Instituto de Engenharia de Sistemas e Computadores de Coimbra

Institute of Systems Engineering and Computers

INESC - Coimbra

Valdir de Jesus Lameira* e Patrícia Pereira da Silva* , †

Is corporate governance associated with the risk of Brazilain energy companies?

No. 8 2010

ISSN: 1645-2631

Instituto de Engenharia de Sistemas e Computadores de Coimbra

INESC - Coimbra

Rua Antero de Quental, 199; 3000-033 Coimbra; Portugal

www.inescc.pt

* *INESC-Coimbra, Rua Antero de Quental, 199, 3000-033 Coimbra, Portugal.*

* , † *Faculdade de Economia da Universidade de Coimbra, Av. Dias da Silva, 165, 3004-512 Coimbra, Portugal.*

IS CORPORATE GOVERNANCE ASSOCIATED WITH THE RISK OF BRAZILIAN ENERGY COMPANIES ?

Abstract: This study estimated the quality of governance practiced by a significant sample of Brazilian publicly traded companies and a sub sample of Brazilian energy companies, between 2002 and 2006, and related it to risk. An index composed of twenty questions, with all answers in binary form, was constructed to measure the quality of governance. The results obtained through the application of the method of simple and multiple linear regressions, were confirmed, with robustness, by the results obtained by the use of structural equations, confirming the original hypotheses. The effects of possible endogeneity do not harm the results obtained using the linear regressions. In this initial approach it seems that governance is relevant for the sample and sub sample of energy companies, though we didn`t observe significant statistical results for the sub sample of energy companies.
Keywords: governance, risk, Brazilian public companies, energy companies, linear regressions and structural equations.

1 – INTRODUCTION

In recent years, with the process of the globalization of financial and product markets proceeding apace, various Brazilian firms have sought to improve their governance practices in order to raise funds in international credit and capital markets. One of the means used by firms to show that they are apt to receive foreign funds has been to issue level 2 or 3 American Depositary Receipts (ADRs) in US capital markets. In Brazil, various public firms have promoted improvements in their governance systems in order to raise funds more cheaply and abundantly in local capital markets. To show that they are a safe investment for new shareholders, they have complied with the requirements of the São Paulo Stock Exchange´s Differentiated Levels of Corporate Governance ("Níveis Diferenciados de Governança Corporativa – NDGC"), including, amongst others, the New Market ("Novo Mercado"). Brazilian regulatory (Securities Commission- CVM) and auto-regulatory (Brazilian Corporate Governance Institute- IBGC) institutions have released voluntary codes of good corporate governance practices.

This has been the path followed by public companies to insert themselves in the contemporary global environment, in which ways are constantly being sought to improve

organizational management in order to have a positive impact on market perceptions of their risk. Assuming that the aim of these companies is to increase shareholder returns and maximize their value, they must seek to reduce their own and third-party costs of capital.

The capital market rewards the absence of uncertainties due to inadequate or poor quality of information disclosed. In addition, the market also discounts the appearance of conflicts of interest between investors, and the possibility of expropriation of minority shareholders' rights.

A continuous process of improving governance in companies occurred within the period under study, so we expected that risk decreased in result of these better practices, and the volatility, the betas and their costs of capital also decreased as well.

In recent years, the electricity supply industry, in many countries, has been restructured in order to improve security of supply, to promote cost effectiveness and price reductions and to reduce C02 emissions. With this new framework, it is supposed that corporate governance methods within energy companies could have been changing. In line with a trend observed in numerous countries, the central purpose of Brazil's electricity sector reform beginning in 1990 was to introduce a competitive environment and increase private participation in sector investment, after the crisis of the 1980s had rendered the public sector-based pattern of investment a thing of the past (Castro, Leite, 2009).

This situation poses the following problem: how are best practices of corporate governance related to the risks of Brazilian public companies?, We intend to go deeper in this line of work by comparing the results in the greater sample, with the outcomes obtained in a sub sample containing Brazilian energy companies.

So, to test this possible relations, we first estimate the quality of the governance practiced by a significant sample of Brazilian publicly companies, using an index composed of 20 questions with binary answers posed between 2002 and 2006. After this, we relate it to some indicators of the risk of Brazilian publicly traded companies and a sub sample of Brazilian energy companies. We used local beta, the beta obtained using the S&P 500, share price volatility, idiosyncratic risk and the implicit cost of capital as indicators of companies´ risk.

We applied linear regressions and confirmed the hypotheses that higher levels of governance are associated with lower risk in the major sample. We still don´t have conclusive results to affirm the same to companies of the energy sectors. We applied the structural equations methodology in the major sample and confirmed the results founded with linear regressions. Unfortunately, for the above mentioned period, we could not access enough data to use the second method in the sub sample of energy companies.

In the second section we examine the theoretical references that underpinned the construction of a broad index of governance and the choice of indicators of risk in order to establish relations between these variables. The third section outlines the research methodology used to link the governance index to the risk. This is followed, in the fourth section, by the results of the tests. The fifth section presents the research's conclusions, relating some of the results obtained to pioneering studies.

2 – **THEORETICAL REFERENCES**

2.1 – **GOVERNANCE AND RISK**

Regarding this issue, Drobetz *et al.* (2003) obtained significant statistical results for the influence of a governance index on the difference between the best and worst governance portfolios. In another test, they verified the extent to which firms' betas and the governance index explained share returns and also obtained significant statistical results for the coefficient related to the governance index. They also achieved significant statistical results for the governance index when using the proxies – dividend yield and the price-earnings ratio – as dependent variables, controlling the risk and the growth of the dividend yield (in the case of the latter) by using the rate of growth *g* (in accordance with Gordon's model). All the coefficients of the governance index used in the tests were statistically significant, which were aligned with initial expectations.

Chen, Chen and Wei (2004) identified that governance practices relative to disclosure were negatively related to the cost of capital. However, they observed that, in Asian emerging markets, diminishing the risk of minority shareholder expropriation was a more significant factor in reducing the cost of capital than improvements in disclosure practices.

Ashbaugh *et al.* (2004) found statistically significant results for the negative relation involving governance practices and the cost of equity, thus confirming the theory, and another negatively significant relation involving the broad index, the reduction in the cost of equity and the firms' beta.

Cremers and Vinay (2005) investigated how external mechanisms (takeovers) and internal mechanisms (shareholder activism) linked to governance were related to the returns on portfolios of high and low levels of governance. They found that the portfolio that was most vulnerable to takeovers generated a return 10 to 15% above market returns, when an institutional investor had a significant stake in the firm's capital. On the other hand, firms with better internal controls generated returns 8% higher than the market average when this characteristic was associated with a great possibility of the firm being vulnerable to a takeover.

Derwall and Verwijmeren (2007) reported that better governance levels are associated with lower implicit costs of capital, lower impacts from systematic risks and lower specific risks of the companies.

In order to consolidate the theory and concepts developed in this research, it is necessary to enumerate and describe the control variables of this study, which is done in the next section.

2.2 – QUALITY OF GOVERNANCE PRACTICED

The level of governance implemented in a company can be estimated by some characteristics or practices, according to Black, Jam and Kim (2006), Leal and Silva (2005), for example. In this research we constructed our broad indicator of governance using some questions of the Brazilian Corporate Governance Institute indicator of governance, utilized in 1995 to select the company with the best practices of governance in Brazil. We also used some questions of the two governance indicators developed in Black, Jam and Kim (2006) and Leal and Silva (2005).

Recent studies have analyzed a series of aspects related to governance, amongst which, the following should be highlighted: a) the importance of the ownership and control structures; b) the level of disclosure of information; c) the existence of private benefits of control; d) the quality of auditing; e) the existence of a supervisory board and committees; f) the board composition; g) corporate compensation policy; h) the existence of activist institutional shareholders; i) the possibility of tag-along rights for minority shareholders; j) the existence of anti-takeover provisions; k) the degree of minority shareholder rights protection; and l) the level of development of financial markets. Thus the quality of governance practiced by firms was measured using a broad governance index. The components, rationale, and scoring criteria of the governance index used in this research can be found in Lameira (2007).

This theoretical framework provides an opportunity to establish stages of development of governance practices by companies. Although the themes presented in the previous paragraph are broad, they allow us to qualify the governance practiced by the companies.

2.3 – RISK: CONCEPTS AND INDICATORS

Regards this issue we included the following variables to measure the risk of the companies: a) the local beta (henceforth also termed localbeta); b) the firm's S&P beta (henceforth called betasp), obtained from the regression of the returns of the company's shares against the returns of the US market measured by the Standard & Poor´s 500 – S&P 500 index; c) the total volatility of the shares' returns (henceforth referred to as volat); d) the idiosyncratic or residual risk (henceforth idios), whose indicator can be estimated by the standard deviation

of the distribution of the difference between actual and expected returns using the firms' S&P 500 beta (betasp), in accordance with Derwall and Verwijmeren (2007); and e) the weighted average cost of capital (henceforth also called wacc).

It is to be expected that the coefficients related to the governance variable show a statistically significant relation when they are inserted in the model used to study the risk variable, as done by Ashbaugh *et al.* (2004), for example.

2.4 – **CONTROL VARIABLES**

Various control variables were included in this study in order to use adequately the methods proposed. The objective of this procedure was to make it possible to obtain results that could adequately direct and assess the relation between governance and firm risk. These variables included: a) capital intensity (fixed) calculated as the ratio of permanent to total assets; b) operational leverage (opl), calculated as the ratio of operating results to operating revenues; c) the relation between indebtedness and capital (*de*), calculated as the ratio of net debt to capital stock; d) the company's size (size), calculated as the logarithm of the company's net operational revenues; and e) the level of investments (inv), calculated as the ratio of the the investment account in assets and stockholders' equity market; f) financial leverage (finl), calculated as the ratio of profits per share to operating results; g) an index of shares' market liquidity (liq) calculated in the Economática databank; h) market-to-book value (mtbv), calculated as the ratio of the market value of equity and the accounting value of equity; i) company experience (exp) calculated as the logarithm of the number of months that the company has been publicly-owned and has had its shares listed on the stock exchange; j) size of the board (log bod) calculated as the algorithm of the board's size; k) domestic private sector (pri) control dummy – 0 if its state-owned and 1 if it has another structure of private sector national control; l) *ADR* 23 (*adr*23) dummy – 0 if it does not have and 1 if it does; l) N2 and NM dummy (lev2nm) – 0 if it does not have and 1 if it does; m) N2 e NM x *ADR*23 (lev2nmadr23) dummy – 0 if it does not have and 1 if it does; m) percentage of common stock owned by the controller (com), calculated as the ratio of the amount of common stock owned by the controller to the company's total common stock; n) percentage of the total capital owned by the controller (cap) calculated as the ratio of the number of shares owned by the controller to the company's total amount of shares.

3. – METHODOLOGY

3.1 – ASPECTS OF THE RESEARCH

The universe was composed of Brazilian publicly traded non-financial companies registered with the CVM as public companies on 31.3.2002, 31.3.2003, 31.3.2004, 31.3.2005 and 31.3.2006. The public companies during the years mentioned numbered 820 (2002), 780 (2003), 695 (2004), 627 (2005) and 620 (2006) respectively. Of this total, and on the same dates, 412 (2002), 391 (2003), 362 (2004), 355 (2005) and 339 (2006) companies had their shares listed on the São Paulo Stock Exchange.

The non-probabilistic sample investigated was composed solely of companies whose shares, listed on the São Paulo Stock Exchange, had liquidity and volatility different from zero (0) during the month of April in at least two of the following years: 2002, 2003, 2004, 2005 and 2006 or made their initial public offering in this period. The study chose April because it is immediately after the time of year when public companies publish their annual balance sheets and hold their annual shareholders meetings. The second criterion used was to include only those companies whose share volume was equal to or greater than 0.01% of the financial volume of trades involving the shares of the most traded stock on the São Paulo Stock Exchange during the period under consideration. At the end, the sample contained 99 companies, some of which entered the sample after 2002. Some of these companies entered in the sample during the study period, because they did their initial public offering (IPO) after 2002. So the sample was composed by 81 companies in 2002, 2003 and 2004, 89 in 2005, and 98 in 2006. The sub sample of energy companies was composed by 19 organizations in 2002, 2003,2004 and 2005, and 21 in 2006. Our database consists of about 20000 observations. In our tests we only have missing values, when we transformed some variables to meet the assumption of normality to run the regressions.

The study used secondary data obtained from Economática´s informatized data base and through documental research in the FS (Financial Statements) and AR (Annual Reports) obtained from the CVM and São Paulo Stock Exchange websites and, in the case of ADRs, from the companies themselves and the J.P.Morgan Bank. Based on the analysis of these documents questions were selected to construct the governance index. The answers to the questions had to be of a YES/NO kind. When the answer was YES, 1 point was scored and when it was NO, the score was 0 (zero). Finally the total number of points attributed to each of the companies surveyed was summed.

The limitations of the research included: a) problems of endogeneity in the variables assumed to be exogenous. In order to deal with this the research used the structural equations

method; b) it should be possible to measure the governance index to be used in the multiple linear regressions with a certain degree of certainty; c) there may possibly be non-normalcy problems in the distribution of the independent variables, but these can be controlled by transformations in the variables that do not pass the normalcy test; d) there may be significant correlations between the independent variables. In this case transformations can be made in these variables (using a natural or neperian logarithm, the inverse function or the square root), or the variable may even be excluded; e) there may be problems of multicollinearity, which can be resolved by transforming the variables or eliminating one of them; f) heteroscedasticity problems may also occur and can be resolved using regressions with White correction and weighting during the periods or cross sections; g) there may be problems regarding the identification of causality or even a relation of reverse causality between governance and risk, that can be minimized using the structural equations method; h) the non-intentional omission of important variables in the models that serve as studies may occur. In order to solve this problem a review of the literature was undertaken which sought to include all the important variables related to the subject; i) there may be difficulties in identifying a time trend, but panel data covering a period of five consecutive years can be used to nullify this effect; and j) there may be problems regarding the selection of the sample, given that the public company segment may include less riskier companies.

3.2 – **MODELS USED TO STUDY THE RISK VARIABLES**

In order to assess the effects that the governance index may have on the company risk variable it was assumed, in this first test, that risk can be measured by the following indicators: a) local beta, b) betasp, c) volatility (volat), d) idiosyncratic risk (idios) whose indicator is the standard deviation of the distribution of the difference between the returns that effectively occurred and the returns calculated using the company's local beta; and e) wacc.

The test is in accordance with those developed by Derwall and Verwijmeren (2007). The models to be tested are listed below. They are in accordance with Ashbaugh *et al.* (2004), and include the dependent variables mentioned above.

$RISK = \beta_0 + \beta_1 \cdot ICG + \beta_i . V_i + \varepsilon$, in which,

RISK represents the dependent variable whose indicators are local beta (localbeta); beta measured against the S&P 500 index (betasp); the volatility of the original distribution of the returns on shares (volat); and the idiosyncratic risk (idios), that is defined in this study to be standard deviation of the distribution of the difference between the returns that occurred and the theoretical returns calculated by the local CAPM, and wacc t + 1;

β_0 represents the constant term of the linear regression;

$\beta_1$represents the coefficient of the term related to the governance index and which represents this variable's impact on the dependent variables;

ICG represents the corporate governance index whose measurement was based on the answers to the questions listed in the Appendix;

β_i represents the coefficients of the terms related to the control or instrumental variables and which represent these variables' impact on the dependent variables;

V_i represents the control and instrumental variables that can provide explanatory power regarding the dependent variable studied;

where $i = \left\{ \frac{x}{1} < x < n, \text{where } x \in \aleph \text{ and } n < \infty \right\}$ and εrepresents the error term.

We constructed the second test based on the literature, especially in Cho (1998), Bhagat and Jefferis, Jr. (2005) and Böhren and Odegaard (2006), so we build a system of structural equations to measure the relationships between governance, risk and value.

The risk indicator was the sqr (*wacc*), the governance variable was sqr (*igc*) and the value variables were log (*mts*) and log (*mtbv*), all of these were variables with normal distribution.

Thus, the authors established the following set of equations covering governance, risk, and value:

Equation 1: $Risk = f_1(Governance, Value, \varepsilon_1)$,

Equation 2: $Governance = f_2(Risk, Value, \varepsilon_2)$,

Equation 3: $Value = f_3(Risk, Governance, \varepsilon_3)$,

where ε_i *is the error term of each equation* and $i = \{x \in \Re, \quad 1 < x < 3\}$.

3.3 – **HIPOTHESES**

From the theoretical framework presented, we tested the following hypotheses:
1. Higher levels of corporate governance practices are associated to lower levels of risk. Negatively correlated (-). The researcher expect results aligned to the results obtained by Drobetz et al. (2003), Chen et al. (2004) and Ashbaugh *et al.* (2004) among others;

4 – **RESULTS**

Regarding the governance index, for the five yearsperiod, the rates ranged from 6.4 points to 17 points, with an average of 9.86 and standard deviation of 2.02. We observed that the sample has a low average and an increasing dispersion. These numbers seem to indicate an increase in differences in the quality of governance, among companies, even though the

average is still very small. This phenomenon can be explained, in part, by the entry of new companies in the capital market, in recent years. These companies invested in higher levels of governance practices.

After undertaking the normalcy corrections the research performed the first test of the relation between the governance – sqr (icg) – variable and the indicators of the independent variable. The linear regression method was applied using structured and balanced panel data for the five years.

The first test used simple linear regression models with all the independent variables, models with weight correction, and models using weight corrections and White's homoscedasticity corrections. The results are presented in Table 1.

Table 1: Results of Test1 – All companies.

Multiple linear regressions using OLS method, with weights and White correction. Panel data between 2002 and 2006 for all companies. The symbol (*) corresponds to a value statistically significant at 15%. The symbol (**) corresponds to a value statistically significant at 10%. The symbol (***) corresponds to a value statistically significant at 5%. The symbol (****) corresponds to a value statistically significant at 1%. The symbol (*****) corresponds to a value statistically significant at 0,001%.

DEPENDENT VARIABLE	SQR (LOCAL BETA)	SQR (BETASP)	LOG (IDIOSSIN)	LOG (VOLAT)	SQR (WACC)
SQR (IGC)	**- 0,04841******	**- 0,06917*****	**- 0,0028**	**- 0,0903*****	**- 0,0736******
ADR23	0,07750*****	0,1918*****	-0,1244***		
IMOB	- 0,1023**	- 0,1023**			- 0,0374****
N2NM	- 0,1647*****	- 0,1616*****		- 0,1197**	
N2NMADR23	0,1598****	0,1363****	0,3378**	0,3139*****	
LOG (AFIN)				-0,0291***	
LOG (AOP)			0,0763***		-0,0328*****
LOG (CAP)	- 0,03343****	- 0,0458*****			-0,00798***
LOG (CONS)	- 0,08187*****	- 0,0904*****		- 0,1010***	
LOG (DE)	- 0,01162****	- 0,0199*****	0,0645****	0,0579****	- 0,0075*
LOG (INV)			0,0469**		- 0,0075****
LOG (LIQ)	0,05675*****	0,0713*****		0,1275****	
LOG EXP	- 0,03505****	- 0,03930**			0,0250****
LOG (MTBV)	- 0,05181*****	- 0,0573*****	0,2469****		- 0,0098***
PRI	- 0,04439***				0,0494****
SQR (ORD)	0,02284****	0,03111*****			0,0041***
TAM	- 0,03026***	- 0,0327*****	-0,1133***		
C	1,4928*****	1,7690*****	1,6203****	5,4699*****	0,5178****
Number of observations	313	313	313	313	313
R ²	0,9977	0,9786	0,1200	0,8644	0,2286
R ² adjusted	0,9976	0,9773	0,0700	0,8566	0,1841
DW	0,9144	0,8035	1,5661	1,4472	0,9490
F	7615,98	757,82	2,3745	110,6718	5,1417
p-value	0,0000	0,0000	0,0019	0,0000	0,0000

Next, we used the method of multiple linear regressions, in cross sections for the years 2002 to 2006, obtaining the following results, shown in tables 2 to 6.

Table 2: Results of Test1 – Energy companies – Local Beta.

Multiple linear regressions using OLS method, with weights and White correction. Panel data between 2002 and 2006 for all companies. The symbol (*) corresponds to a value statistically significant at 15%. The symbol (**) corresponds to a value statistically significant at 10%. The symbol (***) corresponds to a value statistically significant at 5%. The symbol (****) corresponds to a value statistically significant at 1%. The symbol (*****) corresponds to a value statistically significant at 0,001%.

DEPENDENT VARIABLE	SQR (LOCAL BETA) 2002	SQR (LOCAL BETA) 2003	SQR (LOCAL BETA) 2004	SQR (LOCAL BETA) 2005	SQR (LOCAL BETA) 2006
SQR (IGC)	**- 0,052******	-	-	-	-
ADR23	-	-	-	-	-
IMOB	-	-	-	-	-
N2NM	-	-	-	-	-
N2NMADR23	-	-	-	-	-
LOG (AFIN)	-	-	-	-	-
LOG (AOP)	-	0,005***	- 0,047****	- 0,079****	-
LOG (CAP)	-	0,005****	-	-	-
LOG (CONS)	0,061*****	-	-	-	-
LOG (DE)	-	-	-	-	-
LOG (INV)	-	-	-	-	-
LOG (LIQ)	-	-	-	-	-
LOG EXP	-	-	-	-	-
LOG (MTBV)	-	-	-	-	-
PRI	-	- 0,570*****	-	-	- 0,416***
SQR (ORD)	-	-	-	-	-
TAM	0,241*****	-	-	-	-
C	- 1,717*****	1,102*****	0,847*****	0,959*****	1,081*****
Number of observations	19	19	19	19	21
R ²	0,863	0,845	0,445	0,424	0,249
R ² adjusted	0,835	0,814	0,413	0,390	0,210
DW	2,231	0,779	1,620	1,500	1,302
F	31,389	27,176	13,645	12,496	6,309
p-value	0,000	0.000	0,000	0,003	0,021

Table 3: Results of Test1 – Energy companies – Beta S&P.

Multiple linear regressions using OLS method, with weights and White correction. Panel data between 2002 and 2006 for all companies. The symbol (*) corresponds to a value statistically significant at 15%. The symbol (**) corresponds to a value statistically significant at 10%. The symbol (***) corresponds to a value statistically significant at 5%. The symbol (****) corresponds to a value statistically significant at 1%. The symbol (*****) corresponds to a value statistically significant at 0,001%.

DEPENDENT VARIABLE	SQR (BETA S&P) 2002	SQR (BETA S&P) 2003	SQR (BETA S&P) 2004	SQR (BETA S&P) 2005	SQR (BETA S&P) 2006
SQR (IGC)	-	-	-	-	-
ADR23	-	-	0,602****	-	-
IMOB	-	-	-	-	-
N2NM	-	-	-	-	-
N2NMADR23	-	-	-	-	-
LOG (AFIN)	-	-	-	-	-
LOG (AOP)	-	-	- 0,045****	-0,072***	-
LOG (CAP)	-	-	0,597***	-	-
LOG (CONS)	0,170*	-	-	-	-
LOG (DE)	-0,160*	-	-	-	-
LOG (INV)	-	-	-	-	-
LOG (LIQ)	-	-	-	-	-
LOG EXP	-	-	-	-	-
LOG (MTBV)	0,743**	-	-	-	-
PRI	-	-	-	-	-
SQR (ORD)	-	-	-	-	-
TAM	0,905**	-	-	-	-
C	-	-	0,706*****	1,154*****	-
Number of observations	19	19	19	19	21
R^2	0,956	0,953	0,689	0,245	0,815
R^2 adjusted	0,736	0,578	0,627	0,200	0,077
DW	2,088	1,432	1,877	1,883	3,029
F	0,4352	2,543	11,082	5,505	1,104
p-value	0,126	0,319	0,000	0,031	0,516

Table 4: Results of Test1 – Energy companies – Idiossincratic Risk

Multiple linear regressions using OLS method, with weights and White correction. Panel data between 2002 and 2006 for all companies. The symbol (*) corresponds to a value statistically significant at 15%. The symbol (**) corresponds to a value statistically significant at 10%. The symbol (***) corresponds to a value statistically significant at 5%. The symbol (****) corresponds to a value statistically significant at 1%. The symbol (*****) corresponds to a value statistically significant at 0,001%.

DEPENDENT VARIABLE	**LOG (IDIOSSIN) 2002**	**LOG (IDIOSSIN) 2003**	**LOG (IDIOSSIN) 2004**	**LOG (IDIOSSIN) 2005**	**LOG (IDIOSSIN) 2006**
SQR (IGC)	-	-	-	-	-
ADR23	-	-	-	-	-
IMOB	0,360*	-	-	-	-
N2NM	-	-	-	-	-
N2NMADR23	-	-	-	-	-
LOG (AFIN)	-	-	-	-	0,002****
LOG (AOP)	-	-	0,008****	-	-
LOG (CAP)	-	0,005*	-	-	-
LOG (CONS)	-	-	-	-	- 0,116*****
LOG (DE)	-	-	-	-	
LOG (INV)	-	-	-	-	0,005****
LOG (LIQ)	-	-	-	-	0,108****
LOG EXP	-	-	-	-	0,404*****
LOG (MTBV)	-	-	0,020***	-	-
PRI	-	-	-	-	-
SQR (ORD)	0,482*	-	-	-	-
TAM	-	-	-	-	- 0,723*****
C	- 1,004**	-	0,099*****	-	4,901*****
Number of observations	19	19	19	19	21
R ²	0,828	0,973	0,500	0,879	0,929
R ² adjusted	- 0,030	0,759	0,437	- 0,086	0,899
DW	1,974	2,037	2,052	2,033	2,475
F	0,965	4,534	7,991	0,911	30,737
p-value	0,565	0,196	0,004	0,643	0,000

Table 5: Results of Test1 – Energy companies – Volatility.

Multiple linear regressions using OLS method, with weights and White correction. Panel data between 2002 and 2006 for all companies. The symbol (*) corresponds to a value statistically significant at 15%. The symbol (**) corresponds to a value statistically significant at 10%. The symbol (***) corresponds to a value statistically significant at 5%. The symbol (****) corresponds to a value statistically significant at 1%. The symbol (*****) corresponds to a value statistically significant at 0,001%.

DEPENDENT VARIABLE	**LOG (VOLAT) 2002**	**LOG (VOLAT) 2003**	**LOG (VOLAT) 2004**	**LOG (VOLAT) 2005**	**LOG (VOLAT) 2006**
SQR (IGC)	-	-	-	-	-
ADR23	-	-	-	-	-
IMOB	-	202,621*	-	48,073*****	-
N2NM	-	-	-	-	-
N2NMADR23	-	-	-	-	-
LOG (AFIN)	-	-	-	-	-
LOG (AOP)	-	-	- 1,787***	- 2,209****	-
LOG (CAP)	-	-	-	-	-
LOG (CONS)	-	-	-	-	-
LOG (DE)	-	-	-	-	-
LOG (INV)	-	-	-	-	-
LOG (LIQ)	-	-	-	-	-
LOG EXP	-	-	-	-	-
LOG (MTBV)	-	-	-	- 1,969***	-
PRI	-	-	-	-	-
SQR (ORD)	-	-	-	- 25,582***	-
TAM	-	-	-	-	-
C	-	-	44,163*****	43,198*****	-
Number of observations	19	19	19	19	21
R ²	0,675	0,942	0,237	0,819	0,530
R ² adjusted	- 0,947	0,477	0,192	0,717	-1,348
DW	1,994	2,084	2,113	1,956	3,045
F	0,416	2,026	5,270	15,794	0,282
p-value	0,892	0,381	0,035	0,000	0,970

Table 6: Results of Test1 – Energy companies – WACC.

Multiple linear regressions using OLS method, with weights and White correction. Panel data between 2002 and 2006 for all companies. The symbol (*) corresponds to a value statistically significant at 15%. The symbol (**) corresponds to a value statistically significant at 10%. The symbol (***) corresponds to a value statistically significant at 5%. The symbol (****) corresponds to a value statistically significant at 1%. The symbol (*****) corresponds to a value statistically significant at 0,001%.

DEPENDENT VARIABLE	SQR (WACC) 2002	SQR (WACC) 2003	SQR (WACC) 2004	SQR (WACC) 2005	SQR (WACC) 2006
SQR (IGC)	-	-	-	-	-
ADR23	-	0,171*	-	-	-
IMOB	-	-	-	-	-
N2NM	-	-	0,200****	-	-
N2NMADR23	-	-	-	-	-
LOG (AFIN)	-	-	-	-	-
LOG (AOP)	-	-	-	-	-
LOG (CAP)	-	-	-	-	-
LOG (CONS)	-	-	-	-	0,041****
LOG (DE)	- 0,069**	-	-	-	-
LOG (INV)	0,00006*	- 0,015**	-	-	-
LOG (LIQ)	-	-	-	-	-
LOG EXP	-	-	-	-	-
LOG (MTBV)	0,282***	0,179*	-	-	-
PRI	-	-	-	-	-
SQR (ORD)	-	-	- 0,130***	-	-
TAM	-	-	-	-	-
C	-	-	0,204*****	-	- 0,242**
Number of observations	19	19	19	19	21
R^2	0,859	0,961	0,577	0,900	0,384
R^2 adjusted	0,151	0,647	0,524	0,096	0,351
DW	1,847	2,062	1,833	2,072	2,648
F	1,214	3,058	10,892	1,119	11,839
p-value	0,999	0,274	0,001	0,571	0,003

In the second test we used the structural equations. We applied the method with log(mtbv) and log(mts) as value variables. We obtained the results shown in tables 7 and 8.

Table 7: Relations between governance, risk and value with log(mtbv) as value variable
The symbol (***) represents a statistically significant value of 0.001%. The fitting parameters of the model 11 are: NCP – 0 (comparative); SNCP – 0 (NCP/Sample size); GFI – 1,000 (equal or greater than 0,90 – comparative); PGFI – (-) (between 0 e 1,0 – comparative) e CFI – 1,000 (between 0 e 1,0).

	GOVERNANCE (sqrigc)	**RISK** (sqrwacc)	**VALUE** (logmtbv)
GOVERNANCE (sqrigc)	-	- 0,192	0,253
RISK (sqrwacc)	- 0,192	-	- 0,099
VALUE (logmtbv)	0,253	- 0,099	-
Covariances	**GOVERNANCE** (sqrigc)	**RISK** (sqrwacc)	**VALUE** (logmtbv)
GOVERNANCE (sqrigc)	-	- 0,009***	0,034***
RISK (sqrwacc)	- 0,009***	-	- 0,006***
VALUE (logmtbv)	0,034***	- 0,006***	-
λ^2 (Chi-square)	0,000		
Degrees of freedom	2		
p-value	-		

Table 8: Relation between governance, risk and value with log(mts) as value variable
The symbol (***) represents a statistically significant value of 0.001%. The fitting parameters of the model 11 are: NCP – 0 (comparative); SNCP – 0 (NCP/Sample size); GFI – 1,000 (equal or greater than 0,90 – comparative); PGFI – (-) (between 0 e 1,0 – comparative) e CFI – 1,000 (between 0 e 1,0).

Model 12	**GOVERNANCE** (sqrigc)	**RISK** (sqrwacc)	**VALUE** (logmts)
GOVERNANCE (sqrigc)	-	- 0,192	0,123
RISK (sqrwacc)	- 0,192	-	- 0,130
VALUE (logmts)	0,123	- 0,130	-
Covariances	**GOVERNANCE** (sqrigc)	**RISK** (sqrwacc)	**VALUE** (logmts)
GOVERNANCE (sqrigc)	-	- 0,009***	-
Risco (sqrwacc)	- 0,009***	-	-
VALUE (logmts)	-	-	-
λ^2 (Chi-square)	0,000		
Degrees of freedom	2		
p-value	-		

5 – **CONCLUSIONS**

The evidence obtained by applying the linear regression method to analyze the relation between governance and risk in the first test performed, provided a solid basis for inferring that companies with best governance practices are perceived by the market to have lower levels of risk, for the sample with all companies. The sample of energy companies was small for the application of the test with panel data. Thus, tests were performed with linear regression for each year of the studied period. Only in 2002, the IGC had high statistical significance as a factor for explaining local Beta.

The results mentioned before are in tune with those obtained by Derwall and Verwijmeren (2007) for beta, idiosyncratic risk and the implicit cost of capital. Thus the hypothesis was confirmed that investors and other market institutions have, in recent years, afforded differentiated treatment to companies with better governance practices. Thus companies with best governance practices have lower costs and are perceived by the market to have lower levels of risk, which is reflected in the day-to-day trading of their shares. This relation suggests that governance is associated with value generation through the decline in the companies' risk and their cost of capital.

The results obtained by applying the structural equations method reinforce the evidence obtained from the tests using the linear regression method with all the companies. The results of the structural models confirmed the relation between better governance indicators and lower risks. So, the endogeneity does not seem to have affected the results obtained using the linear regression method.

This study ends with some suggestions for future research: a) the number of companies in the energy sample could be increased in order to permit the application of the linear regressions with panel data and tests with the structural method.

6 – **REFERENCES**

ASHBAUGH, Hollis; COLLINS, Daniel W.; LAFOND Ryan. Corporate governance and the cost of equity capital. Available on the site www.ssrn.com, December, 2004.

BHAGAT, Sanjai; JEFFERIS, Jr., Richard H. The econometrics of corporate governance studies, 2ª edition, The MIT Press, 127 p., March, 2005.

BLACK, Bernard S.; JANG, Hasung; KIM, Woochan. Does corporate governance predict firm's market values? Evidence from Korea. Journal of Law, Economics and Organization, v. 22, n. 2, p. 366-403, January, 2006.

BÖHREN, Oyvind; ODEGAARD, Bernt Arne. Governance and performance revisited. In: International Corporate Governance after Sarbanes-Oxley, Paul Ali and Greg Gregoriou editors, p. 27-64. Wiley - IEEE press, 2006.

CASTRO, Nivalde; SILVA LEITE, André. Regulatory Challenges: competition defense in the Brazilian electricity sector. In Jacobs, Noah. (Org) Energy Policy: economic effects, security aspects and environmental issues. New York. Nova Science Publishers. 2009, Chapter 11, pp. 267-278

CHEN, Kevin C. W.; CHEN, Zhihong; WEI, K. C. John. Disclosure, corporate governance and the cost of capital: evidence from Asian's emerging markets. Disponível no site www.ssrn.com, June, 2004.

CREMERS, K. J. Martinj; VINAY, Nair. Governance mechanisms and equity prices. The Journal of Finance, v. 60, nº 6, p. 2859, December, 2005.

DERWALL, Jeroen; VERWIJMEREN, Patrick. Corporate governance and the cost of equity capital: evidence from GMI´s governance rating. European Centre for Governance Engagement, research note, January, 2007.

DROBETZ, Wolfgang; SCHILLHOFER, Andreas; ZIMMERMANN, Heinz. Corporate governance and expected stock returns: evidence from Germany. WWZ/Departament of Finance, working paper nº 2, January, 2003.

LAMEIRA, Valdir de Jesus. Governança corporativa, risco e desempenho das companhias abertas brasileiras. Tese de Doutorado em Administração de Empresas, PUC-Rio, dezembro,2007.

LEAL, R. P. C.; DA SILVA, A. L. Carvalhal. Corporate governance, value and dividend payout in Brazil and Chile. Inter-American Development Bank. Research Network Working Paper R-516, October, 2005.