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Firms' capital structure and the bankruptcy law design:

Evidence from Brazil

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Abstract

This paper studies the effect of changes in creditors' priority order defined by the bankruptcy law on firms' capital structure. Taking advantage of the Brazilian bankruptcy law Reform and using firms' balance sheet data, we obtain results in line with theories that predict the effects on the capital structure due to changes in creditors' expectations. We find evidence of an increase in the debt portion of the capital structure.

Keywords: Capital Structure, Bankruptcy, Law.

JEL Codes: G32, G33, K00.

I Introduction

The goal of this paper is to study the impact of institutional changes – more specifically changes in the bankruptcy law – on firms' financing choices, in other words, their capital structure.

Since the seminal paper of Modigliani and Miller (1958), scholars have discussed the capital structure choice. The most important departures from Modigliani and Miller's assumptions that make capital structure relevant to a firm's value are known. Empirical studies have reported some stylized facts on capital structure choice, but this evidence is largely based on firms in the United States,[1] and it is not at all clear how these facts relate to different economic environments. Hence, one cannot only rely on existing findings in

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[1] See Titman and Wessels (1988).

economics and corporate finance, because countries differ in their economic environments.

In the empirical field, Booth et al. (2001), using data from developing countries, studied if the stylized facts about capital structure beyond the developed countries. They found that the variables relevant to explain capital structure in the United States and Europe are also relevant in developing countries, despite the differences in institutional factors. Rajan and Zingales (1995) analyzed factors that influence the capital structure, including the institutional differences, across the G-7 countries. Our paper focuses on one particular institution: the bankruptcy law. We analyze how relevant the creditors' priority order is for the firms' capital structure, especially in an environment that provides a low level of creditors' protection. We base this analysis on the 2005 Brazilian bankruptcy law reform.

Scott (1977) theoretically addressed the relationship between capital structure and bankruptcy. He argued that when firms sell secured debt, they are not only selling a promise of future repayment, but rather the right to be the first in order of priority in case of bankruptcy. Thus, the priority order defined by the bankruptcy law has a significant value since it reduces the chance that debtors will not be repaid. Such value impacts the debt cost of capital and as a consequence the capital structure.

Taking advantage of the 2005 Brazilian bankruptcy law reform, this paper measures the impact of changes in creditors' priority order on firms' choice of capital structure. Intuitively, since the new bankruptcy law has improved creditors' priority, their expectations about recovery in insolvency states should increase. The more creditors expect to receive in bankruptcy, the less they will require firms to pay in solvency, thus

reducing the cost of capital. A lower cost of debt financing encourages firms to increase the share of debt in their capital structure.

We estimate an econometric model (panel with fixed effects) to measure the effect of the changes in creditors' priority order on firm-level capital structure. The remainder of the article is organized as follows: Section 2 discusses the Brazilian bankruptcy reform; Section 3 presents the empirical results; and Section 4 concludes.

II The Brazilian Bankruptcy Law Reform

Before the bankruptcy reform, the creditor recovery rate in the case of bankruptcy was a mere US$ 0.002 on the dollar in Brazil, while the average of Latin American and Organization for Economic Co-operation and Development (OECD) countries was US$ 0.27 and US$ 0.66, respectively.[2] Basically, the reason for such low recovery was the priority order, since creditors ranked behind labor and tax claims. Thus, the remaining amount from the bankruptcy process used to pay creditors was usually insignificant.

On June 9, 2005 the new legislation on bankruptcy (Law 11,101/05) took effect.

The new liquidation procedure introduced six key changes. First, labor credits are limited to an amount equaling 150 times the minimum monthly wage.[3] Second, secured credits are now given priority over tax credits. Third, unsecured credits are given priority above some of the tax credits. Fourth, the distressed firm may be sold (preferably as a whole) before the creditors' list is constituted, which can speed up the process and increase the value of the bankruptcy estate. Fifth, tax, labor, and other liabilities are no longer transferred to the buyer of an asset sold in liquidation. Finally, any new credit

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[2] Doing Business 2005 – World Bank
[3] Brazil has a minimum monthly wage, called the *salário mínimo,* rather than a minimum hourly wage.

extended during the reorganization process is given first priority in the event of liquidation.

The first two changes have had a direct impact on the secured creditors' priority. Since under the former bankruptcy law, secured creditors came after all labor and tax claims, the priority given to secured creditors has increased significantly. The third one has increased unsecured creditors' priority. The fourth, fifth and sixth changes, in turn, are expected to increase the value of firms in bankruptcy and as a consequence the amount recovered by creditors. The more creditors expect to receive in the insolvency state, the less they will require firms to pay in the solvency state, thus reducing the cost of capital.

As consequence, since the bankruptcy reform, the creditors' recovery rate has increased to US$ 0.12 on the dollar in Brazil, while the average of Latin American and OECD countries has remained stable (US$ 0.29 and US$ 0.67 respectively).[4]

III Empirical Results

In this paper we used firm-specific accounting data for 389 firms from 2002 to 2007.[5] We considered as firm share of debt in the capital structure on the balance sheet[6] the sum of short-term debt, long-term debt plus accounts payable divided by the firm value (total debt plus market value). We also separately analyzed the effect on short-term debt share (short term debt plus accounts payable divided by the firm value) and long-term debt share (long-term debt divided by firm value). We used the amount of firms' assets and macroeconomic data, such as Gross Domestic Product (GDP), inflation rate, risk-free interest rate (SELIC rate, the Central Bank benchmark rate) and Brazilian

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[4] Doing Business 2007 – World Bank
[5] Our study excludes all financial firms, since the reform did not apply to them.
[6] The end of the fiscal year.

Global Bonds (GB) to control our analyses. The variable GDP was used to control our estimation for business cycles. The inflation rate and the risk-free interest rate was included to control for the trend of prices and the cost of debt, respectively, common to all firms and the Brazilian Global Bonds (GB) to control for the risk perception of investors. The data were obtained from both the Economatica database and Ipeadata.[7]

Table 1 reports the descriptive statistics of our variable of interest (share of debt in the capital structure). Notice that the share of debt (total, short-term and long-term) presents a downward trend from the period before to after the bankruptcy reform. The mean of the share of debt went down from 51% before the new law to 35% afterward, a reduction of 31% of debt in the capital structure.

**Table 1: Descritive Statistics - share of debt**

Before the Bankruptcy Law Reform (2002 a 2004)		
	Mean	St. Deviation
Total Debt	0.51	0.28
Short-Term Debt	0.32	0.24
Long-Term Debt	0.19	0.19
After the Bankruptcy Law Reform (2005 a 2007)		
	Mean	St. Deviation
Total Debt	0.35	0.26
Short-Term Debt	0.20	0.21
Long-Term Debt	0.14	0.16
All Period (2002 a 2007)		
	Mean	St. Deviation
Total Debt	0.43	0.29
Short-Term Debt	0.26	0.23
Long-Term Debt	0.17	0.18

The main reason for this trend is the significant increase of the market value of Brazilian firms. Figure 1 shows that the level of the São Paulo Stock Market Index (Ibovespa) fluctuated between 9,000 and 25,000 points from 2002 to 2004, while it fluctuated between 25,000 and 65,000 points to 2005 to 2007. This trend encouraged

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[7] www.ipeadata.gov.br

firms to finance themselves by issuing equity, reducing the portion of debt in the capital structure.

Figure 1: Ibovespa Performance
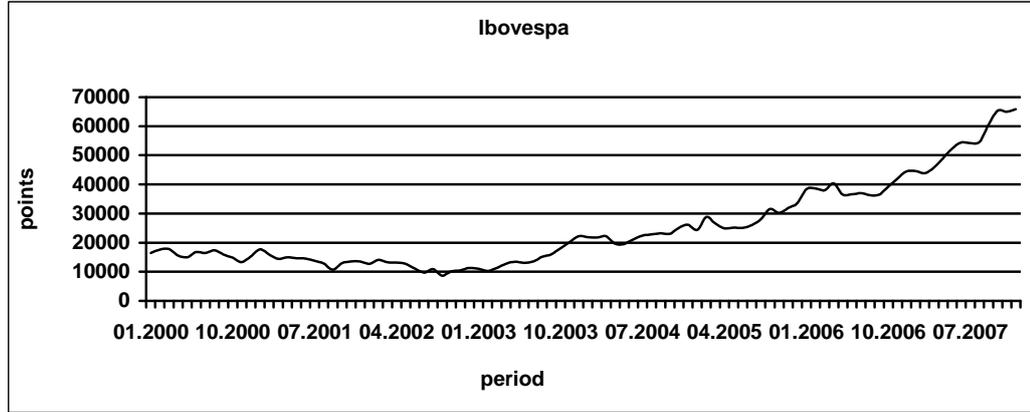
To estimate the impact of changes in creditors' priority brought by the new Brazilian bankruptcy law on firms' share of debt (total, short-term and long-term), we used a panel regression with cross-firm fixed effects, represented by the following functional form:

$$share\_debt_{it} = \alpha_i + \gamma_1 d\_BR_t + \Gamma X_{it} + \varepsilon_{it}, \tag{1}$$

The main results come from the bankruptcy law reform dummy (d_BR), which assumes zero for the pre-reform period (2002-2004) and one for the post-reform period (2005-2007). The set of controls is represented by the vector $X_{it.}$

Table 2: Panel Regression with fixed effects: Share of Debt

This table presents the results of panel robust regressions, with fixed effects, of the firms' share of debt on BANKRUPTCY Reform variable (d_BR), which is represented by a dummy variable codified as 0 before 2005 and 1 after 2005. Panel A presents results for total debt share, while tables B and C present results partitioning by short-term and long-term debt share. We control for macroeconomic variables as GDP, Brazilian risk-free interest rate (SELIC), inflation, Brazilian Global Bonds (GB) and for firms' size (ASSETS).

Panel A: Dependent Variable: Total Debt

	Coefficient	Robust Standard Error	P-Value
Intercept	2.79	0.45	0.000
d_BR	0.07	0.01	0.000
ASSETS	1.27e-06	3.62e-07	0.000
GDP	-0.21	0.03	0.040
GB	0.0001	0.000	0.000
SELIC	-12.98	3.04	0.000
INFLATION	0.001	0.001	0.290

Number of observations: 1541   R-square: 0.1090

Painel B: Dependent Variable: Short-Term Debt

	Coefficient	Robust Standard Error	P-Value
Intercept	1.90	0.38	0.000
d_BR	0.04	0.014	0.003
ASSETS	7.82e-07	2.38e-07	0.001
GDP	-0.17	0.03	0.000
GB	0.0002	0.0001	0.010
SELIC	-11.93	2.93	0.000
INFLATION	0.002	0.38	0.028

Number of observations: 1541   R-square: 0.0674

Painel C: Dependent Variable: Long-Term Debt

	Coefficient	Robust Standard Error	P-Value
Intercept	0.89	0.33	0.007
d_BR	0.03	0.12	0.009
ASSETS	4.84e-07	2.87e-07	0.092
GDP	-0.03	0.03	0.233
GB	-0.00003	0.0001	0.628
SELIC	-1.05	2.63	0.689
INFLATION	-0.001	0.001	0.221

Number of observations: 1541   R-square: 0.0401

The results of regression (1) reported in Table 2 indicate that the bankruptcy law reform had a significant impact on the capital structure. Panels A, B and C show that due to the bankruptcy reform firms increased their share of debt by seven percent, of which four percent represents short-term debt and three percent long-term debt. Notice that this effect represents an increase of approximately 20% of the share of debt in relative terms. This empirical result is totally aligned with our theoretical predictions. Intuitively, the

improvement in creditors' priority reduces their risk of not getting repaid, making debt financing cheaper, and as a consequence, motivating firms to resort to debt. Thus, despite the downward trend of debt financing (as seen in Table 1), the bankruptcy reform induced an increase of the share of debt in the capital structure.

Table 3: Panel Regression with fixed effects: heterogenous effect on share of debt

This table presents the results of panel robust regressions, with fixed effects, of the firms' share of debt on BANKRUPTCY Reform variable (d_BR), which is represented by a dummy variable codified as 0 before 2005 and 1 after 2005, and its interaction with the firms' size (ASSETS). Panel A presents results for total debt share, while tables B and C present results partitioning by short-term and long-term debt share. We control for macroeconomic variables as GDP, Brazilian risk-free interest rate (SELIC), inflation, Brazilian Global Bonds (GB) and for firms' size (ASSETS).

Panel A: Dependent Variable: Total Debt

	Coefficient	Robust Standard Error	P-Value
Intercept	2.80	0.44	0.000
d_BR	0.08	0.014	0.000
d_BR*ASSETS	-6.15e-07	2.69e-07	0.022
ASSETS	2.35e-06	6.62e-07	0.000
GDP	-0.21	0.04	0.000
GB	0.0002	0.0001	0.036
SELIC	-13.08	3.05	0.000
INFLATION	0.001	0.001	0.278

Number of Observatons: 1541   R-square: 0.092

Painel B: Dependent Variable: Short-Term Debt

	Coefficient	Robust Standard Error	P-Value
Intercept	1.89	0.38	0.000
d_BR	0.04	0.01	0.004
d_BR*ASSETS	1.91e-07	2.05e-07	0.350
ASSETS	4.46e-07	4.58e-07	0.331
GDP	-0.18	0.03	0.000
GB	0.0002	0.0001	0.010
SELIC	-11.90	2.93	0.000
INFLATION	0.002	0.0008	0.029

Number of Observatons: 1541   R-square: 0.075

Painel C: Dependent Variable: Long-Term Debt

	Coefficient	Robust Standard Error	P-Value
Intercept	0.90	0.33	0.006
d_BR	0.036	0.012	0.003
d_BR*ASSETS	-8.06e-07	2.02e-07	0.000
ASSETS	1.90e-06	4.88e-07	0.000
GDP	-0.03	0.026	0.202
GB	-0.000	0.000	0.642
SELIC	-1.18	2.63	0.653
INFLATION	-0.001	0.001	0.234

Number of Observatons: 1541   R-square: 0.036

To better understand the capital structure choice, now we explore firms' heterogeneous responses to the bankruptcy reform. We study firms' capital structure choice as a function of their relative size. We use total assets as a measure of firms' size. Firms with more assets should be less sensitive to the reform since they cam finance themselves by debt more easily using their assets as collateral.

To analyze heterogeneity, we add one term in regression (1):

$$share\_debt_{it} = \alpha_i + \gamma_1 d\_BR_t + \gamma_2 (d\_BR_t \cdot ASSETS_{it}) + \Gamma X_{it} + \varepsilon_{it}, \qquad (2)$$

where the interaction of the bankruptcy reform dummy and firm assets ($d\_BR \cdot ASSETS$) captures the firm-size effect.

Table 3 shows the results. Panels A and C show that the bankruptcy reform provided an increase in the debt portion, which is stronger for smaller firms, since the interacted variable $d\_BR \cdot ASSETS$ has a negative sign. This impact is significant for the total debt (long-term plus short-term debt) and for the long-term debt alone. However, the result is not the same for short-term debt alone (Panel B). Even though unsecured creditors' priority is enhanced under the reform, which is reflected in the positive effect of the bankruptcy reform dummy, the interactive term of the regression is not significant. Since such debt does not require collateral, it is also expected that the amount assets should not affect unsecured debt financing.

IV Conclusion

The main goal of this paper was to study the impact of changes in creditors' priority order on firms' capital structure in Brazil. To measure this effect, we took advantage of the recent Brazilian bankruptcy law reform, whose main change is the improvement of secured and unsecured creditors' priority.

Using data from firms' balance-sheets and despite the trend of a fall in the share of debt in the capital structure during 2002 to 2007, we found that the reform has brought an increase of more than 7%, on average, of the debt share. This effect is divided into respective increases of 4% and 3% in the short-term and long-term debt share. This is explained by the improvement in creditors' priority, since this reduces the chance of not being repaid, decreasing the cost of debt and as a result motivating firms to resort to debt funding.

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