Corporate Governance and Credit Access: The Sarbanes-Oxley Act as a Natural Experiment

Abstract

This paper examines the effect of changes on corporate governance levels on the choice of firms' debt financing, taking advantage of Sarbanes-Oxley Act as a natural experiment. Further our paper analyzes a specific benefit of SOX on terms of debt finance in a credit rationing environment. Our empirical methodology uses an experiment-like design in which we control for observed and unobserved firm heterogeneity via a differences-in-differences matching estimator. We evidence that firms subjected to this new regulation, that raised the governance requirements, observe a positive effect on their access to the credit market, increasing their debt level significantly, and reducing the cost of debt, evidencing an economic gains from SOX.

Key-Words: Credit; Corporate Governance; Experiment.
JEL Codes: E51; G38; C99.

1 Introduction

A major issue about corporate finance research is the endogenous relation between corporate governance, firms' wiliness to borrow and interest rates. Intuitively, better corporate governance schemes decrease information asymmetry, alleviating moral hazard problem and improving the terms of credit. On the other hand, debt can work as a discipline mechanism inducing managers to: i) better allocate of free cash flows, ii) higher self-effort, iii) contingent control allocation.[1] Therefore, it is difficult to identify a causal link going from corporate governance to firms' debt financing decisions.

After the failures of Enron, WorldCom, Adelphia and others, academics, politicians and the press have discussed about the corporate governance quality.[2] These huge bankruptcies have boosted a legislative reform – called The Sarbanes-Oxley Act (henceforth SOX) – to improve governance schemes. Also, the debate at the media pointed to an increasing attention of corporations on governance issues.[3]

Coates (2007) states that despite the higher costs created by this new lagislation on internal controls, Sarbanes-Oxley promises a variety of long-term benefits since investors face a lower risk of losses from fraud and theft, and benefit from more reliable financial reporting, greater transparenvy

[1] See Jensen and Meckling (1976), Zwiebel (1995), Innes (1990) and Aghion and placeBolton (1992).

[2] See for example "After 10 Years, Corporate Oversight Is Still Dismal" (The New York Times, 01/26/2003)

[3] See for example "After High-Profile Corporate Busts, Governance Consulting Booms" (The Washington Post, 12/27/2002).

and accountability. As one of its potential results, public companies would pay a lower cost of capital. On the other hand, the Study of the Sarbanes-Oxley Act of 2002 Section 404 Internal Control over Financial Reporting Requirements from SEC (2009) reports the following: "Nonetheless, the evidence suggests that survey participants do not perceive the direct improvements in the reporting process to affect the companies dealings with capital market participants. For instance, respondents recognize virtually no effect from Section 404 implementation on companies' cost of capital or the ease with which they access capital markets." Thus, the main contribution of the present paper is to measure the corporate governance effects from SOX on firms' debt financing policy.

Further, our results bring new evidences on a specific benefit of SOX, since we are exploring the gains of firms in the terms of credit. Much research has been done focusing on the overall costs and benefits of SOX. Leuz (2007) points that the main problem in assessing net effects of SOX is about the difficulty to find a control group of firms that is not affected and comparable to firms affected by SOX. This shortcoming makes it difficult to remove market-wide effects that are unrelated to SOX. In addition, Coates (2007) states that existing studies of SOX are confounded by the presence of contemporaneus economic and legal events, since the legislation was enacted amidst sharp financial and economic changes. Coates says that "It makes a large number of simultaneous, disparate legal changes, which continue to be implemented and phased in over time. . . . Given the corporate scandals of the early 2000s, and the awareness of this behavior by investors and other market participants, the chances are good that public and private enforcement and manager behavior would have changed even had Sarbanes-Oxley not been enacted."

To isolate the effect of SOX on debt financing policy from the other shocks, we have to find a tratment and control groups that are subjected to the same shocks, except for the SOX implementation. To do this, we use differences-in-differences approach that accounts for unobservable time effects. The variation over time and groups provide a potential instrument to identify the causal effect of better governance as required by SOX over debt variables. Since the new law provides an exogenous shock on governance requirements to all US public companies and to non-US firms listed on levels 2 and 3 ADRs, and it does not apply to foreign companies non-listed or listed at levels 1 or 4 ADRs, the cross-listing make viable the natural experiment, where the treatment group are those companies subjected to the Act (cross-listed firms at levels 2 and 3) and the control group is composed by some companies that are neither subject to the Act (cross-listed firms at levels 1 and 4) nor exposed to US regulation (no cross-listed firms).

However, while we argue that cross-firm variation in the terms of debt that comes due right after the Sarbanes-Oxley Act is exogenous, one might wonder if other sources of firm heterogeneity could underlie the relations we might observe. To tackle this concern, we use a differences-in-differences matching estimator that incorporates observable firm characteristics and accounts for unobservable firm effects. In this procedure, the specification instead of represents a model that try to fully explains the endogenous variable, it focus on ensuring that variables that might influence the selection into tratment and observed outcomes are appropriately accounted in the estimation. The variation over time and groups provide a potential instrument to identify the causal effect of better governance as required by SOX over debt variables.

To implement such experiment we use an environment that provides two different sets of firms: the one that was affected by SOX (called treatment group) and another group that was not affect by SOX (called control group). To reduce the concerns about selection we match firms under SOX requirements (treatment), with control firms that were not subjected to the new regulation. We match these groups of firms based on their financial and accounting characteristics such as asset size, industry sector classification; cash holdings; price-to-book ratio; beta; etc. The matching

process is used to assure that we are comparing very similar firms except from the fact that some of them are not subjected to SOX regulation. Also, we account for time invariant firm heterogeneity since we compare within-firm changes in the variable of interest, from the period that proceeds the reform to the period that follows the reform. Also, we perform falsification tests that replicates our matching estimators in pre-reform period to verify that the result wasn't only drove by the time trend.

Under this approach, the Sarbanes-Oxley Act (SOX) will be our natural experiment used to test the effect of changes in the level of corporate governance on debt finance. Since the new law provides an exogenous shock on governance requirements to all US public companies and to non-US firms listed on levels 2 and 3 ADRs, and it does not apply to foreign companies non-listed or listed at levels 1 or 4 ADRs, the cross-listing make viable the natural experiment, where the treatment group are those companies subjected to the Act (cross-listed firms at levels 2 and 3) and the control group is composed by some companies that are neither subject to the Act (cross-listed firms at levels 1 and 4) nor exposed to US regulation (no cross-listed firms). An inportant issue to be considered here is how steady is the cross-listing decision, since it may influence our identification strategy. Under an significant increase of costs brought by the SOX, the listing decision is endogenous to the regulation and therefore they can "Go Dark" after SOX, biasing our estimation. Marosi and Massoud (2008) argues that foreign firms find deregistration extremely difficult, and usually they "can check in, but they can't check out".[4] Leuz et al. (2008) documented a significant increase in the going dark decision, and it was attributable to the Sarbanes-Oxley Act.

A country where that scenario applies would fulfill our experiment requirements. Brazilian firms use extensively American Depositary Shares (ADSs) programs,[5] implying that part of our sample is subjected to the SOX regulation. Also, none of the Brazilian firms cross-listed in the ADR level 23 program deregistrated in the period post-SOX, which allows our identification strategy. They face extremely high level of interest rate spread[6] due to poor legal enforcement[7] and creditors protection, which ends at an underdeveloped credit market with severe credit constraints to the Brazilian firms. To exemplify it, at 2002 the Brazilian ratio of private credit to GDP was 0.35, while the average of OECD countries was 1.02 and Latin America and the place Caribbean countries 0.44. Moreover, the Brazilian interest rate spread (49%) is more than four times larger than the average spread in Latin American countries (11%) and more than twelve times larger than the average for OECD countries (3.87%).[8] So, even with the addition of the SOX costs the cross-listed credit market "outside option" inhibits their decision to "go dark".

The impact of SOX on firms has been investigated from various perspectives, but mostly on net effects of SOX. Kamar et al. (2005), Engel, Hayes and Wang (2007), and Leuz et al. (2008) analyze the effect of SOX on firm's decision of going-private and going-dark. Piotroski and Srinivasan (2007) examine the economic impact of SOX by analyzing foreign listing behavior onto U.S and placecountry-regionUK stock exchanges. Several papers use event studies and find contradictory evidence from SOX on firms returns. Li et al. (2004) and Rezaee and Jain (2005) find positive reactions to SOX while Zhang (2007) find negative reactions. Berger et al. (2005), Smith (2007)

[4] We choose a sample that none of the firms cross-listed deregistred in the post-SOX period. Brazillian firms have this feature.

[5] According to JP Morgan (www.adr.com). In July 2008 Brazil were in the top three country with cross-listed firms in US, just behind UK and Japan.

[6] According to World Bank WDI database, placecountry-regionBrazil has been one of the leading countries in interest rates spread during the last 10 years.

[7] According to Durnev and Kim (2005), only country-regionColombia ranks above country-regionplaceBrazil in terms of legal enforcement.

[8] All the values are referent to the 1997-2002 period. Source: World Development Indicators (2004).

and Litvak (2007) analyze how SOX impacts on cross-listed foreign companies. Berger et al. (2005) compare returns to cross-listed foreign companies to returns to US issuers. According to Litvak (2007, p.197) "this lets them evaluate cross-sectional variation in reaction based on home-country characteristics, but they cannot assess overall investor reaction to SOX, because they lack a control group of companies to which SOX does not apply". Smith (2007) adopts an event study approach to test the impacts from SOX and Litvak (2007) applies a natural experiment approach, controlling for contemporaneous events through a combination of (i) comparing level-2 and 3 cross-listed to non-cross-listed firms, and (ii) comparing level-2 and 3 matched pairs (firms), to level-1 and 4 pairs (firms).

On the specific costs and benefits of SOX, Eldridge and Kealy (2005) examine the cost of the new internal control audit required by SOX for a sample of Fortune 1000 companies, Cohen et al. (2004) study the SOX impact on compensation structure and risk-taking incentives of CEO's and Paligorova (2008) investigate the effect on executive compensation.

Our paper contributes the literature by analyzing a specific benefit (if any) of SOX - iselated from other contemporaneous events - on the terms of debt finance, also, this natural experiment approach gets around the concern that corporate governance and debt are endogenous, and presents an alternative to instrumental variables techniques.

Our main results show that the firms affected by the Sarbanes-Oxley Act increase their total amount of debt of approximately 10% percent more than similar firms that were not affected by SOX. Moreover, we found that both the long-term debt increase approximately 40%, while no effect was evidenced in the short-term debt. Finally, we found that the interest rate charged to firms reduced approximately 18%, which is consistent to an expected reduction in moral hazard costs due to the gains in corporate governance.

The remainder of this paper is structured as follows: section II describes the relation between The Sarbanes-Oxley Act and corporate governance; section III describes the empirica design; section IV presents the database and the main descriptive statistics; section V presents the main results that evidence the effect of corporate governance on firms' debt financing; section VI concludes.

2 The Sarbanes-Oxley Act and Corporate Governance

The Sarbanes-Oxley Act, also known as the Public Company Accounting Reform and Investor Protection Act, enforce changes that affect executive payment compensation and fraud punishment, board and shareholder monitoring, establishing a new audit board, harsher internal controls mechanisms, higher responsibility to senior executives and many other specific issues.[9]

To be more precise, one provision related to executive payment requires the CEO and CFO to discharge any profits from bonuses and stock sales during the twelve-month period that follows a financial report that is subsequently restated due "misconduct". This provision increases their risk of selling a large amount of stock or options in any one year while still in office, inducing a conservative behavior until they are no longer in those positions before selling equity or exercising options. Also, this requirement will act as a deterrent to negligent or deliberate misreporting. Therefore, two sources of moral hazard behavior are mitigated with this requirement, first the ex ante effect due to a reduction of negligent/deliberate misreporting actions and second the ex post effect that inhibits CEOs and CFOs risk investment choices to improve personal gains.

Shareholder-related provisions enhanced financial disclosure. SOX requires more detailed disclosure of off-balance-sheet financings and special purpose entities, which should make it more

[9] See Holmstrom and Kaplan (2003) for more details.

difficult for companies to manipulate their financial statements in a way that boosts the current stock price. The Act also includes several provisions designed to improve board monitoring. These focus largely on increasing the power, responsibility, and independence of the audit committee. SOX requires that the audit committee hire the outside auditor and that the committee consist entirely of directors with no other financial relationship with the company. Such changes in the monitoring practice increase the chances of some misconduct be identified, reducing the expected gains from moral hazard actions.

Finally, the new law increases CEOs, CFOs and the board's responsibility for financial reporting and the criminal penalties for misreporting. This issue clearly increases their cost of misconduct, probably inducing less opportunistic behavior. Table N summarizes the set of mandates of SOX.

Table N: Sarbanes–Oxley Act of 2002: Summary of Provisions

Sections	Topics
101–109	PCAOB's creation, oversight, funding, and tasks
302, 401–406, 408–409, 906	New disclosure rules, including control systems and officer certifications
201–209, 303	Regulation of public company auditors and auditor–client relationship
301, 304, 306, 407	Corporate governance for listed firms (audit committee rules, ban on officer loans)
501	Regulation of securities analysts
305, 601–604, 1103, 1105	SEC funding and powers
802, 807, 902–905, 1102, 1104, 1106	Criminal penalties
806, 1107	Whistleblower protections
308, 803–804	Miscellaneous (time limits for securities fraud, bankruptcy law, fair funds)

Source: Coates (2007)

To sum up, the requirements enforced by SOX induce an improvement in the corporate governance system since it reduces the potential gains from managers, increases their probability of being caught and their cost of misconduct.

2.1 A simple model

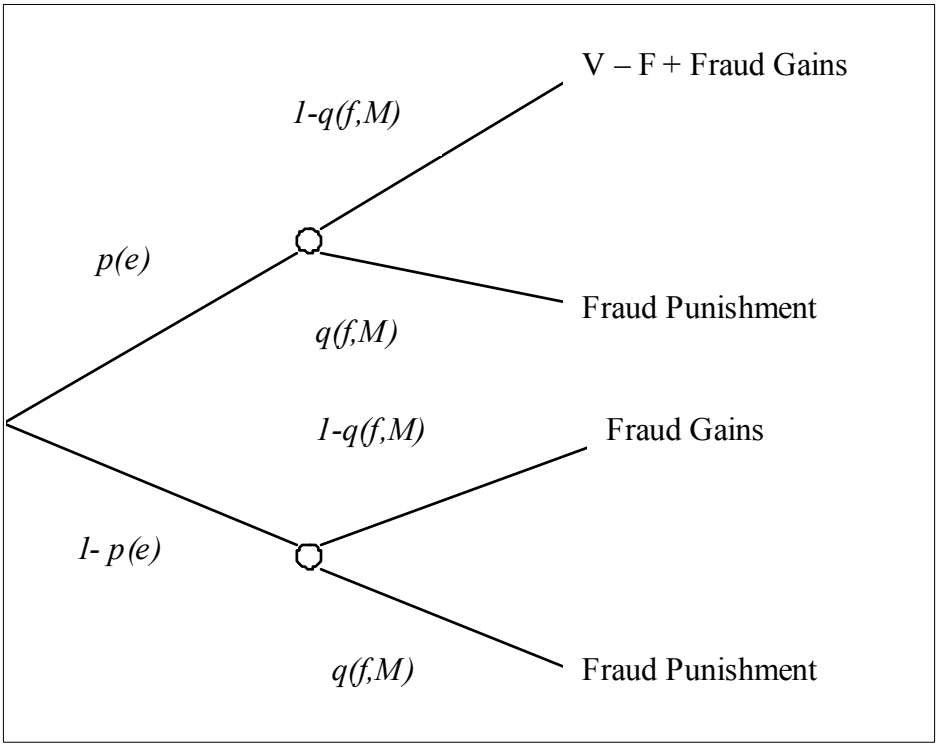
To analyze the potential effect of the new law on corporate governance, let us consider an asymmetric-information problem with regard to the level of effort and fraud that managers – that run debt financing firms – choose when they pursue projects. Since creditors do not observe the variable effort and fraud, they are not able to know whether a borrowing firm chose the optimal effort level. The manager may allocate their time in effort (e) to pursue the project success and fraud (f) to deviate, somehow, gains of the project for himself. Thus, their time is divided by e + f that is equal to the time spent in the firm á (á = e + f). The manager's decision on effort and fraud affect the chance of be caught and the success of firm's investment. We assume that the probability of success of the investment project increases with the manager's effort level. In precise terms, we assume that the probability of the firm be solvent (p $_{solv}$(e)) is differentiable, strictly increasing, and strictly concave in the effort variable e, that

$$\lim_{e \to 0} p'_{solv}(e) = \infty$$

meaning that is efficient for the firm to choose a positive effort level and that $p_{solv}(\alpha) < 1$ for the insolvency state be always possible. Also, since there is a chance of manager be caught, we assume that this probability increases with manager's fraud level (f) and the monitoring level (M). In precise terms, the probability of the manager be caught ($q(f, M)$) is differentiable and strictly increasing in the fraud (f) and monitoring variable (M) , and that $q(f, M)$<1 for the fraud not be discovered be always possible.

The manager gains from fraud are positive function of the level of fraud G(f) and its cost (C_f) is the punishment imposed by the legislation. The dynamics of this problem is illustrated by the figure 1. The figure represents the managers expected return as function of his choice on fraud and effort. The firm can succeed and be solvent, providing a return of V. After the payment to creditors F (debt face value) the value that remains for the manager is V – F. If the manager commits fraud and he is not caught he adds the gains of fraud ($V - F + Fraud\ Gains$), otherwise, if he is caught, he receives a punishment (C_f). The firm can go to bankruptcy, providing a return of zero for managers and v for creditors (where v < F). If the manager commits fraud and if he is not caught, his gains comes only from fraud (Fraud Gains), otherwise, if he is caught, the punishment is applied (C_f).

Figure 1: Manager's output tree.



Thus, from the manager's perspective, he chose the level of effort and fraud to maximizes his expected wealth:

$$\max_{f,e} E(W) = p(e)[q(f,M)(-C_f) + (1-q(f,M))(V-F+G(f))] +$$
$$(1-p(e))[q(f,M)(-C_f) + (1-q(f,M))(G(f))$$
$$s.t.\ \alpha = e + f$$

The problem can be simplified and re-written as:

$$\max_f E(W) = p(\alpha - f)(1-q(f,M))(V-F) + (1-q(f,M))G(f) - q(f,M)C_f$$

The manager exerts fraud until its marginal gain be equal to its marginal cost. The optimal level of fraud is function of gains from solvency, gains from fraud, level of monitoring, level of punishment, etc. Thus we can write the optimal choice of fraud as

$$f^* = f(V-F, \alpha, G(\cdot), M, C_f).$$

Notice that the last two exogenous variables (M and C_f) are directly affected by the Sarbanes-Oxley Act. So, the question that we address to answer is: How an increase in the monitoring level (M) and punishment for fraud (C_f) may affect managers decision on fraud and effort on firms` projects? To see the effect lets take the manager`s expected wealth and divide in three parts:

1) Benefit from solvency:

$$p(\alpha - f)(1-q(f,M))(V-F)$$

2)Benefit from not be caught:

$$(1-q(f,M))G(f)$$

3) Cost of Fraud:

$$q(f,M)C_f$$

Suppose that the monitoring level increases from M to M', where M'>M. In this case, for a higher monitoring level, the level of fraud (f) has a stronger effect on the probability of being caught, increasing $q(f,M)$ and as consequence reducing the marginal benefits from fraud in solvency states and from states which manager is not discovered (1 and 2 respectively). Also, it increases the marginal cost of fraud, since it increases its expected cost (3). Therefore, since a higher level of monitoring reduces the marginal benefit from fraud and increases its marginal cost, the optimal level falls from f* to f**

$$(f^* > f^{**}).$$

We can apply the same idea for the punishment level C_f. Lets suppose an increase of C_f, where

$$C'_f > C_f.$$

In this case, there is no change in the benefit (1 and 2), however, it increases the marginal cost of fraud (3). Therefore, since the marginal cost increases, the optimal level falls from f^* to f^{**}

$$(f^* > f^{**}).$$

Therefore, once we observe a fall at fraud level, more time will be expended for effort on firms' projects (since $\alpha = e + f$), reducing the moral hazard problem.

Proposition 1 *An increase in the Monitoring level (M) reduces the moral hazard problem.*

Proposition 2 *An increase in the cost of fraud (C_f) reduces the moral hazard problem.*

With a reduction in the fraud level (f), the time allocated by the manager on effort for firm's project increase (e), making more possible the solvent state of nature (it increases p(e)) and less possible the insolvency. This effect reduces the risk of lending of the creditors, making the terms of credit better to the firms and, as consequence, motivating the firms' debt financing.

3 Empirical Design

In this section we will describe our experiment and the matching difference-in-difference method used in the paper.

3.1 The Sarbanes-Oxley Act as an Experiment

The basic idea of exploiting the implementation of SOX regulation is that it provides a way to identify the effect of changes at corporate governance on firms' debt financing policy.

As stated by Modigliani-Miller model of frictionless capital market, the financing policy is irrelevant since it does not have any effect on firms' value. However, it is only true under several hypothesis, including the non existence of asymmetric information, i. e., there is no corporate governance problems in their economy.

Lately, problems related to corporate governance has been a recurrent topic of researchers agenda, mostly due to the recent financial scandals. Therefore, in the presence of corporate governance problems, the relevance of firms' financial policy increases.

The problem to deal with the relation between corporate governance and the debt financing is their endogenous relation. To approach this issue, our identification strategy requires that the governance level has to be enough variation to allow comparison accross firms. Also, the variation of the corporate governance level needs to be exogenous and independent from the firms' financing policy. The SOX represents this exogenous shock on the corporate governance level that is independent from firms' financing policy.

The major problem concerning the use of SOX as an experiment is the fact that is difficult to disentangle its effects from other shocks occuring simultaneously the financial and economic field. The legislation was enacted amidst sharp financial, economic, and political changes.

To isolate the effect of SOX on debt financing policy from the other shocks, we have to find a tratment and control groups that are subjected to the same shocks, except for the SOX implementation. Since the new law provides an exogenous shock on governance requirements to all non-US firms listed on levels 2 and 3 ADRs (treatment group), and it does not apply to foreign companies non-listed or listed at levels 1 or 4 ADRs, the cross-listing make viable the natural experiment (non-treatment group). Then, to minimize the concerns about selection we use matching estimation techniques to build our control group selected from the non-treatment group, ensuring that variables that might influence the selection into tratment are appropriately accounted into the estimation. Finally, we have to consider in the model the cross-listing decision, since it may

influence our identification strategy. The listing decision is endogenous to changes in regulation and therefore it can produce a bias in our estimation. With the adoption of SOX, the costs of cross-listing increases inducing firms to "go dark".[10] Using data on Brazilian firms we can avoid this estimation problem since they use extensively American Depositary Shares (ADSs) programs - implying that part of our sample is subjected to the SOX regulation - and none of the cross-listed in the ADR level 23 program deregistrated in the period post-SOX, which allows our identification strategy.

3.2 Matching Diffence-in-Difference Estimators (MDID)

We want to test wether firms had their decision on debt financing policy altered afeter the SOX be in force. Our objective is to develop an identification strategy that represents a "random" experiment, that is, any brazilian publicly traded firm had a positive chance to be regulated by the SOX. If one believe that the shock on corporate governance level was truly randomly assigned accross firms, then it would be suffice to compare the ex-post terms of credit of firms that were affected by SOX with those not affected by the law.

Our analysis, however, needs to allow the fact that we are not in a true randomly experiment, since there is some firms ' characteristics correlated with the exogenous shock, for example, the firms subjected to SOX are those that join the ADS program. In the absence of a controlled randomized trial, we are forced to turn to non-experimental methods that mimic it under reasonable conditions.

Since we are interested to quantify the impact of changes in the corporate governance level on terms of credit, we need carefully identify a group of firms that are virtually similar to those that suffered a change in their corporate governance except for the fact that they do not suffered this shock. That is, we need to pin down the counterfactual firm financing policy in the period of SOX because it would represent the financing policy of the firms if they did not suffer the changes in the corporate governance level.

A commom approach to this problem is running an OLS regression that separates the treatment and control groups via an indicator variable. The effect of the treatment is measured by the coefficient of the variable indicator. Some control variables as asset size, profitability, risk, etc are usally added to capture some heterogeneity. However, the OLS procedure may introduce few problems. First, the OLS allows for the extreme outliers in the estimation that can bias the estimates of interest. Second, the introduction of control variables in the model doesn't address for the different distributions between groups in the control variables, and this feature may turn the control variables ineffective. Finally, since the OLS procedure imposes a linear specification, the estimation of group differences may be improved allowing for non-linear modeling of the variables of interest.

The matching estimators used in this paper is less related to OLS method and more closed to the idea of a randomized experiment. This method isolates treated observations - in this case firms subjected to SOX - and then, from a non-treated observations, search for control that best match the treated observations in several dimensions, called covariates, i.e., their characteristics are the closest to the treated ones.

In this procedure, the set of counterfactuals are represented by the matched controls, or in other words, it means that we assume that the treated group would have behaved as the control group if they had not been treated. The matches are made in order to ensure that both groups

[10] See Leuz et al. (2008)

of observations have identical distributions along the covariates chosen. The matching procedure used in this paper was suggested by Abadie and Imbens (2002).

This matching estimator allows to match each treated firm with one (or more than one) control firm, for categorical and continuous variables. The estimator searchs exact matches on categorical variables and the closest matches as possible for continuous variables. However, in finite sample, when the matchis not exact the matching estimator will be biased. To correct the bias, we will use the biased-corrected matching estimator that adjusts the difference within the matches for the difference in their covariate values.[11]

In this procedure, the specification instead of represents a model that try to fully explains the endogenous variable, it focus on ensuring that variables that might influence the selection into tratment and observed outcomes are appropriately accounted in the estimation. In our case, we are interested in the terms of debt financing. While there are several theories to justify the inclusion of debt determinants, we only include in our estimations covariates that could make a reasonable case for simultaneity in the treatment outcome relation. Among the list of variables used in our matching estimators, we have: sector classification; total assets; cash holdings; price-to-book ratio; beta; accumulated profit; fixed assets and equity.

Finally, since we want to implement a matching difference-in-difference estimators, we model the outcomes in a differenced form. Therefore, we are comparing the changes in terms of debt financing accross the groups.

4 Descriptive Statistics

To proceed our empirical tests we use data from Economatica that contains balance-sheet information on publicly traded Brazilian firms. Our sampling is composed by observations on 446 Brazilian Public Companies, where 34 use the American Depositary Shares (level II and III cross-listed firms),[12] from 1998 to 2006, disregarding observations from financial institutions since their financial policy differs strongly from the firms of the others sectors. We will call this subsample of 34 firms that use the ADSs as treatment group, since they are subject to the changes brought by the SOX. The rest of firms composed by those that are not listed or are listed at levels I or IV ADRs will be called the control group.

We used fiscal-year-end firms' information on their total assets, cash holdings, price-to-book ratio, beta, accumulated profit, fixed assets, equity, amount of credit – short-term and long term – and cost of credit. We consider as firm credit the balance sheet long-term and short-term debt plus the accounts payable to suppliers. The cost of debt is calculated as total year's interest expense for each firm divided by its mean debt over the same period. The terms of credit variable (amount and cost) are the interest variables, while the other accounting/financial variables are used in the matching procedure, together with the industry sector information.

To ensure the robustness of our results, we examine the distribution of our key variables. We begin by removing all observations that appear to be misreported (such as negative numbers for credit or zero assets).

Now we present some descriptive statistics about the median, concerning our covariates and credit variables divided by group – treatment, non-treatment and control - before the SOX be enacted. To avoid the firms' size influence on the level of accounting variables (cash holdings, equity, fixed assets and accumulated profits) we use the variables divided by the total assets.

Table 1 presents the median values of our covariates and terms of credit (differenced) for the

[11] For more details see Abadie et al. (2004).

[12] Information on Brazilian firms that are traded on NYSE and NASDAQ is obtained on www.adr.com

year immediately before the Saarbanes-Oxley Act be in force. For this specific year we have 30 firms composing our treatment group. Panel A compares the treatment group with all publicly traded firms not affected by SOX, representing the non-treatment group. Notice that for the pre-SOX period, both groups have similar medians for terms of credit, unlike from the result observed to the covariates, that present a significant difference between the treatment and non-treatment medians. The treated firms are bigger, with higher price-to-book, risk (represented by beta), cash holdings, equity, and fixed assets. However, potential similiarities wasn't expected, since we are not running a trully random experiment.

The benefits brought by the matching estimators is to control for these distributional differences that can affect both the selection into the treatment group and the pos-SOX outcomes. We perform again the same median test but comparing with a set of firms, called control group, identified by the matching procedure from Abadie and Imbens (2002). In this case if two observations of the opposite treatment group are equally close to that being matched, we allowed both to be used. Observe in Panel B that there is no highly statistical difference between the control and the treatment group for all the covariates. Except for the equity, that is significant at 10%, all the others are statistically different.

Tabela 1: Descriptive Statistics and median tests

Period berore the Sarbanes-Oxley Act (2001)			
Panel A: Treatment vs. Non-treatment			
	Treatment	Non-treatment	P-value
var. total credit	0,22	0,12	0,240
var. cost of credit	-0,01	-0,07	0,470
firm size	8329	728	0,000
price-to-book	1,50	0,60	0,000
beta	0,80	0,50	0,000
cash holdings	0,05	0,03	0,000
equity	0,43	0,35	0,000
fixed assets	0,51	0,40	0,000
accumulated profit	0,00	0,00	0,000
Panel B: Treatment vs. Control			
	Treatment	Control	P-value
var. total credit	0,22	0,34	0,670
var. cost of credit	-0,01	-0,05	0,060
firm size	8329	6074	0,110
price-to-book	1,50	1,20	0,290
beta	0,80	0,90	0,680
cash holdings	0,05	0,07	0,830
equity	0,43	0,48	0,060
fixed assets	0,51	0,61	0,830
accumulated profit	0,00	0,00	0,770

It is also possible to go beyond the median comparison. Since we desire similarities in the entire distribution, the next step should be compare the groups distribution. The results for the entire distribution is very similar to the median test. Table 2 presents the results of Kolmogorov-Smirnov distribution test comparing treatment agains non-treatment group and control group. Again, when we compare the covariates distribution of treatment and non-treatment (first column), they presents statistical differences in their distribution, for all the covariates. Notice that this huge difference gones when we compare the treatment group with the controul group provided via matching, looking closely the the median results. This result indicates that there is no significant

difference between the covariates distribution when we are using the group of firms formed by the matching procedure. This finding is aligned the idea that the matching estimator moves our experiment closer to a true randomization in which treatment and control groups differ only with respect to shock imposed by the Sarbanes-Oxley Act.

Tabela 2: Distributional Tests

Period before the Sarbanes-Oxley Act (2001)		
	Distribution Kolmogorov-Smirnov: Treatment vs.	
	Non-treatment (p-value)	Control (p-value)
var. total credit	0.007	0.268
var. cost of credit	0.011	0.009
firm size	0.000	0.101
price-to-book	0.000	0.102
beta	0.000	0.769
cash holdings	0.000	0.168
equity	0.000	0.060
fixed assets	0.000	0.168
accumulated profit	0.000	0.268

To illustrate the potential impact of SOX implementation, we compare the evolution in the credit-assts ratio between firms in treatment group against all the other firms (non-treatment). Figure 1, 2 and 3 shows a strong increase in the amount (mean and median) of total credit and both long-term and short-term credit after the SOX become effective only for the treatment group. The annual mean and median of total credit to assets ratio increased from 0.36 to 0.40 for the treatment group while a fall is observed for the control group, which means a variation of 11% and -3% for the treatment and control group respectively. The results are qualitatively the same form long-term and short-term credit to assets ratio. For the treatment group we observe an increase of 22% and 29% in the mean and median long-term credit to assets ratio and 6% in the mean and median short-term credit to assets ratio after the SOX, while the same variables remain constant or even dropped for the control group.

*Figure*1 : Mean of total credit to assets ratio before and after SOX

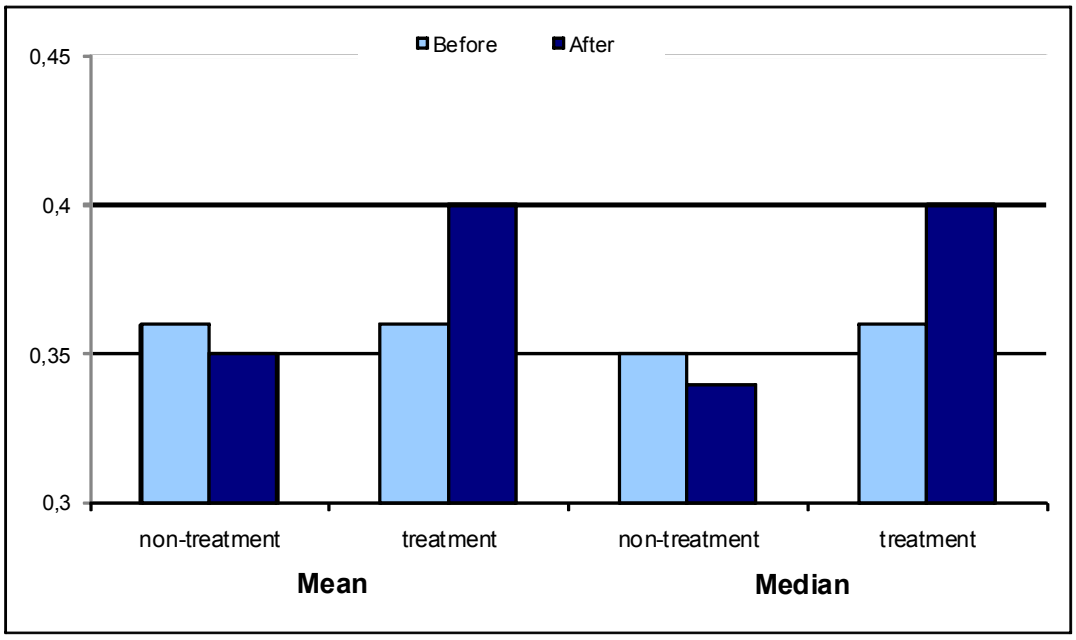


*Figure*2 : Mean of long-term credit to assets ratio before and after SOX

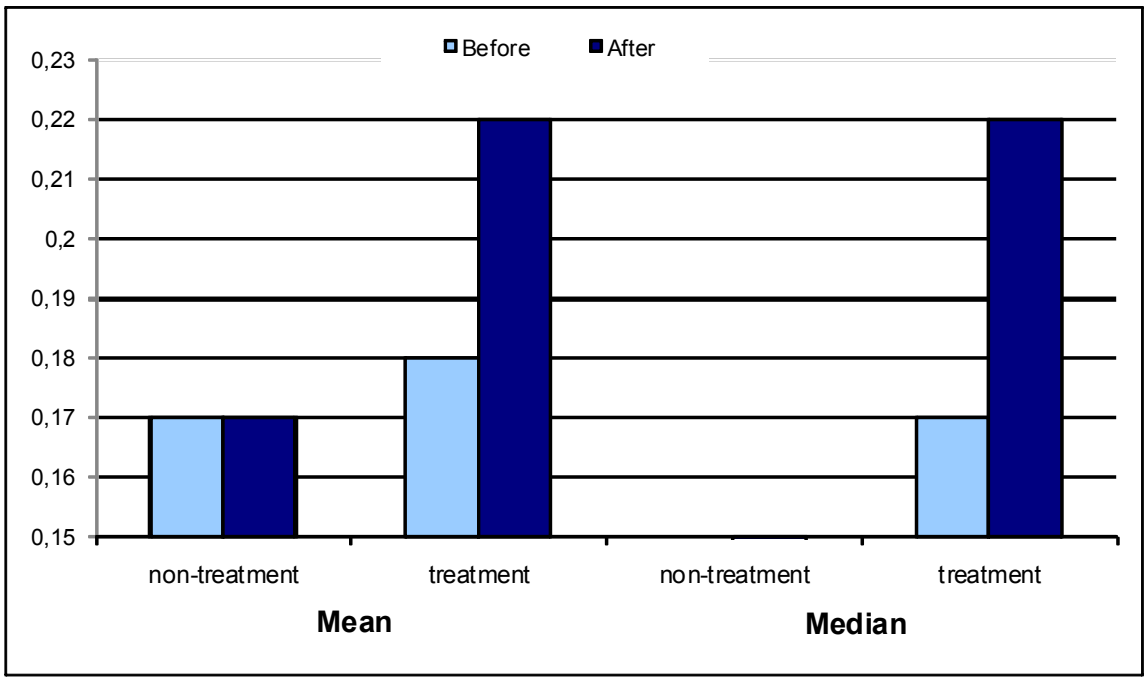
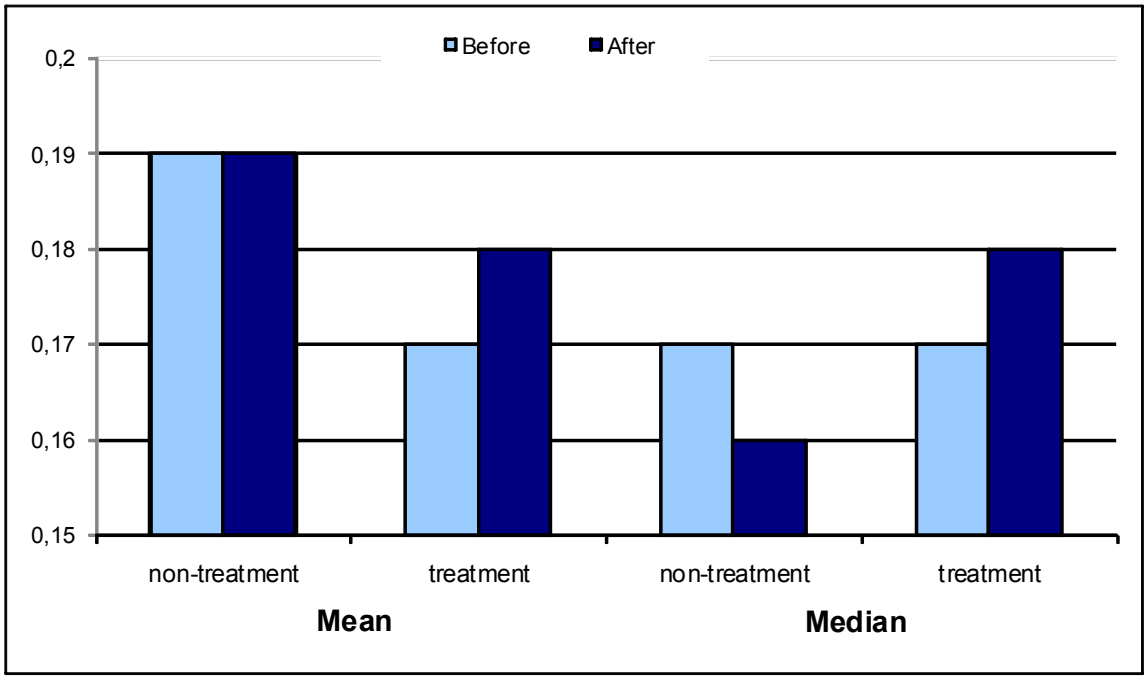
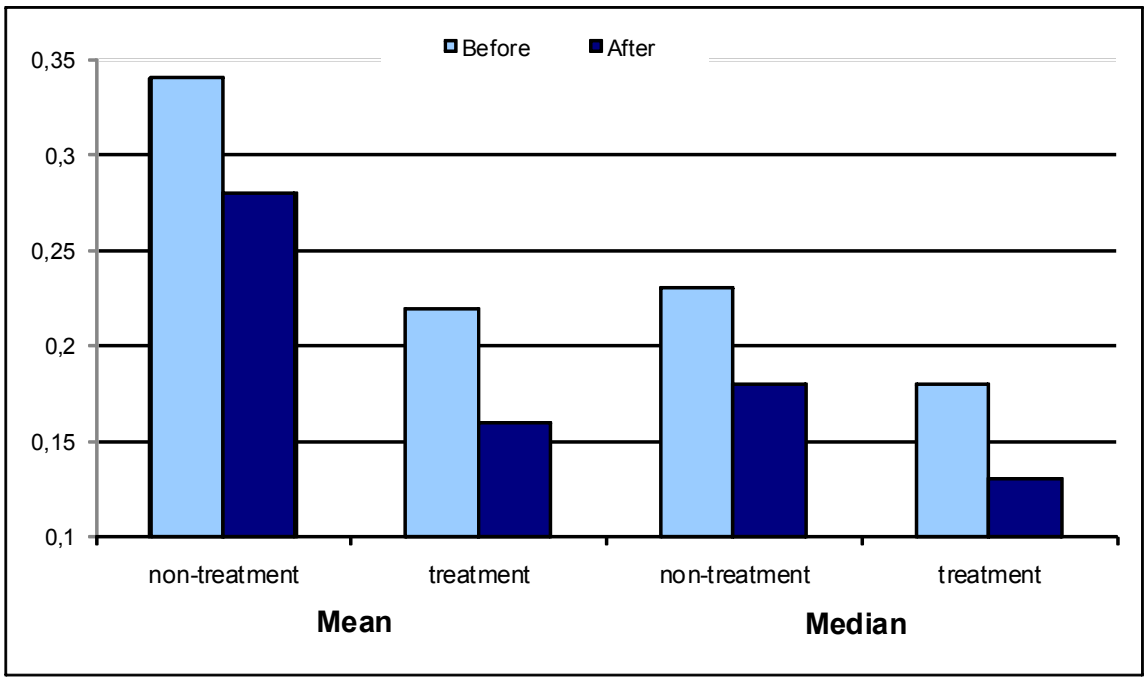


*Figure*3 : Mean of short-term credit to assets ratio before and after SOX



As illustrated in Figure 4, the annually average cost of credit presents a different dynamics. For the cost of credit, we observe a drop for both groups. The difference to be noticed is that the drop in the treated group, in relative terms, was higher than for the non-treated group.

*Figure*4 : Mean of cost of credit before and after SOX



To sum up, the descriptive statistics shows that after the Sarbanes-Oxley we observe for the treatment group a strong increase in the amount of credit, different from the non-treated group where it remains stable or even dropped. For both groups we observe a similar behavior on the cost of credit in absolute terms but a higher drop for treated firms in relative terms.

The difference in the terms of credit behavior between treated and non-treated gives us a nice picture to illustrate the potential effect of SOX, however we cannot forget that such results could be driven for other factors that may influence the assignment into the "experiment" and the post-SOX outcome. To estimate the SOX impact controlling for these facts, next section we present our results using the matching difference-in-difference estimators.

5 Results

We now examine the firms' debt financing policy behavior, using information on amount of credit (total, long term and short term) and its cost, comparing treated and control firms, before and after the Sarbanes-Oxley implementation. Table 3 presents the results for the variable amount of credit. Panels A, B and C report the SOX effect estimation via matching procedure to total amount of credit, short term credit and long term credit respectively. For total amount of credit and long term credit we found a positive and highly significant effect of SOX on treated firms debt financing policy compared with our control firms. The ATT difference is equal to 1.10 and 1.61 for total and long term credit respectively, which means that in percentage terms, the introduction of SOX increases the firms debt financing in approximately 10% and the long term debt financing in almost 40%. The effect on short term credit wasn't statistically significant.

Table 3: Matching difference-in-difference model: amount of credit

This table presents the results of average change in total amount of credit, long term credit and short term credit (the amount of credit variables are in logs) from 2001 (pre-SOX year) to 2003 (post-SOX year) comparing treated and control firms. The matching estimation measures the difference-in-difference between the two groups of firms overs the years. The treated firms are defined as those who are subjected to SOX (firms that are cross-listed on levels 2 or 3). The control firms are the subset of non-treated firms selected as the closest match (two firms at most) to the treated firms based on the covariates: total assets (in logs), cash holdings, equity, fixed assets, industry sector, price-to-book ratio, beta and accumulated profit. The ATT is the Abadie and Imbens average treatment effect for the treated biased corrected matching estimator. Heterokedasticity-consistent erros were used.

Panel A: Dependent Variable: difference of the log of total credit

	Coefficient	Robust Standard Error	P-Value
Matching Estimator (ATT)	1.10	0.229	0.000
Number of observations: 151			

Painel B: Dependent Variable: difference of the log of short-term credit

	Coefficient	Robust Standard Error	P-Value
Matching Estimator (ATT)	0.214	0.187	0.254
Number of observations: 151			

Painel C: Dependent Variable: difference of the log of long-term credit

	Coefficient	Robust Standard Error	P-Value
Matching Estimator (ATT)	1.61	0.290	0.000
Number of observations: 151			

Table 4 presents the results for the cost of credit variable. We find a prominent reduction in the cost of credit for the treatment firm comparing with the control firms. Notice that the reduction in the cost of credit was higher for the firms that were affected for the new law implementation. The ATT difference is equal to 0.18, which means that the experiment made the interest rates

decreases 18% more for the treated firms if compared to the control firms. This result directly explained the previous result, since lower prices motivates a higher demand for credit and the debt financing.

These results are consistent with the hypothesis that the Sarbanes-Oxley Act had a positive impact on terms of credit. Since the SOX brought better information, managers' punishment and monitoring, creditors may expect better corporate governance due to a reduction in managers' moral hazard action (see propositions 1 and 2). This reduction of asymmetric information cost increases the probability that firms succeed in their investment projects, diminishing the chance of firms' default. This effect reduces the risk of lending, motivating creditors to supply more credit at better terms.

Table 4: Matching difference-in-difference model: cost of credit

This table presents the results of average change in the cost of credit from 2001 (pre-SOX year) to 2003 (post-SOX year) comparing treated and control firms. The matching estimation measures the difference-in-difference between the two groups of firms overs the years. The treated firms are defined as those who are subjected to SOX (firms that are cross-listed on levels 2 or 3). The control firms are the subset of non-treated firms selected as the closest match (two firms at most) to the treated firms based on the covariates: total assets (in logs), cash holdings, equity, fixed assets, industry sector, price-to-book ratio, beta and accumulated profit. The ATT is the Abadie and Imbens average treatment effect for the treated biased corrected matching estimator. Heterokedasticity-consistent erros were used.

Panel A: Dependent Variable: difference of the cost of credit

	Coefficient	Robust Standard Error	P-Value
Matching Estimator (ATT)	-0.180	0.051	0.000
Number of observations: 150			

Given the similarity between firms that compose both groups, theses evidences suggests a true effect of Sarbanes-Oxley Act on firms debt financing policy. In order to verify that the result wasn't only drove by some unobservable characteristics that could predict an increase in amount of credit and a decrease in its cost, we perform a placebo tests that replicates our matching estimators in pre-reform period, from 1999 to 2001.

Table 5: Matching difference-in-difference model: placebo test for amount of credit

This table presents the placebo tests result of average change in total amount of credit, long term credit and short term credit (the amount of credit variables are in logs) from 1999 to 2001 comparing treated and control firms. The matching estimation measures the difference-in-difference between the two groups of firms overs the years. The treated firms are defined as those who are subjected to SOX (firms that are cross-listed on levels 2 or 3). The control firms are the subset of non-treated firms selected as the closest match (two firms at most) to the treated firms based on the covariates: total assets (in logs), cash holdings, equity, fixed assets, industry sector, price-to-book ratio, beta and accumulated profit. The ATT is the Abadie and Imbens average treatment effect for the treated biased corrected matching estimator. Heterokedasticity-consistent erros were used.

Panel A: Dependent Variable: difference of the log of total credit

	Coefficient	Robust Standard Error	P-Value
Matching Estimator (ATT)	-0.176	0.151	0.241
Number of observations: 175			

Painel B: Dependent Variable: difference of the log of short-term credit

	Coefficient	Robust Standard Error	P-Value
Matching Estimator (ATT)	0.202	0.188	0.282
Number of observations: 175			

Painel C: Dependent Variable: difference of the log of long-term credit

	Coefficient	Robust Standard Error	P-Value
Matching Estimator (ATT)	-0.367	0.366	0.317
Number of observations: 175			

The results of the placebo test are presented at tables 5 and 6. Panels A, B and C, from table 5, present the matching difference-in-difference estimation for the period before SOX. For all three cases treated and control firms have virtually the same behavior in debt financing. The ATT differences have no statistic significance for total amount of credit, short term and long term. Table 6 shows that the same result of no statistic significance of ATT happens with cost of credit variable. Therefore, we can conclude that there is no difference in the terms of credit across the two groups of firms in pre-treatment period. This result provide us more evidence that the improvement in corporate governance schemes via SOX had a causal positive effect on the terms of credit and on firms debt financing policy.

Table 6: Matching difference-in-difference model: placebo test for the cost of credit

This table presents the placebo test results of average change in the cost of credit from 1999 to 2001 comparing treated and control firms. The matching estimation measures the difference-in-difference between the two groups of firms overs the years. The treated firms are defined as those who are subjected to SOX (firms that are cross-listed on levels 2 or 3). The control firms are the subset of non-treated firms selected as the closest match (two firms at most) to the treated firms based on the covariates: total assets (in logs), cash holdings, equity, fixed assets, industry sector, price-to-book ratio, beta and accumulated profit. The ATT is the Abadie and Imbens average treatment effect for the treated biased corrected matching estimator. Heterokedasticity-consistent erros were used.

Panel A: Dependent Variable: difference of the cost of credit

	Coefficient	Robust Standard Error	P-Value
Matching Estimator (ATT)	-0.180	0.051	0.000
Number of observations: 154			

6 Concluding Remarks

This paper uses the Sarbanes-Oxley Act to assess the effect of changes at corporate governance level on firms' debt financing policies to deal with the endogeneity problems. In particular, this study tests whether firms subjected to a positive shock at the corporate governance level – brought by this new regulation – observed more pronounced increase in their debt amount and reduction in its cost than similar firms whose weren't subjected to the new corporate governance level imposed by SOX.

Our empirical approach aims at replicating an experiment like-design – using the Sarbanes Oxley Act as an experiment – in which we control for observed and unobserved firms' heterogeneity via the difference-in-difference matching estimator.To implement such experiment we use an environment that provides two different sets of firms: the one that was affected by SOX (called treatment group) and another group that was not affect by SOX (called control group). To reduce the concerns about selection we match firms under SOX requirements (treatment), with control firms that were not subjected to the new regulation. We match these groups of firms based on their financial and accounting characteristics. The matching process is used to assure that we are comparing very similar firms except from the fact that some of them are not subjected to SOX regulation. Also, we account for time invariant firm heterogeneity since we compare within-firm changes in the variable of interest, from the period that proceeds the reform to the period that follows the reform.

Our main results show that the firms affected by the Sarbanes-Oxley Act increase their total amount of debt of approximately 10% percent more than similar firms that were not affected by SOX. Moreover, we found that both the long-term debt increase approximately 40%, while no effect was evidenced in the short-term debt. Finally, we found that the interest rate charged to firms reduced approximately 18%, which is consistent to an expected reduction in moral hazard costs due to the gains in corporate governance. Our results contributed to the literature in three ways. First, our empirical strategy allow us to analyze the effect of changes at corporate governance levels on firms' debt policy without the endogeneity problems; second, we evidence the positive effect of the SOX on firms access to credit market; and finally, we evidence the SOX effect on cross-listed foreign companies subjected to credit rationing.

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