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Corporate Governance, Bankruptcy Law and Firms' Debt Financing under Uncertainty

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Abstract

This paper examines the relationship between corporate governance level and the bankruptcy law to such debt variables as firms' cost of debt and amount of debt under uncertainty (in the Knight´s sense). First we find that the better the corporate governance and the harsher bankruptcy law, the lower the cost of debt. Second, we find that better governance and a harsher bankruptcy laws have a positive effect on debt. As consequence, firms increase their set of investment projects financed by creditors. Finally, uncertainty has a negative effect on terms of debt (higher interest rate and smaller set of financed investment projects) and such effect is stronger for firms with worse corporate governance and for economies with a bankruptcy law that is lenient to debtors.

Keywords: Debt, Cost of Debt, Corporate Governance, Bankruptcy, Uncertainty.
JEL Codes: E44,G3, G33, D8 .

I – Introduction

This paper analyzes the impact of firm-level corporate governance arrangements and of an institutional shock – as a change in the bankruptcy law which increases punishment to managers in case of bankruptcy – on firms' debt financing features under uncertainty (in the Knight sense). Both effects presumably alleviate moral-hazard and consequently reduce firms' cost of debt, which motivates firms to increase their debt position.

The literature of accounting on corporate governance and its effects on firms' financial decisions is mostly empirical. Anderson, Mansi and Reeb (2004) find an inverse relation between the cost of debt and board independence and size. Bushman, Chen, Engel and Smith (2004) show that limited transparency of firms' operations to outside investors increases demands on governance systems to alleviate moral hazard problems. More recently, Kanagaretnam, Lobo and Whalen (2007) show that firms with higher levels of corporate governance have lower information asymmetry around quarterly earnings announcements. On the bankruptcy law design and its effect on financial markets, La Porta et al (1997, 1998) and Djankov et al (2007) point to an important role of the legal protection to creditors in supporting credit market development. Araujo and Funchal (2006) show how this result modifies if the degree of punishment to debtors is the unique determinant of creditors' protection. They found that higher levels of creditors' protection will not provide a broader credit market, in fact, there is an intermediate level of protection that is optimal for the

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development of such market. Funchal (2008), using the Brazilian Bankruptcy Reform as an experiment found that the positive relationship between creditors' protection and credit market conditions are valid for countries whose previous situation was bad in protecting creditors' interests.

Our study adds to the previous literature by relating, theoretically, firm-level corporate governance arrangements and an exogenous shock - bankruptcy law reform - to the cost of debt and to the amount of debt under uncertainty.

Approach this subject under knightian uncertainty is fundamental. Given the increasing volatility in financial markets, and the set of possibilities of scenarios that we cannot preview nowadays, inserting uncertainty brings more reality to the model. It is important to note that, in an environment subject to uncertainty, creditors weights more the worst state of nature when they evaluate the expected value around the prospective projects. We will do this by the use of uniform squeezes, a special class of convex capacity[5] (the interest reader should see the appendix for an introduction to the basics of the study of Knightian uncertainty, through the use of capacities).

In the present paper we develop a model that connects the governance and the bankruptcy law to such debt variables as the cost of debt and firms' amount of debt. Through a set of propositions we show that: first, corporate governance has a negative impact on the cost of debt and a positive impact on the amount of debt; second, a harsher bankruptcy law also has a negative impact on the cost of debt and a positive impact on its amount; the effect of bankruptcy law changes is stronger for firms with better corporate governance standards; and finally, the effect of uncertainty on interest rates charged to debtors is higher for firms with worse corporate governance arrangements and for countries with lenient bankruptcy laws.

The remainder of the paper is organized as follows: Section 2 discusses the theoretical model relating corporate governance and the bankruptcy law to the cost of debt and credit availability in an environment that is also affected by the uncertainty; Section 3 concludes and in the Appendix is presented basic statements of Knightian Uncertainty.

II – The Model

In this section we develop a model that describes how the corporate governance and the bankruptcy law affect debt variables in an environment subject to the uncertainty. To develop our model we assume the following:

Let e be the effort exerted by the manager. We assume that the effort e is a function of the level of corporate governance of the firm and the degree of punishment imposed by the bankruptcy law: $e(L,g) = aL + bg$, where $e_L > 0$ and $e_g > 0$.

When we take effort into account, we can assume that the probability of success of the firm increases with the firm's governance level and the punishment of the bankruptcy law. In precise terms, we assume that $p(e(L,g))$ is differentiable, strictly increasing, and strictly concave in the governance level, g, as well in the level of the punishment of the bankruptcy

[5] See Appendix

law, L and it is also true that $p(e(\overline{L},\overline{g}))<1$, where $\overline{g}$ is the maximum level of governance as well $\overline{L}$ is the maximum level of the punishment of the bankruptcy law. This condition means that is ever possible the insolvency state due to some idiosyncratic shock, even when $g=\overline{g}$ and $L=\overline{L}$.

The beliefs of the creditors incorporate uncertainty through a distortion in the probability following sense: $(1-\phi)p(e(L,g))$ where ϕ is a parameter that refers to the uncertainty level. So, if there is no uncertainty then the beliefs of the creditors coincides with the probability distribution.

Firms Investment

We make three important assumptions: creditors are imperfect monitors a firm's actions related to payoffs after it borrows; creditors can predict their mean payoffs in the default state with beliefs that includes uncertainty; and creditors and the firm are risk-neutral. We make the first assumption because it captures the asymmetric information between the firm and its creditors. The second rests on the view that professional creditors have considerable experience with default but also incorporating an uncertainty parameter and the third is more accurate when applied to firms than to individual persons.

The borrowing firm has a project that requires capital, I , which it must raise externally. The firm promises to repay creditors the sum, F . The project can return a value, v , where the firm is solvent if $v\geq F$ and insolvent if $v<F$. Two states are possible in the future, one if the firm is solvent and the other if it is not.

The solvency and insolvency states return to the firm v_{solv} and v_{ins} , respectively, where $v_{solv}\geq F>v_{ins}$. The convex capacity associated to the solvency state can be written as $(1-\phi)p(e(L,g))$ where ϕ is refers to the uncertainty level and $p(e(L,g))$ is the probability of solvency and similarly, the convex capacity associated to the insolvency state can be written as $(1-\phi)(1-p(e(L,g)))$ where $(1-p(e(L,g)))$ is the probability of insolvency. This implies that the expected value of the project is $E(v)=v_{ins}+(1-\phi)p(e(L,g))(v_{solv}-v_{ins})$, where ϕ is the uncertainty aversion measure, the expected return conditional on the solvency state is $E_{solv}(v)=\phi v_{insolv}+(1-\phi)v_{solv}$, and the expected return conditional on the insolvency state is $E_{ins}(v)=v_{ins}$.

Assuming that the credit market is competitive, F is the largest sum that creditors can demand to fund the project. We take the risk-free interest rate equal to zero, so that a borrowing firm's interest rate is a function of the riskness of its project and the properties of the corporate governance level, the punishment imposed by bankruptcy law and also from the uncertainty.

Creditors who lend I should expect to receive I in return. This expectation can be written as follows:

$$I=v_{ins}+(1-\phi)p(e(L,g))(F-v_{ins});$$

$$F = I(1 + r(\phi)) = \frac{I - (1 - (1-\phi)p(e(L,g)))(v_{ins})}{(1-\phi)p(e(L,g))} \qquad (1)$$

The firm's interest rate is $r(\phi) = (F / I) - 1$, which is increasing in F ; this is the value that the firm is required to repay in the solvency state. Denoting by v_{ins}^{u} $(v_{ins}^{u} \in (0,1))$ the per-unit-of-investment $(I = 1)$ counterparts of v_{ins} we also have

$$r = \frac{[1 - (1-\phi)p(e(L,g))]}{(1-\phi)p(e(L,g))}\left[1 - v_{ins}^{u}\right] \qquad (2)$$

Equation (2) shows that interest rate could be affected by the level of corporate governance, bankruptcy law and uncertainty. Using this relation, we will present some results that derive from the influence of such variables on interest rate charged to debtors.

First, analyzing the impact of uncertainty on interest rate we find that it exerts a positive effect since

$$\frac{\partial r}{\partial \phi} = \frac{(1-\phi)^{-2}}{p(e(L,g))}\left(1 - v_{ins}^{u}\right) > 0, \qquad (3)$$

which allow us to provide the following result:

Proposition 1: *An increase at the uncertainty level at the economy raises the interest rates charged to debtors.*

The effect of corporate governance level has a significant impact on interest rate too. Intuitively, better corporate governance arrangements induce managers to work harder, with actions aligned with firm's interests. A higher effort increases the chance of success of firm's investment projects reducing the chance of creditors' insolvency and, as consequence, the interest rate charged to debtors.

From equation (2), making comparative static with governance level we see that:

$$\frac{\partial r}{\partial g} = -p'(e(L,g))b(1-\phi)^{-1}\, p(e(L,g))^{-2}\left(1 - v_{ins}^{u}\right) < 0, \qquad (4)$$

and

$$\frac{\partial^2 r}{\partial g \partial \phi} = -p'(e(L,g))b(1-\phi)^{-2}\, p(e(L,g))^{-2}\left(1 - v_{ins}^{u}\right) < 0, \qquad (5)$$

which implies by (4) that the interest rate is decreasing on the level of corporate governance and by (5) that the effect of uncertainty on interest rates charged for firms is higher for those with worse corporate governance arrangements.

Proposition 2: *A higher level of corporate governance reduces the interest rate charged to*

the firm.

Proposition 3: *The impact of the uncertainty on the interest rate is higher for firms with worse corporate governance levels.*

Finally, we will analyze the influence of the design of the bankruptcy law on cost of debt. We expect that a bankruptcy laws that provide a harsh punishment inhibits moral hazard, increasing the managers' effort and the probability of solvency, fearing the punishment in the states of default. This effect increases the expected return of creditors and consequently a reduction of interest rate.

From equation (2), making comparative static with the level of bankruptcy law punishment to debtors we see that:

$$\frac{\partial r}{\partial L} = -p'(e(L,g))a(1-\phi)^{-1}\, p(e(L,g))^{-2}\left(1-v_{ins}^{u}\right) < 0, \qquad (6)$$

and

$$\frac{\partial^2 r}{\partial L \partial \phi} = -p'(e(L,g))a(1-\phi)^{-2}\, p(e(L,g))^{-2}\left(1-v_{ins}^{u}\right) < 0, \qquad (7)$$

which means that by (6), the interest rate is decreasing on the level of punishment of the bankruptcy law and by (7) the effect of uncertainty on interest rate is stronger for countries with a bankruptcy law that is lenient with indebted firms.

Proposition 4: *A higher punishment of the bankruptcy law reduces the interest rate charged to the firm.*

Proposition 5: *The impact of the uncertainty on the interest rate is higher in an institutional environment with lower punishment provided the bankruptcy law.*

Thus, it is clear that from (4) and (6) that the interest rate is decreasing on the degree of governance and bankruptcy law punishment and also from (5) and (7) that the impact of the uncertainty on interest rate is stronger for firms with worse corporate governance arrangements and in economies that protect debtors in case of default. Both – better governance and harsher bankruptcy law – limit the agency cost associated with the external finance.

Until this point we analyze the effect governance, bankruptcy law design and uncertainty on interest rates. From now on we will discuss the extension of this effect the set of investment projects and as consequence on economic growth.

An ex ante objective of the firm is to maximize the project option set that creditors want to

finance. Society prefers firms that pursue projects with positive expected returns. A firm should therefore undertake a project that creates value. We denote social welfare as W, such that

$$W = v_{ins} + (1-\phi)p(e(L,g))(v_{solv} - v_{ins}) - I \geq 0.$$

As social efficiency always requires a minimum conditional expectation value of return, $E_{solv}(\underline{v})$, we let $W = 0$. Then,

$$E_{solv}(\underline{v}) = \frac{I - (1-(1-\phi)p(e(L,g)))(v_{ins})}{(1-\phi)p(e(L,g))}, \quad (8)$$

where $F = [I - (1-(1-\phi)p(e(L,g)))v_{ins}]/(1-\phi)p(e(L,g))$ is identical to the right-hand side of $E_{solv}(\underline{v})$. Note that the uncertainty affects implicitly both equations.

Since equation (1) solves for the minimum repayment promise the firm must make to obtain financing and equation (8) solves for the minimum conditional expected return that is socially accepted, the equations show that it is socially efficient for firms to undertake all projects that creditors will finance. Debtors will thus be able to fulfill their promises in solvency states, since equation (1) equals equation (8).

Also, we can notice that the level of corporate governance and a harsher bankruptcy law exert an effect on the minimum conditional expected return, in the sense that a higher level of governance and/or legal punishment reduce it (see equations (9) and (10)), which spans the set of financiable projects by the creditors

$$\frac{\partial E_{solv}(\underline{v})}{\partial g} = -(I - v_{ins})p'(e(L,g))^{-2}b(1-\phi)^{-1}p(e(L,g))^{-1} < 0, \quad (9)$$

$$\frac{\partial E_{solv}(\underline{v})}{\partial L} = -(I - v_{ins})p'(e(L,g))^{-2}a(1-\phi)^{-1}p(e(L,g))^{-1} < 0. \quad (10)$$

However, the effect of uncertainty on minimum conditional expected return is positive, meaning that an economy with higher uncertainty increases it, reducing the set of projects potentially financed by the creditors

$$\frac{\partial E_{solv}(\underline{v})}{\partial \phi} = (I - v_{ins})p'(e(L,g))^{-1}(1-\phi)^{-2}p(e(L,g))^{-1} > 0. \quad (11)$$

Thus far, we have considered the set of projects to be financed. We now examine borrowers' incentives to invest. The interest rate imposes the expected costs on firms, so the firm's expected return, when it borrows, becomes

$$E(R^B) = (1-\phi)p(e(L,g))(v_{solv} - F) + (0) \geq 0. \quad (12)$$

Substituting for F from equation 1 yields

$$E(R^B) = (1-\phi)p(e(L,g))v_{solv} + (1-(1-\phi)p(e(L,g)))v_{ins} - I \geq 0,$$

which is the expression indicating that the project is socially efficient. This equation holds with equality for the minimum conditional expected return, $E_{solv}(\underline{v})$. Therefore, the borrower invests in all projects that creditors will finance.

Proposition 6: *Higher level of corporate governance increases the equilibrium level of debt.*

Proposition 7: *A harsher bankruptcy law increases the equilibrium level of debt.*

Proposition 8: *Higher uncertainty reduces the equilibrium level of debt.*

Proposition 9: *The impact of the uncertainty on the equilibrium level of debt is higher for firms with worse corporate governance level and for economies with a harsher bankruptcy law.*

In summary, our model shows that better corporate governance and a harsher bankruptcy law reduces the interest rate charged to debtors and expands the set of financed projects. Also, we find that the negative impact of uncertainty on terms of debt (cost and amount) is stronger for firms with worse corporate governance and for countries with lenient bankruptcy law.

III – Conclusion

The objective of this paper was to add new empirical findings to the literature on corporate governance. Our paper contributes to prior literature by relating, theoretically, firm-level corporate governance arrangements and bankruptcy law design to the cost of debt and to the amount of debt, under an economic environment which considers uncertainty. First, we found that uncertainty in economic environment increases interest rate and reduces the credit availability. Second, we found that the better the corporate governance arrangement the lower is the cost of debt and the larger is the set of financed projects. Third, we found that the harsher the bankruptcy law design – punishing debtors in case of default – the lower is the cost of debt and the larger is the set of financed projects. Moreover, the negative effect that uncertainty has on credit (interest rate and amount) is stronger for firms with worse corporate governance and in countries with a lenient bankruptcy law.

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Apendix: Preliminaries on Knightian Uncertainty

The definitions and notations in this section are standard in the literature. Let $S = \{s_1,\ldots, s_n\}$ be a non-empty and finite set of states of nature (world) endowed with the algebra of all events denoted by Σ. A set-function $v : \Sigma \rightarrow \Re_+$ with $v(\varnothing) = 0$ is called a capacity (also called a non-additive probability) on S if it is normalized and monotone, that is: i) normalized: $v(S) = 1$; ii) monotone: For all $A,B \subseteq S$ such that $A \subseteq B$: $v(A) \leq v(B)$. A capacity is convex if it is normalized and convex: iii) convex: for all $A,B \subseteq S$: $v(A \cup B) + v(A \cap B) \geq v(A) + v(B)$. It is easy to prove that every convex capacity is a capacity. A convex capacity is a probability measure if it is normalized and additive: iii') additive: for all $A,B \subseteq S$ such that $A \cap B = \varnothing$: $v(A \cup B) = v(A) + v(B)$. It is easy to prove that every probability measure is a convex capacity.

If a convex capacity is not a probability measure then there exists at least a pair $A,B \subseteq S$ such that: $v(A \cup B) + v(A \cap B) > v(A) + v(B)$. In particular, if $B = S\backslash A$ then $v(A) + v(S\backslash A)$ may be less than 1, implying that not all probability mass is allocated to an event and its complement. The uncertainty aversion measure of a capacity v at event $A \subseteq S$ is defined by $\phi\,(v,A) = 1 - v(A) - v(S/A)$. Because it, convex capacities are also know as non-additive probabilities reflecting uncertainty aversion.

In this paper it was considered a special case of convex capacities: the uniform squeeze, where $v(A)=(1-\varnothing)p(A)$ if $A \neq S$ and $v(A)=1$ if $A=S$. Because it the expected value has that very interesting formula on which the uncertainty appears parametrically represented by the uncertainty aversion measure that we use in our paper.