benefits of corporate social responsibility policies surpass the possible costs implied by the adoption of such policies, leading corporate social responsibility to exert a positive impact on firm value.

*JEL Classification:* G15; G32.

*Keywords:* Firm Value; Corporate Social Responsibility; Sustainability; Emerging Markets; Brazil.

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## **1. Introduction**

According to the 2007 report on socially responsible investment trends in the United States (Social Investment Forum, 2007), Social Responsible Investments (SRI) have been growing in a faster pace than any other asset in the US. The text asserts that 11 percent of assets under professional management in the US are related to Social Responsible Investments. It also shows that Social Responsible Investments rose from \$639 billion in 1995 to \$2.71 trillion in 2007. In addition, in the period 2005-2007, the report indicates that SRI increased more than 18 percent a year while the other assets managed by professional investors increased less than 3 percent a year. Moreover, projections indicate that social responsible screening by investors will increase in the future.

Although the data has shown this rapid increase in social responsible investments, the economic literature has not reached a consensus whether this re-orientation towards policies that maximize stakeholders surplus instead of the traditional policies of maximization of shareholders value yields more efficient outcomes. The literature argues that absent externalities, policies where firms maximize shareholder value are optimal from an efficiency point of view. Yet, in the presence of externalities, regulation would lead to more efficient outcomes since it would lead managers to internalize these externalities. Absent regulations, the screening imposed by investors towards social responsible assets would force managers to adopt policies to achieve the best social allocation.

Social responsibility can also be viewed as an attempt to move managers' focus toward more long-term value maximization. It might be the case that managers place more weight on current results disregarding a long-run maximization value. In this scenario, social responsibility policies would represent only a change in the current paradigm of value maximization moving for a more long term objectives. It would characterize a trade-off between short run costs and long-run benefits moving to a more sustainable path for the firm.

The costs associated to the adoption of corporate social policies would be the possibility of deadlocks in the decision making with a possibility of the existence of conflicting objectives and generation of inefficiency on decision making. In addition, it would have a lack of clear mission for management with more vague objectives than the traditional profit maximization. The main benefit would be a reduction in the cost of capital. Social responsible firms would be rewarded with a lower cost of capital since investors would increase their demand for their assets, leading to higher stock prices.

The empirical evidence with respect to the impact of corporate social responsibility on firms' performance is mixed. Most of the papers show that the difference in expected returns between a

corporate responsibility and a market index is very small and there is little difference in moments and the indexes are very highly correlated.<sup>2</sup> Yet, event studies indicate that firms that are deleted from an index of social responsibility suffer a price drop. Recent studies focus on the existence of a downward sloping demand curve for stocks, Hong and Kacperczyk (2008) show that sin stocks (tobacco, gaming and alcohol) are neglected by investors and are traded at a lower market-to-book ratio compared to other stocks from comparable industries.

This paper casts light on this question by analyzing the direct impact of corporate responsibility policies on firm value in a sample of non-financial Brazilian firms from 2005 to 2007. Using companies' Tobin's Q as a proxy for their market value, the paper finds that firms that compose the Bovespa Corporate Sustainability Index (ISE) are traded with a premium compared to the other publicly traded firms. The result is robust to the inclusion of a set of control variables and the method of estimation. Therefore, the paper indicates that the benefits of corporate social responsibility policies surpass the possible costs implied by the adoption of such policies, leading corporate social responsibility to exert a positive impact on firm value.

The paper contributes to the literature in different directions. First, differently than previous studies for the Brazilian ISE index, the paper is the first to analyze the direct impact of corporate sustainability policies on firms' market value. Lo and Sheu (2007) performed a similar study for the Dow Jones Sustainability Index, the authors found support to the hypothesis that sustainable policies cause an increase in firm value. This paper goes one step further by using different parametric methods to compare social responsible and other stocks and including an extensive set of controls to assert the robustness of the results. Different than previous studies, the paper addresses a traditional critique that previous studies suffered that is the possible problem of self-selectivity in the construction of the index. Performing a non-parametric propensity score matching estimation, the paper confirms the positive impact of composing a sustainability index on firm value.

The paper is organized as follows. Section 2 presents the description of the Bovespa corporate sustainability index and its performance since 2005. Section 3 reports and discusses the data. Section 4 shows the methodology and results. Section 5 concludes.

## **2. The Bovespa Corporate Sustainability Index (ISE)**

According to the BOVESPA (São Paulo stock exchange) the corporate sustainability Index (ISE) was introduced in 2005 in order to create a benchmark for socially responsible investments. It is

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<sup>2</sup> Cavalcante, Bruni e Costa (2007) e Rezende et al (2007) confirm these fact using the Brazilian corporate sustainability index

composed for shares of companies “highly committed to social responsibility and corporate sustainability and also to promote good practices in the Brazilian corporate environment”.

The ISE is composed by companies ranked at the top of corporate sustainability policies among the most liquid stocks in the BOVESPA. The selection is made according the answers of a questionnaire that comprehends three different aspects: environmental, social and economical. These aspects are divided into four different groups of criteria. Policies (commitment indicators), management (program, target, and monitoring indicators), performance and legal compliance. After being ranked, the composition of the index is decided and approved by a board composed by representatives from different institutions that compose the Brazilian society.<sup>3</sup> The index is composed by a maximum number of 40 companies and a company can be excluded from the index during the reevaluation period the company whether no longer it meets the inclusion criteria, or between two periods of reevaluation either if the company enters a regime of preventive composition with creditors or files for bankruptcy or any event that changes significantly a component of the index. Table 1 shows the composition of the index in the years of the study.

Figure 1 shows the behavior of the ISE and BOVESPA indexes. Interesting to note in figure 1 that both indexes are highly correlated confirming the doubts about the existence of capital gains of composing a sustainability index. The paper tries to address this question.

### **3. Data**

The database used comprehends all non-financial Brazilian firms listed in the São Paulo Stock Exchange from 2005 to 2007. The accounting and financial data were collected from the Economática site. All companies under judicial administration were excluded from the sample. The number of firms varies in each year included in the study but, on average, 241 firms were analyzed.<sup>4</sup> All the variables used are evaluated at the end of the fiscal year. It is important to note that the analysis is developed only for non-financial firms since the market value of financial companies is determined for different factors than the non-financial sector, even the sustainability questionnaire is built in a different fashion for companies in the financial sector.

Tobin's Q was used as a proxy for firm value. This is defined as the ratio of the firm market value to the replacement cost of assets. The firm market value is calculated as the book value of total

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<sup>3</sup> Institutions participants are: ABRAPP, ANBID, APIMEC, BOVESPA, IBGC, IFC, Ethos, Brazilian Ministry of the environment and UNEP.

<sup>4</sup> In an exercise of robustness, the analysis involved only firms that were included in the sample in 2005 and still remained in it in 2007, totaling 205 firms. There was no alteration in the results.

assets plus the market value of the equity minus the book value of the equity. The replacement cost of assets is calculated as being equal to the book value of the firm's assets. In this way, the following formula is used to calculate a company's Tobin's Q.<sup>5</sup>

$$Q = \text{Book Value of the Assets} - \text{Book Value of the Equity} + \text{Market Value of the Equity} / \text{Book Value of the Assets} \quad (1)$$

Table 2 shows a summary of the statistics in the sample. The data indicates that the sample shows enough variability. The total assets of the firms in the sample are worth R\$ 5,651 millions with standard deviation equal to R\$ 18,470 millions, indicating that the sample is not confined to large-sized firms, but also includes medium-sized and small firms. The situation is similar when the total sales and market value are analyzed. Another relevant fact in table 2 is that Tobin's Q has a mean (1.57) higher than the median (0.97), showing asymmetry in its distribution. To minimize this problem in the subsequent estimations, the logarithm of this variable will be used at the econometric implementation.<sup>6</sup>

To analyze whether sustainability policies have an impact on firm value, we control for other variables mentioned in the literature and that may have an impact on this value. The control variables used are:

Derivatives: Allayannis and Weston (2001) for US companies and Allayannis, Rossi and Laham (2008) for Brazilian firms and Allayannis, Lel and Miller (2007) in a cross-country study show the existence of a hedging premium, i.e., firms that use derivatives for risk management purposes have higher market value. Moreover, they show that the hedging premium is higher for firms with strong internal governance. A variable for the firm's hedging policy was constructed. The variable named *derivatives* represents a dummy variable which assumes the value 1 if the firm uses derivatives and 0 otherwise. The data on the use of currency derivatives were collected directly from companies' annual reports, located in the explanatory notes under the item financial instruments. It is important to highlight that for a firm to be considered a derivative user it must explicitly state the derivative or hedging policy adopted and the notional value of the derivative used. Table 2 shows that around 40% of the companies in the sample use derivatives.

Size: The proxy is calculated as a logarithm of the firm total assets. Either by its relationship with profitability (Mueller, 1987), or by its relationship with the firm's efficiency (Peltzman, 1977), the

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<sup>5</sup> As a robustness exercise, Tobin's Q was also defined as a simple relation market-to-book, that is, the ratio between the market value to the book value of equity. Allayannis and Weston (2001) showed that the result is robust with relation to adopting procedures developed by Lewellen and Badrinath (1997) and by Perfect and Wiles (1994) for the calculus of company's Tobin's Q. Allayannis, Lel and Miller (2007) use a similar formulation.

<sup>6</sup> A similar fact was observed by Allayannis and Weston (2001) and Jin and Jorion (2004).

firm size may be related to its value. Previous literature found a negative relationship between size and firm's market value.

Access to financial markets: Lang and Stulz (1994) and Servaes (1996) argue that firms without access to the financial markets will have a higher Q, as they will only execute projects with positive present value. Moreover Fazzari, Hubbard and Petersen (1988) discuss that greater the dividend yield, the lower is the probability that the firm is financially constrained. Following Allayannis and Weston (2001), in order to control for firms' financial constraints we add a dummy for the firms that pay dividends. This dummy is set to 1 if the firm paid dividends and 0 otherwise. Therefore, we expect a negative relationship between dividends and firms' Tobin's Q.

Leverage: previous studies (Allayannis and Weston, 2001) show that the firm's capital structure is related to its value. To control for differences in the capital structure, we calculate the firm leverage defined by the ratio of total debt to equity. The impact of leverage on firm value is ambiguous. If there are tax shields with relation to the payments of interest, or the debt soothes the dispute between shareholders, manager and creditors, the impact is positive. If an increase in the leverage represents an increase in the likelihood of incurring payment of bankruptcy costs, the impact is negative.

Profitability: A profitable firm may trade at a premium in relation to a less profitable one; therefore, firms that are more profitable are expected to have a higher Tobin's Q. The index return over assets (ROA) calculated by the ratio of net income to total assets is used as proxy for the firm's profitability.

Investment opportunities: Myers (1977) show that firm value depends on firm investment opportunities. The ratio of investment to sales – investment being calculated by the variation of fixed assets – is used as indicative of the firm's investment opportunities.<sup>7</sup>

Geographic diversification: Several theories suggest that firms that diversify their operations geographically present a higher value in the market. Mork and Yeung (1991) and Bodnar, Tang and Weintrop (1997) found a positive relation between geographic diversification and firm value. We built a dummy variable, which is set to 1 when the firm develops activities in other countries as an exporter of goods or has subsidiaries abroad and 0 otherwise. The multinationality of a firm is expected to relate positively to its value.<sup>8</sup>

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<sup>7</sup> Empirical studies also use the ratio of research and development investments to total sales as an indicator of investment opportunities. Unfortunately, this information is not available for all the firms.

<sup>8</sup> Allayannis and Weston (2001) used the ratio between foreign sales and total sales as proxy for the geographic diversification of the firm. In this study, we opted to use a more representative variable of the firm's multinationality.

Industrial Diversification: The theory establishes an ambiguous relationship between the production diversification in several segments and firm value, however, empirical evidence (Berger and Ofek, 1995; Lang and Stulz, 1994) suggests a negative relationship between firm value and its industrial diversification. A variable dummy is built which is set to 1 if the firm operates in more than one industrial segment and 0 otherwise.

Industry effect: If the firms in the sustainability index are concentrated in high-Q segments, then these firms will have higher value not because they adopted sustainable policies, but because they belong to a specific industrial segment. A dummy variable is used to analyze the industry effect on firm value.

Time effects: The macroeconomic situation of the country may affect firm value. Restrictions to the international flow of capital, adoption of taxes on investors, changes in the legislation may, among other factors, have an impact on firm value. Annual dummies are used to control for the significance of the macroeconomic situation on firm value.

The variable of our main attention is the sustainability dummy. This variable assumes the value of 1 whether the firm is in the composition of the sustainability index and 0 otherwise. Table 3 shows the main differences in characteristics between the firms in the ISE index and the other firms.

Table 3 reveals the first evidence on the impact of sustainable polices on firm value. The data in Table 3 shows that the firms in the ISE index present a greater Tobin's Q than those that do not compose it. The test for the equality of the means indicates that the firms that compose the sustainability index have a greater market value that those that do not compose the index.

Table 3 also shows that firms in the ISE index are larger, use more extensively derivatives – an indication that these firms have a more structured risk management policies - these firms have less leverage, have higher profitability and pay more dividends. Except for the geographic diversification in 2006, it seems that there is no significant differences among companies in the ISE index and non-ISE wit respect to investment opportunities and industrial diversification. Yet, these results do not imply any causality. This fact will be analyzed in the next section.

#### 4. Methodology and Results

This analysis tests whether sustainability has an impact on firm value. The following equation is estimated:

$$Q_{\text{tobin},it} = \alpha_{it} + \beta \cdot \text{Sustainability}_{it} + \gamma \cdot X_{it} + \varepsilon_{it} \quad (2)$$

where:

Sustainability = Dummy variable if the firm is in the composition of the ISE Index and 0 otherwise.

$X_{it}$  = Control variables mentioned previously.

First, two econometric methods were used for the estimation of equation (2): pooled OLS and panel. We adopted two different methods because in the case that there is serial correlation in the composition of the Index the estimation using pooled OLS would underestimate the standard deviation of the coefficients. In addition, the estimation using panel techniques permits the control for individual effects of each firm. The results of the equation estimation (2) are found in Table 4.

Results in table 4 confirm that firms in the sustainability index have a higher market value than firms that do not compose the index. Corroborating Lo and Sheu (2007) for the Dow Jones sustainability index there is evidence that being sustainable causes an increase in firm value. In this way, when investors compare the costs and benefits of firms' sustainability policies they are likely to recompense managers for the adoption of such policies. This result is robust to the inclusion of the control variables and the method of estimation adopted. Following the hedging literature, the results in table 4 indicate a sustainability premium varying from 10 to 19 percent; therefore, everything else equal, firms in the sustainability index worth 10 to 19 percent more than firms that do not compose the index.

With relation to the control variables, consistent with Allayannis and Weston (2001) and Hagelin et al. (2004), the results indicate that the adoption of a hedging policy increases firm value. The results show a positive and significant impact of the hedging policy on firm value.

Corroborating the previous literature, the results in Table 4 also show the existence of a negative relation between size and firm value, indicating that larger firms trade at a discount. The results also confirm that firms that pay dividends show lower Qs, corroborating the hypothesis that firms that have no access to the financial market adopted positive present value projects leading to higher Qs.

The results in Table 4 point out that firms with higher leverage present higher value, confirming the theories of monitoring by debt or the importance of tax shields. The results show that more profitable firms present higher Qs, indicated by the significant and positive relation between firm profitability and the firm's Tobin's Q.

Confirming the expectations, the multinationality of the firms has a positive impact on their values. Similarly, firms with higher growth opportunities have higher market value but this result is not robust across different specifications. Yet, contrasting to the previous empirical literature, industrial

diversification has a positive impact on firm value, but this result is not robust in different specifications.

#### **4.1 Robustness Exercises**

The main problem that affects the estimation of the impact of the sustainability policies on firm market value is the possible self-selection bias. The problem arises when characteristics of the firms might cause them to adopt sustainable policies but these variables might also affect the outcome – firms' market value. The econometric literature points out to propensity score methods as a way to solve this problem. This method employs the predicted probability of a group membership – treatment vs. control group – based on observed predictors to create a counterfactual group and then propensity scores are used for matching.

First, we estimate the propensity scores using a probit model. The dependent variable is the sustainability dummy. Absent formal models, we use our control variables as our explanatory variables.

The results reported in the panel A of Table 5 indicate that size, the use of derivatives and firms' profitability are important determinants of the probability of a firm composing the sustainability index. These results are robust with respect to the period of the estimation. Larger firms, firms with better risk management policies and more profitable are more likely to incur in sustainable policies.

Panel B of table 5 compares the Tobin's Q of the two groups. The results corroborate our previous estimations indicating that firms that compose the sustainability index have higher market value, implying a positive premium for the adoption of sustainable policies. Results in panel b show that for all years of the sample companies' in the ISE index have higher Tobin's Q than non-ISE companies and that except for the year of 2007, the difference between the firms is statistically significant. More important, the difference is significant for the whole period of the sample.

#### **5. Conclusion**

This study analyzed the impact of firms' sustainability policies on their market value for a sample of Brazilian non-financial companies from 2005 to 2007. The results indicate that the adoption of policies that focus on companies' sustainability do increase the value of the firm. They also indicate that the positive impact of these policies is independent of the econometric method and period analyzed. The result is also robust with relation to the inclusion of control variables and to the correction of the possible self-selection problem.

The results of the estimation are in line with studies by Lo and Sheu (2007) for companies in the Dow Jones sustainability index, displaying evidence that for Brazilian companies there is a significant gain in adopting sustainability policies.

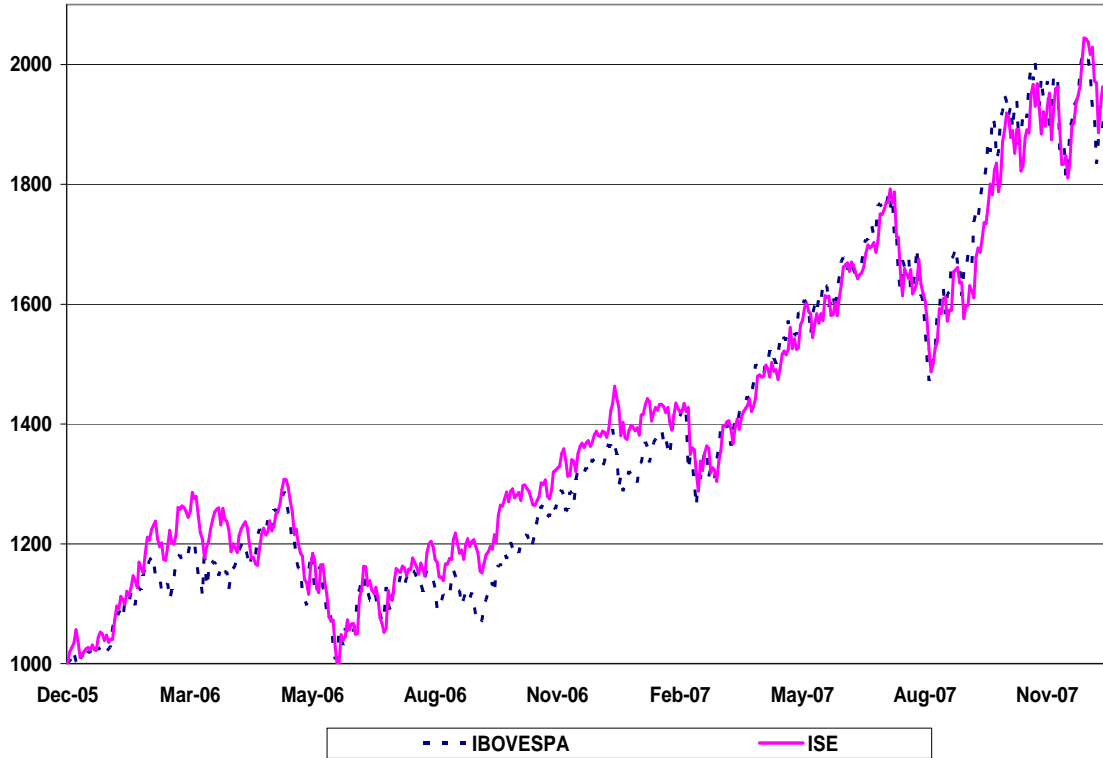
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**Figure 1**  
**ISE and IBOVESPA Indexes**

Figure 1 shows the daily behavior of BOVESPA Corporate Sustainability Index (ISE) and the São Paulo stock exchange index (IBOVESPA) between December 2005 and December 2007. (Dec. 2005=1000).



**Table 1****Composition of the ISE Index**

Table 1 shows the composition of the Corporate Sustainability Index in the years of 2005, 2006 and 2007.

| <b>2005</b>     | <b>2006</b>        | <b>2007</b>           |
|-----------------|--------------------|-----------------------|
| CESP            | Acesita            | AES Tietê             |
| Copesul         | ALL                | Arcelor Mittal Brasil |
| Eletrobrás      | Aracruz            | Aracruz               |
| Weg             | Arcelor            | Bradesco              |
| ALL             | Banco do Brasil    | Banco do Brasil       |
| Aracruz         | Bradesco           | Braskem               |
| Arcelor         | Braskem            | CCR                   |
| Banco do Brasil | CCR                | Cemig                 |
| Bradesco        | Celesc             | CESP                  |
| Braskem         | Cemig              | Coelce                |
| CCR             | Coelce             | Copel                 |
| Celesc          | Copel              | CPFL Energia          |
| Cemig           | CPFL Energia       | DASA                  |
| Copel           | DASA               | Eletrobrás            |
| CPFL Energia    | Eletropaulo        | Eletropaulo           |
| DASA            | Embraer            | Embraer               |
| Eletropaulo     | Energias do Brasil | Energias Brasil       |
| Embraer         | Gerdau             | Gerdau                |
| Gol             | Gerdau metalúrgica | Gerdau metalúrgica    |
| Itaú            | Gol                | Ioichp-Maxion         |
| Itausa          | Itaú               | Itaubanco             |
| Ioichp-Maxion   | Itausa             | Light                 |
| Natura          | Ioichp-Maxion      | Natura                |
| Perdigão        | Localiza           | Perdigão              |
| Suzano Papel    | Natura             | Petrobrás             |
| Tractebel       | Perdigão           | Sabesp                |
| Unibanco        | Petrobrás          | Sadia                 |
| VCP             | Suzano Papel       | Suzano papel          |
|                 | Suzano Petro       | Suzano Petro          |
|                 | TAM                | Tractebel             |
|                 | Tractebel          | VCP                   |
|                 | Ultra Unibanco     | Weg                   |
|                 | VCP                |                       |

**Table 2**  
**Descriptive Statistics**

Table 2 presents the descriptive statistics for a sample of Brazilian non-financial firms from 2005 to 2007. Table 2 also shows the summary statistics of control variables used in the analysis. Derivatives stands for a dummy variable for the use of derivatives. Profitability represents the ratio of net income to book value of assets. Investment opportunities is the ratio of capital expenditures to total sales. Leverage is the ratio of total debt to equity. Dividends is a dummy variable if the firm paid dividends. Industrial diversification is a dummy if the firm operates in different segments. Geographic diversification is a dummy if the firm operates in the foreign market or have subsidiaries abroad.

| Variable / Statistics      | N   | Mean  | Standard Deviation | Median |
|----------------------------|-----|-------|--------------------|--------|
| Tobin's Q                  | 725 | 1.57  | 0.97               | 1.29   |
| Total Assets (R\$ million) | 725 | 5,651 | 18,470             | 1,366  |
| Total Sales (R\$ million)  | 725 | 4,493 | 15,170             | 1,224  |
| Market Value (R\$ million) | 725 | 5,288 | 22,720             | 1,061  |
| Derivatives                | 725 | 0.38  | 0.48               | 0      |
| Profitability              | 725 | 0.092 | 0.099              | 0.087  |
| Investment Opportunities   | 725 | 0.021 | 0.90               | 0.008  |
| Leverage                   | 725 | 0.69  | 2.12               | 0.27   |
| Dividends                  | 725 | 0.76  | 0.42               | 1.00   |
| Industrial Diversification | 725 | 0.23  | 0.41               | 0.00   |
| Geographic Diversification | 725 | 0.17  | 0.37               | 0.00   |

**Table 3**  
**Comparison between ISE and non-ISE firms**

Table 3 examines the main differences between firms that compose the ISE Index and the other firms. \*,\*\* denote, respectively, significance at 5 and 10% of a Wilcoxon rank-sum test of the sample. Asterisks are placed above the higher value.

|                               |     | 2005  | 2006  | 2007   |
|-------------------------------|-----|-------|-------|--------|
| Number of Firms               | ISE | 24    | 30    | 28     |
|                               | Non | 213   | 217   | 213    |
| Tobin's Q                     | ISE | 2.06* | 2.15* | 2.29*  |
|                               | Non | 1.66  | 2.02  | 1.88   |
| Size<br>(log Total Assets)    | ISE | 15.6* | 15.8* | 16.1*  |
|                               | Non | 13.3  | 13.4  | 13.6   |
| Derivatives                   | ISE | 0.79* | 0.83* | 0.68*  |
|                               | Non | 0.34  | 0.23  | 0.29   |
| Leverage                      | ISE | 0.56  | 0.35  | 0.31   |
|                               | Non | 3.90* | 2.83* | 0.89   |
| Profitability                 | ISE | 0.16* | 0.14* | 0.145* |
|                               | Non | 0.076 | 0.071 | 0.073  |
| Dividends                     | ISE | 0.88* | 0.93* | 0.89*  |
|                               | Non | 0.63  | 0.65  | 0.69   |
| Investment<br>Opportunities   | ISE | 0.02  | 0.062 | 0.10   |
|                               | Non | 0.10  | 0.019 | 0.030  |
| Industrial<br>Diversification | ISE | 0.25  | 0.26  | 0.29   |
|                               | Non | 0.22  | 0.21  | 0.22   |
| Geographic<br>Diversification | ISE | 0.29  | 0.33* | 0.25   |
|                               | Non | 0.14  | 0.12  | 0.15   |

**Table 4****Estimation Results**

Table 4 shows the estimation result of equation (2). Pooled means estimation by pooled OLS and Panel means estimation per panel of fixed effects. The explanatory variable is the logarithm of Tobin's Q. Sustainability is a dummy variable that assumes the value of 1 if the firm is the composition of the Corporate Sustainability Index (ISE) and 0 otherwise. t-statistics are in parentheses. \*, \*\* denote significance at 5% and 10% level, respectively.

| Sustainability                | Pooled           |                    |                    | Panel            |                    |                    |
|-------------------------------|------------------|--------------------|--------------------|------------------|--------------------|--------------------|
|                               | 0.145<br>(2.31)* | 0.195<br>(4.01)*   | 0.176<br>(3.72)*   | 0.135<br>(2.02)* | 0.143<br>(2.47)*   | 0.108<br>(2.06)*   |
| Size                          |                  | -0.114<br>(-6.65)* | -0.086<br>(-4.99)* |                  | -0.097<br>(-5.87)* | -0.128<br>(-6.56)* |
| Derivatives                   |                  | 0.171<br>(4.31)*   | 0.197<br>(5.17)*   |                  | 0.066<br>(1.43)    | 0.145<br>(3.28)*   |
| Dividends                     |                  | -0.029<br>(-5.46)* | -0.027<br>(-4.74)* |                  | -0.018<br>(-4.56)* | -0.010<br>(-2.74)* |
| Leverage                      |                  | 0.082<br>(4.47)*   | 0.093<br>(5.15)*   |                  | 0.024<br>(1.73)**  | 0.039<br>(2.97)*   |
| Profitability                 |                  | 1.96<br>(6.85)*    | 1.94<br>(6.78)*    |                  | 1.14<br>(7.90)*    | 1.12<br>(8.44)*    |
| Investment<br>Opportunity     |                  | 0.047<br>(2.92)*   | 0.030<br>(1.97)*   |                  | 0.038<br>(0.99)    | 0.015<br>(1.07)    |
| Industrial<br>Diversification |                  | 0.119<br>(2.39)*   | 0.029<br>(0.57)    |                  | 0.067<br>(0.88)    | 0.060<br>(0.070)   |
| Geographic<br>Diversification |                  | 0.176<br>(3.49)*   | 0.107<br>(1.92)**  |                  | 0.143<br>(1.71)**  | 0.069<br>(1.75)**  |
| Time<br>Dummies               | No               | No                 | Yes                | No               | No                 | Yes                |
| Industry<br>Dummies           | No               | No                 | Yes                | No               | No                 | Yes                |
| N                             | 725              | 725                | 725                | 725              | 725                | 725                |
| R2                            | 0.06             | 0.29               | 0.34               | 0.06             | 0.25               | 0.28               |

**Table 5****Propensity Score Matching**

Table 5 shows the result of the estimation of the difference in Tobin's Q between firms that compose the sustainability index (ISE) and non-participants using a non-parametric matching estimation. Panel A shows the estimation of the probability of the firm compose the index using a PROBIT model. Panel B shows the result of the comparison between the two groups. \*, \*\* stands for, respectively, 5% and 10% statistical significance. t-statistics are in parenthesis.

| <b>Panel A – Estimation of the probability of being on the Sustainability Index</b> |                    |                   |                   |                   |
|---|--------------------|-------------------|-------------------|-------------------|
| <i>Characteristics</i>  | <i>2005 - 2007</i> | <i>2005</i>       | <i>2006</i>       | <i>2007</i>       |
| Size  | 0.459<br>(7.45)*   | 0.423<br>(4.00)*  | 0.48<br>(4.92)*   | 0.580<br>(4.86)*  |
| Derivatives   | 0.639<br>(6.74)*   | 0.634<br>(1.95)** | 0.98<br>(3.20)*   | 0.355<br>(1.22)   |
| Dividends   | -0.043<br>(-1.55)  | -0.068<br>(-1.51) | -0.017<br>(-0.32) | -0.023<br>(-0.47) |
| Leverage  | -0.050<br>(-0.46)  | -0.058<br>(-0.41) | -0.037<br>(-0.17) | 0.014<br>(0.03)   |
| Profitability   | 3.40<br>(3.76)*    | 3.23<br>(2.08)*   | 3.58<br>(2.05)*   | 3.49<br>(2.13)*   |
| Investment Opportunity  | 0.112<br>(0.46)    | 0.502<br>(0.60)   | 0.712<br>(1.01)   | -0.175<br>(-0.33) |
| Industrial Diversification  | 0.040<br>(0.19)    | -0.056<br>(-0.15) | 0.100<br>(0.28)   | 0.246<br>(0.65)   |
| Geographic Diversification  | 0.066<br>(0.31)    | 0.112<br>(0.30)   | 0.184<br>(0.50)   | -0.207<br>(-0.51) |
| <i>N</i>  | 725                | 237               | 247               | 241               |
| <i>Pseudo - R2</i>  | 0.316              | 0.288             | 0.356             | 0.344             |
| <b>Panel B – Propensity Score Matching – Tobin's Q</b>                              |                    |                   |                   |                   |
| <i>Matchings</i>  | 82                 | 24                | 30                | 28                |
| <i>ISE</i>  | 1.989              | 2.063             | 2.025             | 2.298             |
| <i>Non-ISE</i>  | 1.514              | 1.332             | 1.517             | 1.888             |
| <i>Difference</i>   | <b>0.475*</b>      | <b>0.730*</b>     | <b>0.508*</b>     | <b>0.410</b>      |
| <i>Standard Deviation (t statistics)</i>  | 0.113<br>(4.18)    | 0.219<br>(3.33)   | 0.200<br>(2.54)   | 1.32<br>(0.31)    |