Improved Creditor Protection and Verifiability in the U.S.*

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Abstract

The dissatisfaction with the U.S. bankruptcy law is largely due to its excessive focus on distribution rather than efficiency issues. The existence of dispersed creditors and different classes of debt make out-of-court restructuring harder and often result in rejections of reorganization plans in Chapter 11. In these cases, creditors' recovery values crucially depend on the level of verifiability of assets in place in court, the strategic uncertainty among lenders, and the debtor's uncertainty about the outcome of out-of-court renegotiations. Building on the work by Diamond (2004) and Ayotte and Gaon (2011), we develop a model that incorporates these three sources of uncertainty and examines the effect of verifiability on bankruptcy filing and firm financing. We show that higher verifiability increases both the probability of Chapter 11 filings and debt capacity. The model also predicts the effect on debt capacity to be increasing in verifiability. We test these predictions exploring an exogenous variation in one of several forms verifiability, namely, the ability of courts to price assets in place. We use the natural experiment provided by a Supreme Court ruling in 1999 stating that shareholders in Chapter 11 must auction their equity interest whenever they propose a restructuring plan contributing cash to the firm but violating creditor absolute priority. This change effectively precludes shareholders from making cash contributions below the market value of the assets, and thus substantially increasing asset verifiability. Our results strongly support our predictions. Chapter 11 filings for affected firms more than doubled after the Supreme Court ruling (from 0.63% to 1.73%), while control firms remained largely unaffected. The positive market reaction surrounding this event is also increasing in verifiability. Results are robust to various specifications and tests. Our theory and empirical work help clarify and quantify some of the channels by which creditor protection increases firm value.

Key words: Asset Verifiability, Distress, Coordination, Creditor Protection.
JEL classification: G33, G34, G38.

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1 Introduction

To a large extent, the dissatisfaction with the U.S. bankruptcy law is largely due to its excessive focus on distribution rather than efficiency issues. The existence of dispersed creditors and different classes of debt make out-of-court restructuring harder and often result in rejections of reorganization plans in Chapter 11. In these cases, creditors' recovery values crucially depend on the level of verifiability of assets in place in court. Theories about debt financing have long recognized the difficulty of contract enforcement and the associated importance of asset verifiability (Hart and Moore (1994, 1998), Bolton and Scharfstein (1990, 1996)). Most of the literature focuses on imperfect verifiability of cash flows and assumes that assets in place can be fully pledged to creditors. Surprisingly, however, little is known about the verifiability of assets in place in court and the channels by which it affects firm value. While some studies greatly improved our understanding about the tangibility channel (Kiyotaki and Moore (1997), Shleifer and Vishny (1992), and Almeida and Campello (2007)), we know little about another important channel of verifiability, namely, the ability of courts to price assets in place. Understanding how this verifiability channel affects distress outcomes and financing decisions is an important step for improving bankruptcy procedures.

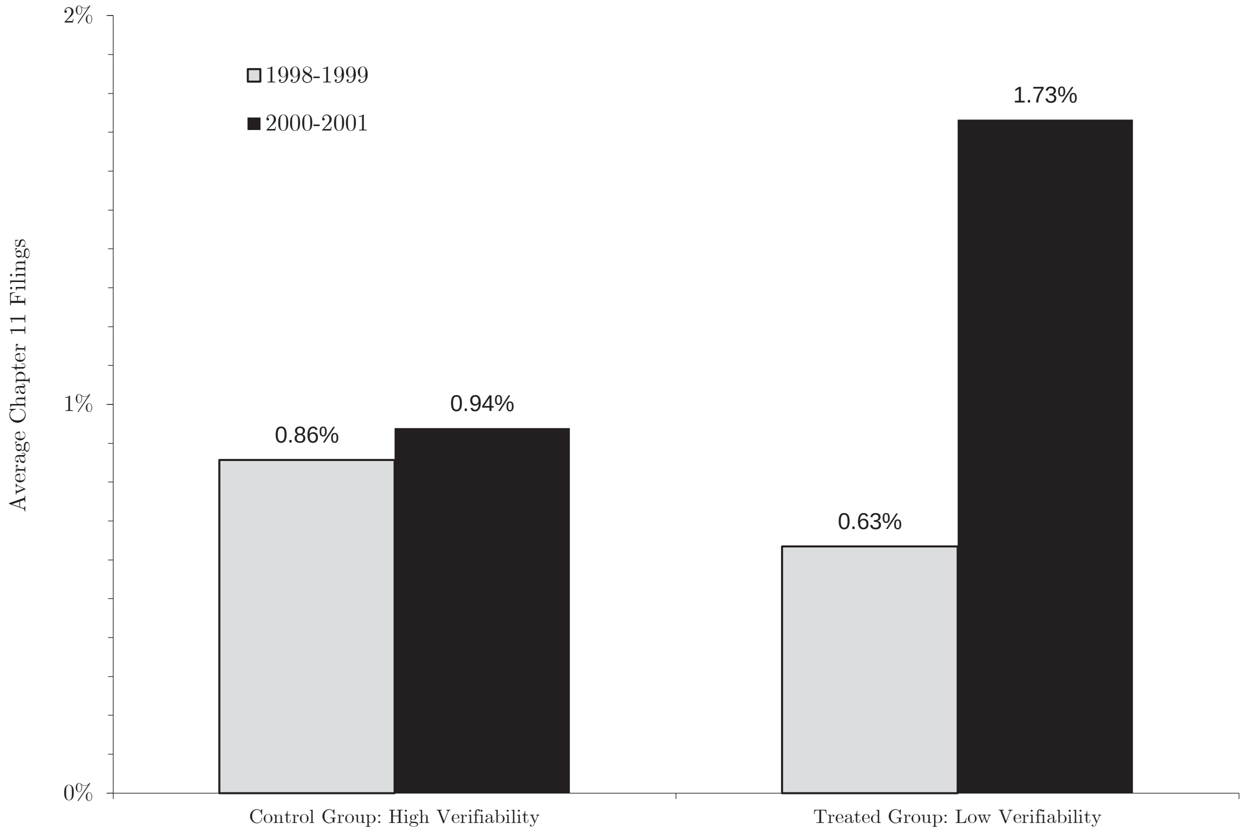
The goal of this paper is to model and test how verifiability of assets in place, and its interplay with strategic uncertainty among lenders, and debtors' uncertainty about the outcome of out-of-court renegotiations, determine distress outcomes and firm financing. We start by developing a model that incorporates these three important channels of uncertainty which are currently missing in the literature. We examine the effect of verifiability on the likelihood of Chapter 11 filings and the income that can be pledged to creditors. In a nutshell, our model shows that higher verifiability increases both the probability of Chapter 11 filings and debt capacity. The model also shows that the effect on debt capacity is increasing in verifiability. To our knowledge, we are the first to incorporate all these three uncertainty components in the analysis of distress resolution.

In our model, a distressed borrower tries to renegotiate the outstanding debt out of court. Renegotiation is difficult because debt is dispersed and lenders face a coordination problem. Not only they do not observe the likelihood of the success of an out-of-court renegotiation, but they also do not know what other lenders think are the odds of a successful renegotiation or what other lenders think about other lenders' beliefs about a successful renegotiation. The likelihood of a successful renegotiation depends on the stake of the continuation value offered to lenders during renegotiation and what lenders expect to receive in court in the event renegotiation fails. From the borrower's perspective, things are even more complicated because the exact outcome of renegotiation is not known even after conditioning on the stake offered to lenders. As a result, the borrower faces a fundamental tradeoff: the borrower can reduce the probability of going to court only at the expense of increasing lenders' share of the continuation value. An increase in asset verifiability affects this tradeoff as it raises lenders' payoff in court, hence their opportunity cost of accepting the borrower's offer. This makes coordination among lenders harder and increases the probability of bankruptcy. In order to keep the probability of going to court constant, the borrower would have to substantially increase the stake of the continuation value offered to lenders. However, increasing lenders' stake is costly since it reduces the borrower's interest in the continuation value if renegotiation succeeds. This makes reducing the probability of going to court less attractive. As a result, the probability of an in court renegotiation increases.

An increase in verifiability has two opposing effects on debt capacity. Bankruptcy is inefficient in our model as the continuation value of the assets is assumed to be higher than the value of the assets in court. As a result, higher verifiability reduces the ex-ante size of the pie that can be pledged to lenders since it increases the probability of bankruptcy. However, higher verifiability increases the lenders' payoff in court. This second effect becomes stronger as the probability of bankruptcy becomes higher, which results from increases in verifiability. Therefore, pledgeable income is increasing in verifiability if the degree of creditor protection is above a certain standard.

We test the predictions of the model using a natural experiment provided by a ruling from the Supreme Court — which rarely considers bankruptcy issues. This ruling reversed the previous decision by the Circuit Court of Appeals, changing the standard practice in Chapter 11 procedures regarding the approval of reorganization plans. A reorganization plan can be confirmed over a dissenting class — *a cramdown* — if the court considers it to be fair and equitable. A plan is considered to be fair and equitable if it satisfies the absolute priority rule (APR) — no junior claimant receives anything when a senior creditor rejects the plan and is not paid in full. However, there is an exception to the APR rule called "the new value contribution" (NVC). Under this exception, shareholders may retain their interest without paying creditors provided they infuse capital into the firm. The court allows an NVC exception if it thinks the new capital contribution is “substantial”. However, the ability of the court to determine what is substantial depends crucially on the possibility of relying on efficient markets to infer the price of the firm’s assets.

Figure 1: Bankruptcy Filings and Asset Verifiability: Difference-in-Difference Analysis



On May 3, 1999, the Supreme Court in Bank of America v. 203 North LaSalle Partnership ruled that shareholders in Chapter 11 must auction their equity interest whenever they propose a restructuring plan that maintains their interest if they contribute cash and the absolute priority rule (APR) is violated. This decision prohibits the shareholder to contribute an amount of cash that is lower than the market value of the assets, and thus effectively increases asset verifiability and creditor protection in Chapter 11. We would expect this change to have little or no effect on firms for which courts can observe the asset prices in efficient markets, but have a substantial increase of creditor protection for firms for which asset markets are illiquid and/or unreliable. To test this hypothesis, we use a difference-in-differences approach comparing Chapter 11 filings for firms with and without an active market for property, plant, and equipment (PP&E) before and after the

Supreme Court ruling. More specifically, we define low-verifiability firms — our treatment group — as those firms for which industry-year sales of PP&E as a percentage of book assets are below the sample median. Our bankruptcy data come from the UCLA-LoPucky Bankruptcy Research Database (BRD), which reports all Chapter 11 filings for publicly listed firms in the U.S. with total assets are above $100 million. We marry this data with firm level characteristics extracted from the COMPUSTAT industrial database. Our sample includes non-financial firms.

According to our theoretical model, we should expect the Supreme Court ruling to have a significant positive impact on Chapter 11 filings mostly for firms with illiquid asset markets. This base result is apparent in Figure 1, which illustrates the unconditional difference-in-differences results. Chapter 11 filings more than double (from 0.63% to 1.73%) for low-verifiability firms following the Supreme Court decision. By comparison, Chapter 11 remained roughly unchanged for the control group. This result is essentially unaltered by conditioning on firm controls, as well as year, industry, and the interaction of year and industry fixed effects.

We also test the prediction of our model that higher verifiability increases the income that can be pledged to lenders, hence funding availability. This allows borrowers to invest in profitable projects that would not be financed otherwise. Therefore, an increase in verifiability should increase borrowers' payoff, hence the equity value of shareholders. Consistent with this prediction, we find that the firms in our sample experienced significant positive Cumulative Average Abnormal Returns of 1.62% in the five days surrounding the Supreme Court ruling. Our theory also predicts that the market reaction should be stronger for firms characterized by higher verifiability. Our evidence confirms this prediction.

Our econometric specifications also assess the role of the assumptions of our theory for our results. Debt dispersion and coordination among lenders are pivotal to our model. In line with our predictions, we find that our results hold mainly for groups of firms where coordination among lenders might be difficult: that is, firms with dispersed debt (i.e., firms with access to either bond or commercial paper market) or firms with mixed debt structure (i.e., firms using at least three different types of debt instruments). Our model also predicts that the effect of improved in-court verifiability should be stronger for firms near financial distress. Consistent with this prediction, we find that the effect of the Supreme Court ruling is stronger for firms in "financial alert" (Altmans

Z-score less than 3) and is decreasing in Z-scores.

A common concern with inferences from difference-in-differences estimators is whether treatment and control group outcomes followed ”parallel trends” prior to the treatment. Only under this assumption it is possible to attribute differences in the post-treatment period to the treatment itself. For this reason, we compare pre-treatment trends in Chapter 11 filings of low and high-verifiability firms. We find no graphical evidence that they followed different trends. To test directly the implications of the "parallel trend" assumption for our findings, we estimate our baseline model controlling for treatment-specific trends and we find that our results hold.

In order to further show the robustness of our results, we also conduct a series of placebo and falsification tests to check the robustness of our results. First, we show that our result are robust to selecting different sample periods covering the Supreme Court decision. Notably, these tests shows that our findigns are economically stronger for sample periods more closely centered around the Supreme court ruling. Second, we run a series of replications of our estimation for "place dates" (i.e., years prior or following the Supreme Court ruling in 1999). These tests show that results only hold for 1999. Finally, our results are also robust to using different cutoffs of industry sales of PP&E to define the treatment group.

Our paper is mainly related to two strands of the literature in the theoretical domain. The first strand is devoted to understanding the effect of debt dispersion on the resolution of distress (e.g., Diamond (2004), Bolton and Scharfstein (1996), Gertner and Sharfstein (1991), and Genaiolli and Rossi (2013)) and abstract away from the verifiability of assets in place in bankruptcy procedures. Gertner and Sharfstein (1991) consider out-of-court renegotiation following default but, unlike in our model, lenders do not face strategic uncertainty regarding renegotiation. Although Bolton and Scharfstein (1996) examine externalities among lenders, bargaining occurs after bankruptcy and they use a cooperative bargaining approach in which ex post outcomes are always efficient. Diamond (2004) examines uncertainty among lenders that can cause "firm runs" and lead to bankruptcy. It does not consider, however, strategic out-of-court renegotiation following default. Our paper builds on Gertner and Sharfstein (1991) and Diamond (2004) by considering both uncertainty among lenders and out-of-court renegotiation between borrowers and lenders after default. The second strand studies the effect of creditor protection on continuation versus liquidation outcomes in bankruptcy (e.g., Ayotte and Gaon (2011), Genaiolli and Rossi (2010), and Eisfeldt and Rampini (2009)) and does not consider debt dispersion and coordination among lenders. It is important to note that all of these papers assume away the either of the three key uncertainty aspects considered in this paper, namely verifiability of assets in place in court, strategic uncertainty among lenders, and debtors' uncertainty about the outcome of out-of-court renegotiations.

Our paper also adds to the literature that empirically examines the role of financial institutions for the ability of firms to access financial markets. In La Porta, et al. (1997), Demirguc-Kunt and Maksimovic (1998), and Djankov, McLiesh, and Shleifer (2007) weak creditor protection gives rise to credit frictions and has implications for real activities. La Porta and Lopez-de Silanes (2001) examine the effect of bankruptcy laws and the protection they give to creditors on firms' access to credit. We contribute to this literature by identifying an important channel — the role of asset verifiability — through which creditor protection and increased market participation in bankruptcy can improve access to finance and increase firm value.

The paper is organized as follows: Section 2 presents the model and the main empirical implications; Section 3 we show our empirical results; Section 4 discusses some model extensions; and Section 5 concludes.

2 The Model

The economy lasts for three periods $t = 0, 1, 2$. There is a borrower and a continuum of lenders indexed by $i \in I \supset [0, 1]$. The borrower is penniless and endowed with a project that needs an amount g of funding in order to generate cash flows. The borrower raises funds from lenders, each of whom is endowed with g units of funds. Therefore, the borrower needs to borrow from a subset of mass one of lenders.

If the project is financed, it generates a verifiable cash flow of $c \in \{0, y\}$ in $t = 1$, where $c = y$ with probability λ and $c = 0$ with probability $1 - \lambda$. If the cash flow is $c = y$, we say the borrower is "sound", while if it is $c = 0$, the borrower is in "financial distress".

The borrower raises funds by means of securities issuance. At this moment, we assume that the borrower issues the same security to all lenders. We later show that out model is robust to having a finite number of securities. The repayment associated with the security is decomposed by the repayment when the borrower is sound and that when the borrower is in distress. The former is denoted by s and the latter by r.

If the borrower is in distress and fails to renegotiate the debt, he goes bankrupt. Let ℓ be the market value of the assets in bankruptcy. We assume that in bankruptcy only a fraction α of the assets is verifiable. We refer to α as *asset verifiability*. This is meant to reflect the idea that the court cannot rely on efficient markets to infer the price of the underlying assets. As a result, the borrower is capable of retaining an interest of $1-\alpha$ of the value of the assets. Therefore, lenders receive $r = \alpha\ell$.

We assume that renegotiation is efficient. If the borrower succeeds in renegotiating the debt, the project generates a continuation value of v in $t = 2$. If renegotiation fails, the borrower files for bankruptcy. We assume that v is nonverifiable in $t = 0$, but becomes verifiable in $t = 1$, making renegotiation possible.

The likelihood of a successful renegotiation is governed by a fundamental θ. This fundamental is unknown to all participants until $t = 2$ and is drawn from a continuously differentiable and strictly positive density k with support on the real line. However, lenders receive a noisy signal in $t = 1$ given by

$$x_i = \theta + \sigma\eta_i, \tag{1}$$

where $\sigma > 0$ and the noisy terms are i.i.d. with continuous density h and support on the real line.

Let f be the fraction of lenders that adhere to renegotiation. Renegotiation succeeds if and only if f is sufficiently large

$$f \geq 1 - d\theta, \tag{2}$$

where $d > 0$ is a dispersion — or scale — parameter.

The last inequality states that renegotiation is more likely whenever the fundamental is higher. It also says that the odds of a successful renegotiations is higher the larger the proportion of lenders that accept the borrower's offer.

Renegotiation proceeds as follows. The borrower offers a fraction q of the continuation value to each lender. If the lender accepts the offer, he no longer holds the security and loses its associated payoff both when renegotiation succeeds and when it fails. The lender's net benefit of accepting the offer is $qv - s$ when renegotiation succeeds and $-r$ when it fails.

Formally, each lender's net payoff of renegotiating over not renegotiating is given by

$$\pi = \begin{cases} qv - s, \text{ if renegotiation succeeds} \\ -r, \text{ if renegotiation fails} \end{cases} \tag{3}$$

Finally, we make the following additional assumptions.

Assumption 1 $\lambda y + (1-\lambda)\, v > g > \lambda y + (1-\lambda)\, \ell$.

Assumption 2 $k(\theta)$ *is strictly log-concave.*

Assumption 3 *The distribution of* $d\theta$*,* $K\left(\frac{\theta}{d}\right)$*, is sufficiently concentrated, i.e., the dispersion parameter* d *is sufficiently small.*

Assumption 1 indicates that continuation is optimal relative to bankruptcy. It also states that if bankruptcy occurs very often, then the project might have a negative NPV. In this case, either the borrower loses money, or the lenders, or both. As a result, the project will not be financed. Assumption 2 is a technical one. It implies that k has strictly increasing hazard rate $\frac{k}{1-K}$ and strictly decreasing reverse hazard rate $\frac{k}{K}$. This assumption is made to guarantee uniqueness of equilibrium and to streamline the analysis.[1] Assumption 3 is made for the analysis to be interesting. It implies that the renegotiation outcome is sensitive enough to the borrower's offer to lenders. It guarantees that the borrower's optimal offer to lenders is interior.

2.1 Equilibrium and Results

We start by examining the outcome of renegotiation if the borrower is in distress. From lenders' net payoff in 3, we can see that it is a dominant strategy for them to reject any offer $q \leq \frac{s}{v}$. In this case, renegotiation fails with probability one and the borrower's payoff is $(1-\alpha)\, \ell$. Therefore, we turn our analysis to the case in which the borrower offers $q > \frac{s}{v}$.

If lenders were able to observe how likely the renegotiation is able to succeed, then both mutual renegotiating and not renegotiating would be self-enforcing outcomes for $\theta \in (0,1)$. Therefore, successful renegotiation could be achieved if lenders could coordinate on playing the renegotiating equilibrium. Moreover, this would be efficient since $v > \ell$.

[1]This assumption is not very restrictive as many well-known distributions are log-concave such as normal, logistic, uniform, chi-squared and others.

However, this is not a realistic assumption as it implies that lenders know the actions of other lenders. More importantly, it fails to capture the huge uncertainty about lenders' decision at the time of renegotiation and the high potential for inefficient outcomes.

Under private information about how likely a renegotiation is to succeed, each lender's decision crucially depends on the belief about the fraction of lenders that adhere to renegotiation. We use global game techniques to find the unique equilibrium of this coordination game as the signal about the renegotiation fundamental becomes nearly precise. This is done in order to focus on strategic uncertainty rather than uncertainty about the fundamental.[2] The result is described in Proposition 1.

Proposition 1 *As $\sigma \to 0$, the unique equilibrium has lenders following a threshold strategy around a common critical cutoff $\overline{\theta}$: lenders coordinate on renegotiating if $\theta > \overline{\theta}$, and not renegotiating if $\theta < \overline{\theta}$, where*

$$\overline{\theta} = \frac{1}{d}\frac{r}{qv-(s-r)} = \frac{1}{d}\frac{\alpha\ell}{qv-(s-\alpha\ell)} \tag{4}$$

The cutoff in Proposition 1 is determined using two conditions. The first one is the fact that the lender exactly at the cutoff is indifferent between accepting and not accepting the borrower's proposal given his beliefs about f. The second one is that the belief about f conditioning on being at the cutoff is the uniform distribution on the unit interval. Therefore, the cutoff $\overline{\theta}$ is the one that satisfies

$$\int_{1-d\overline{\theta}}^{1} (qv-s)\ df + \int_{0}^{1-d\overline{\theta}} (-r)\ df = 0. \tag{5}$$

Proposition 1 states that the probability of an out-of-court renegotiation is decreasing in asset verifiability α, the value of the assets in court ℓ, and the face value of debt s. On the contrary, the likelihood of a successful renegotiation is increasing in the stake offered to lenders q, the continuation value v, and the dispersion parameter d.

Given that the borrower does not observe the true fundamental θ, the relationship between $\overline{\theta}$ and q captures the main tradeoff faced by the borrower. He can reduce the probability of bankruptcy only at the expense of reducing his stake of the continuation value. Note that there would be no tradeoff if the borrower observed θ. If $\theta > \overline{\theta}$, the borrower can reduce q up to the point that $\theta = \overline{\theta}$, increasing his payoff and making sure renegotiation still succeeds.

[2] See Carlsson and van Damme (1993a,b) and Morris and Shin (2003) for a comprehensive discussion on global games.

The borrower will choose q such as to solve

$$\max_{q\in\left(\frac{s}{v},1\right]} \Pi\left(q\right) \equiv \left(1-K\left(\overline{\theta}\right)\right)v\left(1-q\right)+K\left(\overline{\theta}\right)(1-\alpha)\ell. \tag{6}$$

An interior local maximum satisfies the following necessary first order condition:

$$\frac{k\left(\overline{\theta}\right)}{1-K\left(\overline{\theta}\right)}\overline{\theta}^{2}d=\frac{\alpha\ell}{v\left(1-q\right)-\left(1-\alpha\right)\ell}. \tag{7}$$

The right-hand side of 7 is strictly increasing in q and becomes arbitrarily large as q approaches $1-\frac{(1-\alpha)\ell}{v}$. The left-hand side, however, is strictly decreasing in q since $\overline{\theta}$ is strictly decreasing in q and k has strictly increasing hazard (Assumption 2). Moreover, the left-hand side is greater than the right-hand side for q close to $\frac{s}{v}$ and d sufficiently small (Assumption 3). This implies that there exists $q^* \in \left(\frac{s}{v},1-\frac{(1-\alpha)\ell}{v}\right)$ that satisfies the equality. Since the left-hand side is strictly decreasing in q and the right-hand side is strictly increasing, there is a unique such q^*.

We also have that, for $q\in\left(\frac{s}{v},1-\frac{(1-\alpha)\ell}{v}\right]$, $\Pi'\left(q\right)>0$ if $q<q^*$ and $\Pi'\left(q\right)<0$ if $q>q^*$. In addition, $\Pi'\left(q\right)<0$ for $q>1-\frac{(1-\alpha)\ell}{v}$. Therefore, q^* is the unique local maximizer of a strictly quasiconcave function, hence the unique global maximizer. This lead us to Proposition 2.

Proposition 2 *The borrower's optimal offer q^* is the unique solution to 7.*

We define the renegotiation cutff associated with the optimal stake q^* as $\overline{\theta}^{*}\equiv\overline{\theta}\left(q^*\right)$. Since $\overline{\theta}$ is increasing in α and k has strictly increasing hazard, we can conclude that the left-hand side of 7 is increasing in α. The same can be verified for the right-hand side. Because the left-hand side is decreasing in q and the right-hand side is increasing in q, it follows that $\overline{\theta}^{*}$ is increasing in α. In other words, the probability of an in-court renegotiation is increasing in asset verifiability. We formalize this in Proposition 3.

Proposition 3 *The optimal stake offered to lenders q^* and the probability of bankruptcy $K\left(\overline{\theta}^{*}\right)$ are increasing in asset verifiability α, the value of assets in court ℓ, and the face value of debt s; and decreasing in the continuation value v.*

Proposition 3 states that the inefficiency resulting from filing for bankruptcy is increasing in verifiability. Higher verifiability increase lenders' payoff in court, which makes coordination more difficult. At the same time, increased lender protection reduces the borrower's payoff in bankruptcy, which reduces the opportunity cost of increasing his stake of the continuation value. All in all, the final result in a higher probability of going to court.

It is now possible to derive the payoffs of the borrower and lenders and to examine how the interaction of lenders' coordination problem and verifiability affect financing.

The borrower's payoff is given by

$$B(\alpha) \equiv \lambda (y - s) + (1 - \lambda) \left[\left(1 - K\left(\overline{\theta}^*\right)\right) (1 - q^*) v + K\left(\overline{\theta}^*\right) (1 - \alpha) \ell \right], \tag{8}$$

while that of lenders' is

$$L(\alpha) \equiv \lambda s + (1 - \lambda) \left[\left(1 - K\left(\overline{\theta}^*\right)\right) q^* v + K\left(\overline{\theta}^*\right) \alpha \ell \right] - g. \tag{9}$$

Combining the borrower and lenders' payoff we derive the aggregate payoff of the economy

$$A(\alpha) \equiv B(\alpha) + L(\alpha) = \lambda y + (1 - \lambda) \left[\left(1 - K\left(\overline{\theta}^*\right)\right) v + K\left(\overline{\theta}^*\right) \ell \right] - g. \tag{10}$$

Since $K\left(\overline{\theta}^*\right) > 0$, it immediately follows that funding will not be granted if the investment requirement g is large enough, in which case $A(\alpha) < 0$. Since the borrower's payoff is positive, in such situation it must be that lenders' are losing money. This inefficiency is the combined result of dispersed debt and the borrower not being able to observe the renegotiation fundamental.

We still need to examine how asset verifiability interacts with these two features in determining financing, hence the maximum income that can be pledged to lenders. The pledgeable income is given by

$$P(\alpha) \equiv \lambda y + (1 - \lambda) \left[\left(1 - K\left(\overline{\theta}^*\right)\right) q^* v + K\left(\overline{\theta}^*\right) \alpha \ell \right]. \tag{11}$$

The pledgeable income can be rewritten to be expressed in term of the borrower's maximized payoff in distress:

$$P(\alpha) = A(\alpha) - (1 - \lambda) \left[\left(1 - K\left(\overline{\theta}^*\right)\right) (1 - q^*) v + K\left(\overline{\theta}^*\right) (1 - \alpha) \ell \right] + g \tag{12}$$

There are basically two channels by which verifiability affects the pledgeable income. The first term on the right-hand side indicates that higher verifiability reduces the pledgeable income by increasing the probability of bankruptcy. Since the value of the assets in court is lower than the continuation value, the size of the pie that can be distributed among lenders is smaller.

The second term on the right-hand side is $-(1-\lambda)$ times the borrower's maximized payoff in distress. Since the borrower's payoff in distress is decreasing in asset verifiability, it implies that higher creditor protection increases lenders' payoff in distress. This contributes to a higher pledgeable income. Differentiating 12 we obtain:

$$\frac{dP(\alpha)}{d\alpha} = -(1-\lambda)\left[k\left(\overline{\theta}^*\right)\frac{d\overline{\theta}^*}{d\alpha}(q^*v-\alpha\ell) - \left(1-K\left(\overline{\theta}^*\right)\right)v\frac{dq^*}{d\alpha} - K\left(\overline{\theta}^*\right)\ell\right]. \tag{13}$$

This expression is positive if and only if

$$\frac{k\left(\overline{\theta}^*\right)}{K\left(\overline{\theta}^*\right)}\frac{d\overline{\theta}^*}{d\alpha}(q^*v-\alpha\ell) - \frac{1-K\left(\overline{\theta}^*\right)}{K\left(\overline{\theta}^*\right)}v\frac{dq^*}{d\alpha} < \ell, \tag{14}$$

which holds when the dispersion parameter d is small enough (Assumption 3). Therefore, we are led to Proposition 4.

Proposition 4 *Pledgeable income is increasing in asset verifiability.*

Although higher verifiability increases the probability of bankruptcy (hence the ex post inefficiency), enhanced creditor protection can improve ex ante efficiency as it allows profitable projects to be financed. This is especially true in the real world, where firms face financial constraints. Proposition 4 indicates that this effect is increasing in verifiability. The reason is that verifiability has two opposing effects on pledgeable income. On one hand, higher verifiability increases the probability of bankruptcy, which reduces the ex ante size of the pie that can distributed to lenders since bankruptcy is inefficient. On the other hand, higher verifiability increases lenders' payoff in court. The latter effect becomes stronger the more likely the borrower is to file for bankruptcy, which is the case for higher values of verifiability.

3 Empirical Evidence

3.1 Data and Descriptive Statistics

Our bankruptcy data are from the UCLA-LoPucky Bankruptcy Research Database (BRD). The database reports all Chapter 11 filings for publicly listed firms in the U.S. for which the total assets is more than \$100 million. All firm level data are obtained from the COMPUSTAT industrial database. The sample includes all non-financial firms.

<u>TABLE 1 ABOUT HERE</u>

We define our focus variable, *Chapter11*, as a dummy variable that takes a value of 1 if the firm files for Chapter 11 protection during the period 1998 – 2001 and zero otherwise. The other variables are defined following standard practice in corporate finance established in capital structure studies published over the last two decades.[3] *TobinsQ* is defined as the ratio of the market value of total assets ($at - ceq + prcc\_c \times csho$) to the book value of total assets (at). *BookLeverage* is the ratio of total debt (COMPUSTATs items $dlc + dltt$) to book value of total assets. *Size* is total assets (measured in millions of 2001 dollars using the Producer Price Index (PPI) published by the U.S. Department of Labor as the deflator). *Profitability* is the ratio of earnings before interest, taxes, depreciation and amortization (*oibdp*) to book value of total assets. *DispersedDebt* is a dummy variable that takes a value of 1 if the firm has either a bond rating (*splticrm*) or a commercial paper rating (*spsticrm*) and zero otherwise.

Table 1 lists the descriptive statistics for the variables used in our main empirical models. Our main variable of interest is Chapter 11 filings. Table 1 shows that, as one would expect, Chapter 11 filings are rare. The mean of *Chapter11* is 0.9%. All the other variables' statistics reported in Table 1 are close to what earlier studies find.

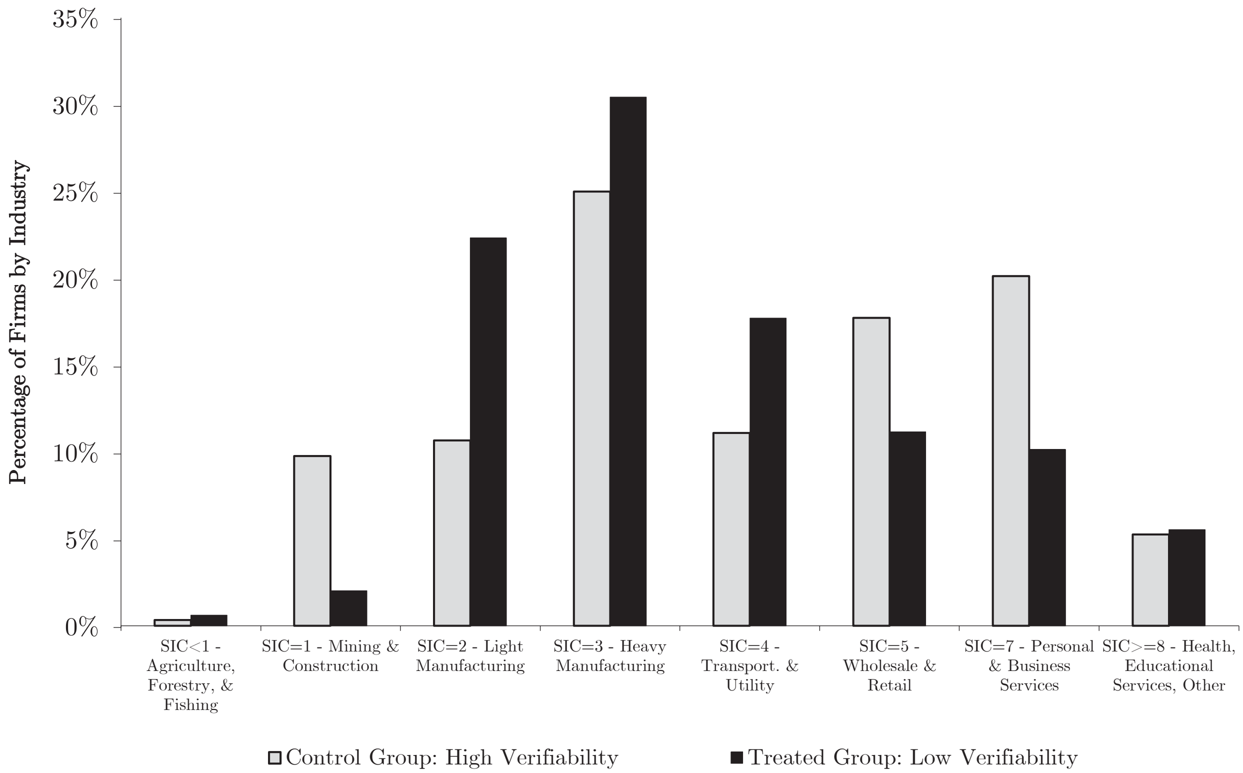
Since we compare changes in Chapter 11 filings for low and high-verifiability firms, it is interesting to see whether our treated or control groups are composed systematically of firms from particular industries. If this were the case, then one could be concerned about our results being caused by some omitted variables correlated with industry characteristics and our definition of treated and control groups. The results in Figure 2 shows that the distribution of high and low-verifiability firms across industries does not seem to follow a systematic pattern.

3.2 Results

In this subsection we the effect of improved creditor protection following the Supreme Court ruling on Chapter 11 filings. On one hand, our identification strategy uses the fact that this ruling would not impact asset verifiability and creditor protection if the court can observe the prices of

[3]These studies include Barclay and Smith (1995), Rajan and Zingales (1995), Graham (2000), Baker and Wurgler (2002), Frank and Goyal (2003), Johnson (2003), Faulkender and Petersen (2006), Flannery and Rangan (2006), Billett, King, and Mauer (2007), Lemmon, Roberts, and Zender (2008), Byoun (2008), and Sibilkov (2009).

Figure 2: Percentage of Firms by Industry: Control and Treated Groups

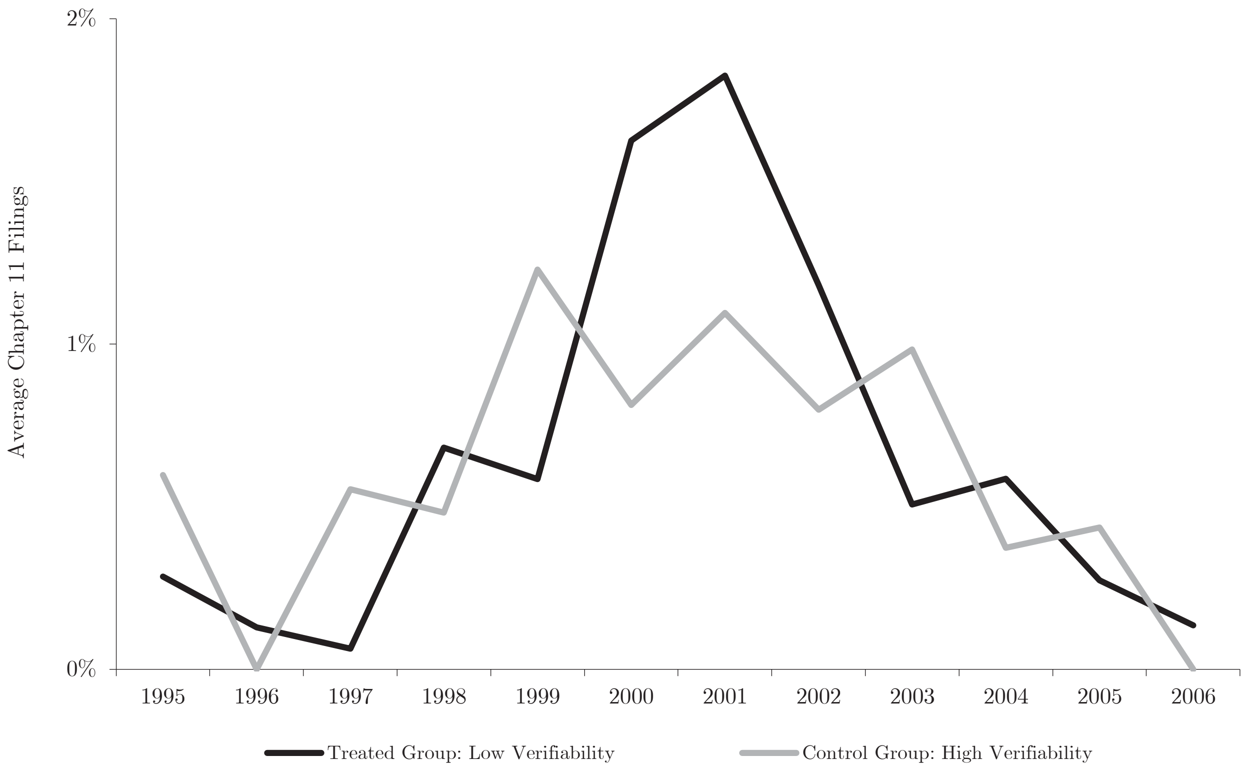


the underlying assets in efficient markets. In this environment, the court is capable of accurately assessing if shareholders' cash contribution is "substantial" in the sense of reflecting the true value of the assets. This represents a high degree of creditor protection.

On the other hand, we rely on the fact that the ruling represents a substantial increase of creditor protection for firms where asset markets are illiquid and unreliable. We employ the standard difference-in-difference method (see, e.g., Bertrand, Duflo, and Mullainathan 2004). We compare Chapter 11 filings for firms with high and low verifiability, that is, with and without an active market for property, plant, and equipment (PP&E) before and after the Supreme Court ruling.

More specifically, our low-verifiability group is composed of firms for which industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median and zero otherwise. Firms in the treatment group are characterized by the dummy variable *LowVerifiability*, which equals one if the firm is in the low-verifiability group and zero otherwise. Our treatment is represented by the dummy variable *SupremeCourt1999*, which takes the value of one for the fiscal

Figure 3: Average Chapter 11 Filings for Treated and Control Groups over the Period 1995 – 2006



year starting from 1999 and zero otherwise.

<u>Table 2 About Here</u>

Our main results are presented in Table 2. The regressions are Probit estimation results from Chapter 11 filing regressions. The coefficient of interest is that of the interaction term LowVerifiability × SupremeCourt1999. This coefficient is positive and significant at the 1% significance level and is associated with a likewise significant marginal effect of 1.1 percentage points. That is, low-verifiability firms experienced an increase of 1.1 percentage points in Chapter 11 filings more than high-verifiability firms following the Supreme Court decision. The magnitude of the impact is substantial as the percentage increase is twice as much as the average bankruptcy filing in the period before the ruling. Table 2 reports estimation results for various specifications that differ relative to inclusion of year fixed effects, industry fixed effect, and the interaction of both.

It is important for our identification strategy that both treated and control groups follow a "parallel trend" such that we can say the difference in outcomes is due to the Supreme Court ruling. Only under this assumption it is possible to attribute differences in the post-treatment period to the treatment itself. This seems to be the case as Figure 3 illustrates. Except for the period of Supreme Court decision in 1999, both groups with high and low verifiability follow a similar trend.

As Table 3 shows, our results are robust to including trend effects interacting with the *LowVerifiability* dummy for various sample periods. We perform the same baseline estimations controlling for treatment-specific trends and our results are unaffected by these changes. This robustness persists even if we choose different sample periods as columns 2 and 3 indicate. As a result, we find no evidence that treated and control groups followed different trends.

We also test the prediction of our model that higher verifiability increases the income that can be pledged to lenders, hence funding availability. This allows borrowers to invest in profitable projects that would not be financed otherwise. Therefore, an increase in verifiability should increase the borrowers' payoff, hence the equity value of shareholders. Consistent with our theory, the results in Panel A Table 4 show significant positive Cumulative Average Abnormal Returns of 1.62% in the five days surrounding the Supreme Court ruling. The numbers in Panel 4 also indicate that our estimations do not seem be the result of a confounding factor that occurred close to the Supreme Court decision as the results fade away as one considers a wider window before the event.

Table 3 About Here

Our theory also suggests that increase in firm value comes from allowing more profitable projects to be financed. One one hand, verifiability in our model affect decisions and outcomes when firms are in distress, which in turn have feedback effects on firm financing. If the story we tell is relevant, then our implications should matter more for firms that face a non-negligible chance of default. On the other hand, the ex ante channel of verifiability might not be available for firms that are substantially close to default. For these firms, the ex post effects of verifiability become relatively more important relative to ex ante financing considerations. Therefore, the harmful effects of increased verifiability in terms of higher probability of bankruptcy might be dominant. This is exactly what is shown in Panel B of Table 4. The market reaction is higher for firms that are less safe, highlighting the relevance of our story. At the same time, among firms that are under "financial alert", those that are relatively closer to default do not see a positive market reaction.

Table 4 About Here

In addition, our theory states that the ex ante financing benefits of improved credit protection should be higher for firms with more verifiable assets. Although higher verifiability reduces the ex ante size of the pie that can be pledged to lenders (increased probability of bankruptcy), it increases lenders' payoff in court. The latter effect tends to dominate as bankruptcy becomes the most likely outcome. Since increases in verifiability raise the chances of a Chapter 11 restructuring, pledgeable income is increasing in verifiability. This result is precisely that of Panel C of Table 4, which reports that the market reaction is essentially monotonically increasing in the ability of courts to verify assets in place.

Table 5 About Here

We also check if some of the underlying assumptions and implications of our theory and empirical methods are supported by the data. One key assumption of our theory is the dispersion of debt and the coordination problem among lenders. In line with these assumptions, Table 5 shows that our results only hold for firms that have either bond or commercial paper rating or for those with mixed debt structure (with at least three different debt instruments). These measures of debt dispersion and coordination problems are standard in the literature (see, e.g., Gilson et al. (1990)).

Table 6 About Here

The verifiability channel of our model works through its implications for out-of-court versus in-court renegotiations of distressed firms. Therefore, changes in verifiability should matter more for firms that are in distress. These firms should be the ones experiencing a higher increase in the probability of filing for Chapter 11 following the Supreme Court ruling. The results on Table 6 support this prediction and show that the effect of the ruling is stronger for firms in "financial alert" (Z-score less than 3) and is decreasing in Z-scores.

3.3 Robustness

In this subsection we test for the robustness of our results. First, we test if our results are robust to changes in the sample periods. That is, we want to know if our findings unaltered by selecting different sample periods around the treatment to measure changes in Chapter 11 filings. The results in Table 7 show that our results are robust and are not caused by selectively choosing the sample periods. Expectedly, the estimated coefficients become larger as the window of measurement shrinks towards the date of the Supreme Court ruling. Intuitively, as one starts widening the window of measurement, estimations are more subject to capturing effects other than those associated with the ruling itself.

Table 7 About Here

Second, we test whether our results hold only for the period identified as the treatment. If our results also hold for different periods, then one would be sceptical about the change in outcome being the result of the Supreme Court decision. In order to test this, we run a set of placebo tests having different periods as potential treatment periods. Our results *only* hold for 1999, the year of the Supreme Court ruling.

Table 8 About Here

Third, we redefine our treatment group based on different cutoffs of industry sales of PP&E to check for the sensibility of our results to definition of the treatment group. According to the logic of our theory, refining the partition of industry sales of PP&E to smaller cutoffs should strengthen the results as this would be selecting firms for which verifiability is even lower. Table 9 supports this prediction and confirm that our results are robust to different definitions of the treatment group.

Table 9 About Here

Forth, we want to rule out the possibility that our results are related to debt structure rather than the verifiability of assets in place. Therefore, we add secured debt over assets and secured debt over total debt as controls in our baseline regressions. The first three columns of Table 10 show that our results are unaltered by controlling for overall ratios of secured debt. In addition, the last two columns indicate that, when most of the debt is composed of secured debt, the effect of verifiability on Chapter 11 filings vanishes. This goes in line with our model assumptions of dispersed debt and coordination problems among lenders. In the absence of these assumptions, renegotiation between the borrower and the major class of creditors is facilitated, dramatically reducing the probability of bankruptcy.

Table 10 About Here

4 Model Extensions

4.1 Large Lenders

In this section we assume that the borrower can obtain funding also from a large lender, which we call "bank". The amount the borrower owes to the bank is named "private debt". We refer to atomistic lenders simply as "lenders" and to the securities they hold as "public debt". The fraction of funds borrowed from the bank is given by γ. The bank debt is characterized by the repayment when the borrower is sound, b, and that when the borrower is in distress, r_B. Both are expressed in terms of per g units of funds lent. Therefore, differences in r and r_B reflect different seniority regarding bank and public debt.

Following Gertner and Scharfstein (1991), we assume that it is easier for the borrower to renegotiate directly with the bank so that the borrower approaches the bank first. The decision to renegotiate with the bank depends on its impact on the renegotiation with dispersed lenders. Renegotiation with the bank reduces the fraction of lenders that need to accept the borrower's proposal for a successful out-of-court renegotiation. We model this by introducing a location parameter $\mu(\phi, \gamma)$. We make the following assumption regarding μ:

Assumption 4 *μ is twice continuously differentiable, $\mu(0, \gamma) = \mu(\phi, 0) = 0$, $\mu_{\phi,\gamma} > 0$, and $\lim_{\gamma \to 1} \mu_{\phi,\gamma} = \infty$.*

The new condition for renegotiation with dispersed lenders is given by

$$f \geq 1 - \mu(\phi, \gamma) - d\theta, \tag{15}$$

From the condition above we can see that — at least in principle — if the lender renegotiates with the bank, it becomes easier to renegotiate with other lenders. However, renegotiation with the bank reduces the size of the pie available to renegotiate with lenders, making renegotiation harder. In addition, private debt renegotiation reduces what the bank gets in bankruptcy, thereby increasing what lenders receive in this event. As a result, coordination becomes more difficult. Therefore, we need to investigate the interplay among all these effects.

The first step is to derive the new renegotiation cutoff in the presence of a bank. We assume that the bank forgoes the same fraction ϕ of its in-court payoff if he renegotiates with the borrower. The foregone renegotiation proceeds go the other lenders such that $(1-\phi)\gamma r_B + (1-\gamma) r = \alpha\ell$, which is equivalent to $r(\alpha,\phi,\gamma,r_B) = \frac{\alpha\ell-(1-\phi)\gamma r_B}{1-\gamma}$ for $\gamma < 1$.

Let z be the stake of the continuation value that the borrower offers to the bank. The remaining portion of the continuation value available to offer the other lenders is $\underline{v} \equiv (1-\gamma z) v$. Therefore, the new renegotiation cutoff $\underline{\theta}$ is given by

$$\underline{\theta} = \frac{1}{d}\frac{r(\alpha,\phi,\gamma,r_B)}{q\underline{v} - (s - r(\alpha,\phi,\gamma,r_B))} - \frac{\mu(\phi,\gamma)}{d} \tag{16}$$

Since the first term on the right-hand side of 16 is increasing in ϕ, Assumption 4 implies that there exists $\underline{\gamma}$ such that renegotiating with the bank reduces the probability of bankruptcy if $\gamma > \underline{\gamma}$.

For a given z, the borrower will choose q such as to solve

$$\max_{q\in\left(\frac{s}{\underline{v}},1\right]} \Pi(q) \equiv (1-K(\underline{\theta}))\,\underline{v}\,(1-(1-\gamma)q) + K(\underline{\theta})(1-\alpha)\ell. \tag{17}$$

The new optimal stake offered to lenders is given by $\underline{q}^*$, which satisfies the following first order condition:

$$\frac{k(\underline{\theta})}{1-K(\underline{\theta})}\left(\underline{\theta} + \frac{\mu(\phi,\gamma)}{d}\right)^2 d = \frac{r(\alpha,\phi,\gamma,r_B)(1-\gamma)}{\underline{v}(1-(1-\gamma)q) - (1-\alpha)\ell}. \tag{18}$$

We define the renegotiation cutoff with the optimal stake $\underline{q}^*$ as $\underline{\theta}^* \equiv \underline{\theta}\left(\underline{q}^*\right)$. In order to establish how the probability of bankruptcy is affected by verifiability, we still need to determine the optimal fraction of private debt ϕ renegotiated by the borrower and what the borrower offers to the bank in exchange z.

For the bank to be willing to renegotiate with the borrower, the borrower needs to offer at least what the bank would get without renegotiation. Therefore, z must be such that

$$(1-K(\underline{\theta}^*(\phi)))\,zv + K(\underline{\theta}^*(\phi))(1-\phi)\,r_B \geq (1-K(\underline{\theta}^*(0)))\,b + K(\underline{\theta}^*(0))\,r_B \tag{19}$$

If renegotiation is feasible, there exists z^* that satisfies the equality such that

$$z^* = \frac{(1 - K(\underline{\theta}^*(0)))\, b + r_B \left[K(\underline{\theta}^*(0)) - K(\underline{\theta}^*(\phi))(1-\phi)\right]}{(1 - K(\underline{\theta}^*(\phi)))\, v}. \tag{20}$$

Since the right-hand side is increasing and convex in z, the solution is unique.[4] This solution provides the borrower with a set of successful renegotiation outcomes for given desired fractions of private debt renegotiation ϕ. We can use 20 along with 18 to derive how the probability of bankruptcy and the optimal offers z^* and $\underline{q}^*$ relate to ϕ. The formal relationship is given in Proposition 5.

Proposition 5 *If the proportion of private debt is sufficiently small, i.e., $\gamma < \underline{\gamma}$, renegotiation is not feasible. If the fraction of private debt is sufficiently large, i.e., $\gamma > \underline{\gamma}$, then the probability of bankruptcy $K(\underline{\theta}^*)$, the stake offered to bank z^*, and the stake offered to lenders $\underline{q}^*$ are decreasing in the fraction of private debt renegotiated with the bank ϕ.*

The next step is to derive the fraction of private debt ϕ that the borrower wants to renegotiate with the bank in the event of distress. The borrower's payoff in distress as a function of ϕ is:

$$(1 - K(\underline{\theta}^*)) \left(1 - (1-\gamma)\, \underline{q}^*\right)(1 - \gamma z^*)\, v + K(\underline{\theta}^*)(1-\alpha)\,\ell \tag{21}$$

Since we know from previous results that $K(\underline{\theta}^*)$, z^*, and $\underline{q}^*$ are decreasing in ϕ, the borrower payoff in the event of distress is increasing in the fraction of private debt renegotiated with the bank ϕ. Therefore, the borrower optimally chooses to renegotiate 100% of the private debt, i.e, $\phi^* = 1$. As a result, all the comparative statics derived in Proposition 3 with only atomistic lenders carry through. This is summarized in the Proposition 6.

Proposition 6 *If the proportion of private debt is sufficiently small, i.e., $\gamma < \underline{\gamma}$, renegotiation is not feasible, i.e., the equilibrium fraction of private debt renegotiated is $\phi^* = 0$. If the fraction of private debt is sufficiently large, i.e., $\gamma > \underline{\gamma}$, then the equilibrium fraction of private debt renegotiated is $\phi^* = 1$. The same results of Proposition 3 carry through replacing q^* and $K\left(\overline{\theta}^*\right)$ for $\underline{q}^*$ and $K(\underline{\theta}^*)$, respectively.*

[4] Differentiating the right-hand side with respect to z gives

$$\frac{\partial \underline{\theta}^*(\phi)}{\partial z} \frac{k(\underline{\theta}^*(\phi))}{v^2 (1 - K(\underline{\theta}^*(\phi)))^2} v \left[-r_B (1-\phi) + (1 - K(0))\, b + K(0)\, r_B\right],$$

which is positive and increasing in z since both $\frac{\partial \theta^*(\phi)}{\partial z}$ and $\underline{\theta}^*(\phi)$ are increasing in z and K has increasing hazard.

Proposition 6 states that our results concerning the relationship between verifiability and the likelihood of filing for bankruptcy is robust to having large lenders such as banks.

5 Concluding Remarks

The dissatisfaction with the U.S. bankruptcy law is largely due to its excessive focus on distribution rather than efficiency issues. The existence of dispersed creditors and different classes of debt make out-of-court restructuring harder and often result in rejections of reorganization plans in Chapter 11. In these cases, creditors' recovery values crucially depend on the level of verifiability of assets in place in court, the strategic uncertainty among lenders, and the debtor's uncertainty about the outcome of out-of-court renegotiations.

We develop a model that builds on these real-world complexities and examine the effect of verifiability on the likelihood of bankruptcy filings and firm financing. We show that higher verifiability increases both the probability of Chapter 11 filings and debt capacity. The model predicts the effect on debt capacity to be increasing in verifiability. We test the predictions of the model exploring an exogenous variation in one of several forms verifiability, namely, the ability of courts to price assets in place. We use a natural experiment provided by a Supreme Court ruling in 1999 that *reversed* the Circuit Court of Appeals. The ruling stated that shareholders in Chapter 11 must auction their equity interest whenever they propose a plan that maintains their interest if they contribute cash and absolute priority rule (ABS) is violated. This effectively precludes debtors from contributing with an amount of cash that is lower than the market value of the assets, increasing asset verifiability.

Our results strongly support the predictions of the model. Chapter 11 filings for affected firms increased by 1.1 percentage points more compared to unaffected firms. The positive market reaction surrounding this event is increasing in verifiability. Our theory elucidates some of the *channels* by which creditor protection increases firm value. Our results are robust to various specifications and tests.

Appendix

Proof of Proposition 1. The proof follows from Propositions 1 and 2 in Sakovics and Steiner (2012), which characterizes the unique Bayesian Nash equilibrium for a general class of global games with heterogeneous payoffs that have ours as a especial case. ■

Proof of Proposition 2. See discussion in text. ■

Proof of Proposition 3. Rewrite 7 as

$$\Delta\left(\overline{\theta}^*\left(\alpha, q^*\left(\alpha\right)\right)\right) d\overline{\theta}^*\left(\alpha, q^*\left(\alpha\right)\right)^2 = \Omega\left(\alpha, q^*\left(\alpha\right)\right).$$

Total differentiating with respect to α gives

$$\frac{dq^*}{d\alpha} = \frac{\overbrace{d\overline{\theta}^*\frac{\partial\overline{\theta}^*}{\partial\alpha}\left(\Delta'\overline{\theta}^* + 2\Delta\right)}^{>0} - \overbrace{\frac{\partial\Omega}{\partial\alpha}}^{>0}}{\underbrace{\frac{\partial\Omega}{\partial q^*}}_{>0} - \underbrace{d\overline{\theta}^*\frac{\partial\overline{\theta}^*}{\partial q^*}\left(\Delta'\overline{\theta}^* + 2\Delta\right)}_{<0}}. \tag{A.1}$$

The denominator of the right-hand side is positive while the numerator is positive for d small enough (Assumption 3). Therefore, $\frac{dq^*}{d\alpha} > 0$.

Rearranging A.1 gives

$$\underbrace{\frac{\partial\overline{\theta}^*}{\partial\alpha}}_{>0} + \underbrace{\frac{\partial\overline{\theta}^*}{\partial q^*}}_{<0}\frac{dq^*}{d\alpha} = \frac{\overbrace{\frac{\partial\Omega}{\partial\alpha}}^{>0} + \overbrace{\frac{\partial\Omega}{\partial q^*}}^{>0}\frac{dq^*}{d\alpha}}{\underbrace{d\overline{\theta}^*\left(\Delta'\overline{\theta}^* + 2\Delta\right)}_{>0}}.$$

If $\frac{dq^*}{d\alpha} \geq 0$, then the right-hand side is positive, which implies the left-hand side is also positive, which, in turn, implies that $\frac{d\overline{\theta}^*}{d\alpha} > 0$. If $\frac{dq^*}{d\alpha} < 0$, then the left-hand side is positive, which implies that $\frac{d\overline{\theta}^*}{d\alpha} > 0$. Therefore, $\frac{d\overline{\theta}^*}{d\alpha} > 0$.

A similar argument establishes the results relative to ℓ, s, and v. ■

Proof of Proposition 4. See discussion in text. ■

Proof of Proposition 5. Rewrite 18 as

$$\Delta\left(\underline{\theta}^*\left(\phi, \underline{q}^*\left(\phi\right), z^*\left(\phi\right)\right)\right) d\left(\underline{\theta}^*\left(\phi, \underline{q}^*\left(\phi\right)\right) + \frac{\mu\left(\phi\right)}{d}\right)^2 = \Omega\left(\phi, \underline{q}^*\left(\phi\right), z^*\left(\phi\right)\right). \tag{A.2}$$

Total differentiating A.2 and 20 with respect to ϕ gives

$$d\left(\underline{\theta}^*+\frac{\mu}{d}\right)\left\{\left(\frac{\partial\underline{\theta}^*}{\partial\phi}+\frac{\partial\underline{\theta}^*}{\partial\underline{q}^*}\frac{d\underline{q}^*}{d\phi}+\frac{\partial\underline{\theta}^*}{\partial z^*}\frac{dz^*}{d\phi}\right)\left[\Delta'\left(\underline{\theta}^*+\frac{\mu}{d}\right)+2\Delta\right]+2\Delta\frac{\mu'}{d}\right\}=\frac{\partial\Omega}{\partial\phi}+\frac{\partial\Omega}{\partial\underline{q}^*}\frac{d\underline{q}^*}{d\phi}+\frac{\partial\Omega}{\partial z^*}\frac{dz^*}{d\phi} \tag{A.3}$$

$$-\left(\frac{\partial\underline{\theta}^*}{\partial\phi}+\frac{\partial\underline{\theta}^*}{\partial\underline{q}^*}\frac{d\underline{q}^*}{d\phi}+\frac{\partial\underline{\theta}^*}{\partial z^*}\frac{dz^*}{d\phi}\right)\underbrace{\frac{k}{K}\left[vz^*-(1-\phi)\,r_B\right]}_{>0}=\underbrace{r_B-\frac{1-K}{K}v}_{>0}\frac{dz^*}{d\phi}. \tag{A.4}$$

The right-hand side of A.4 is positive for d sufficiently small (Assumption 3). Therefore, it follows that $\frac{d\underline{\theta}^*}{d\phi}<0$.

Rearranging A.3 and A.4 gives

$$\overbrace{\left\{d\frac{\partial\underline{\theta}^*}{\partial\underline{q}^*}\left[\Delta'\left(\underline{\theta}^*+\frac{\mu}{d}\right)^2+2\Delta\right]-\frac{\partial\Omega}{\partial\underline{q}^*}\right\}}^{\equiv A<0}\frac{d\underline{q}^*}{d\phi}+\overbrace{\left\{d\frac{\partial\underline{\theta}^*}{\partial z^*}\left[\Delta'\left(\underline{\theta}^*+\frac{\mu}{d}\right)^2+2\Delta\right]-\frac{\partial\Omega}{\partial z^*}\right\}}^{\equiv B>0}\frac{dz^*}{d\phi}=a \tag{A.5}$$

$$\underbrace{\left\{\frac{\partial\underline{\theta}^*}{\partial\underline{q}^*}\frac{k}{K}\left[-z^*v+(1-\phi)\,r_B\right]\right\}}_{\equiv C>0}\frac{d\underline{q}^*}{d\phi}+\underbrace{\left\{\frac{\partial\underline{\theta}^*}{\partial z^*}\frac{k}{K}\left[-z^*v+(1-\phi)\,r_B\right]+\frac{1-K}{K}v\right\}}_{\equiv D<0}\frac{dz^*}{d\phi}=b, \tag{A.6}$$

where

$$a\equiv-d\frac{\partial\underline{\theta}^*}{\partial\phi}\left[\Delta'\left(\underline{\theta}^*+\frac{\mu}{d}\right)^2+2\Delta\right]-2\Delta d\left(\underline{\theta}^*+\frac{\mu}{d}\right)\frac{\mu'}{d}$$

$$b\equiv r_B+\frac{k}{K}\frac{\partial\underline{\theta}^*}{\partial\phi}\left[z^*v-(1-\phi)\,r_B\right].$$

Because of the decreasing reverse hazard property of K (Assumption 2), $b>0$ for d sufficiently small (Assumption 3). It follows from A.6 that, if $\frac{d\underline{q}^*}{d\phi}<0$, then $\frac{dz^*}{d\phi}<0$.

The sign of a is determined by the sign of it's first term for d small enough (Assumption 3). Thus, $a>0$ if and only if $\frac{\partial\underline{\theta}^*}{\partial\phi}<0$. If $a>0$, then it follows from A.5 that, if $\frac{dz^*}{d\phi}<0$, then $\frac{d\underline{q}^*}{d\phi}<0$. From this and the result in the last paragraph we conclude that, for $\frac{\partial\underline{\theta}^*}{\partial\phi}<0$, $\frac{d\underline{q}^*}{d\phi}<0$ if and only if $\frac{dz^*}{d\phi}<0$.

Since $\frac{d\underline{\theta}^*}{d\phi}<0$ for d small enough (shown in the beginning of the proof), it follows that the left-hand side of A.3 is negative for d sufficiently small. Since $\frac{\partial\Omega}{\partial\phi}$, $\frac{\partial\Omega}{\partial\underline{q}^*}$, and $\frac{\partial\Omega}{\partial z^*}$ are all positive, it must be that either $\frac{d\underline{q}^*}{d\phi}<0$ or $\frac{dz^*}{d\phi}<0$. From this and the result in the last paragraph, we conclude that $\frac{d\underline{q}^*}{d\phi}<0$ and $\frac{dz^*}{d\phi}<0$ for $\frac{\partial\underline{\theta}^*}{\partial\phi}<0$.

Finally, suppose $\frac{\partial\underline{\theta}^*}{\partial\phi}>0$. Solving the system A.5-A.6 using Cramer's rule gives us

$$\frac{dz^*}{d\phi}=-\frac{Ab-Ba}{AD-BC}.$$

The denominator is negative for d sufficiently small. The numerator, however, is positive if $\frac{\partial\underline{\theta}^*}{\partial\phi}>0$ ($a<0$) and d is small enough. Therefore, $\frac{dz^*}{d\phi}>0$. Since $\frac{d\underline{\theta}^*}{d\phi}<0$, then it must be that $\frac{d\underline{q}^*}{d\phi}>0$.

Because $\frac{d\Omega}{d\phi} < 0$, then it must be that $\frac{d\underline{q}^*}{d\phi} < 0$. This is a contradiction. Thus, the optimality condition A.3 and the feasibility condition A.4 cannot be simultaneously satisfied, which in turn implies renegotiation is not possible. Therefore, either $\frac{\partial\underline{\theta}^*}{\partial\phi} < 0$ or $\frac{\partial\underline{\theta}^*}{\partial\phi} = 0$, which can only occur if $\phi = 0$. ■

Proof of Proposition 5. See discussion in text. ■

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Table 1 − Sample Descriptive Statistics

This table reports summary statistics for the main variables used in the paper. The bankruptcy data are from the UCLA-LoPucky Bankruptcy Research Database (BRD). The database reports all chapter 11 filings for publicly listed firms in the U.S. for which the total assets is more than $100 million. *Chapter11* is a dummy variable that takes a value of 1 if the firm files for chapter 11 protection during the period 1998 − 2001 and zero otherwise. All firm level data are obtained from the COMPUSTAT industrial database. The sample includes all non-financial firms. *BookLeverage* is the ratio of total debt (COMPUSTAT's items *dlc* + *dltt*) to book value of total assets (*at*). *TobinsQ* is the ratio of market value of total assets (*at* − *ceq* + *prcc_c* × *csho*) to book value of total assets. *Size* is total assets (measured in millions of 2001 dollars using the Producer Price Index (PPI) published by the U.S. Department of Labor as the deflator). *Profitability* is the ratio of earnings before interest, taxes, depreciation and amortization (*oibdp*) to book value of total assets. *DispersedDebt* is a dummy variable that takes a value of 1 if the firm has either a bond rating (*splticrm*) or a commercial paper rating (*spsticrm*) and zero otherwise.

Variables	Sample Statistics					
	Mean	Median	St. Dev.	25th Pctile	75th Pctile	Obs.
Chapter11	0.009	0.000	0.094	0.000	0.000	14,769
Leverage	0.305	0.2927	0.239	0.093	0.449	13,818
TobinsQ	2.111	1.478	1.613	1.106	2.378	11,533
Size ($ Billions)	1.879	0.578	2.836	0.240	1.927	13,878
Profitability	0.103	0.125	0.148	0.075	0.178	13,768
DispersedDebt	0.361	0.000	0.480	0.000	1.000	14,769

Table 2 – Bankruptcy Filings and Asset Verifiability: Difference-in-Difference Analysis

This table reports PROBIT estimation results from chapter 11 filing regressions. The dependent variable is *Chapter11*. *LowVerifiability* is a dummy variable that takes a value of 1 if industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median and zero otherwise. *SupremeCourt1999* is a dummy variable equal to 1 for the fiscal year starting from 1999 and zero otherwise. Refer to Table 1 for detailed variable definitions. All firm-level data are from the COMPUSTAT industrial database. The sample includes non-financial firms. Standard errors reported in parentheses are based on heteroskedastic consistent errors adjusted for clustering across observations of a given firm (Petersen, 2009).

	(1)	(2)	(3)	(4)	(5)
LowVerifiability × *SupremeCourt1999*	0.475***	0.473***	0.479***	0.476***	0.406**
	(0.175)	(0.174)	(0.176)	(0.175)	(0.190)
Marginal Effects [%]	[1.1%]***	[1.1%]***	[1.1%]***	[1.1%]***	[1.1%]***
	(0.3%)	(0.4%)	(0.4%)	(0.4%)	(0.4%)
LowVerifiability	-0.165	-0.163	-0.178	-0.176	-0.109
	(0.137)	(0.136)	(0.138)	(0.137)	(0.150)
SupremeCourt1999	-0.010	0.015	-0.035	-0.001	-0.352
	(0.124)	(0.150)	(0.126)	(0.152)	(0.644)
Leverage	2.276***	2.275***	2.440***	2.439***	2.564***
	(0.238)	(0.239)	(0.252)	(0.253)	(0.265)
TobinsQ	-0.569***	-0.566***	-0.563***	-0.560***	-0.612***
	(0.133)	(0.133)	(0.129)	(0.129)	(0.129)
LnSize	0.098***	0.098***	0.122***	0.121***	0.124***
	(0.037)	(0.037)	(0.039)	(0.039)	(0.040)
Profitability	-2.601***	-2.592***	-3.078***	-3.069***	-3.616***
	(0.330)	(0.335)	(0.373)	(0.376)	(0.411)
DispersedDebt	0.327***	0.327***	0.384***	0.385***	0.428***
	(0.112)	(0.112)	(0.116)	(0.116)	(0.117)
Year Fixed Effects (FEs)	No	Yes	No	Yes	No
Industry Fixed Effects (FEs)	No	No	Yes	Yes	No
Year FEs × *Industry FEs*	No	No	No	No	Yes
Obs.	11,400	11,400	11,400	11,400	10,603
Pseudo-R^2	0.256	0.256	0.276	0.276	0.297

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 3 – Bankruptcy Filings and Asset Verifiability: Controlling for Low Verifiability-Specific Trends

This table reports PROBIT estimation results from chapter 11 filing regressions, for various sample periods. The dependent variable is *Chapter11*. *LowVerifiability* is a dummy variable that takes a value of 1 if industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median and zero otherwise. *SupremeCourt1999* is a dummy variable equal to 1 for the fiscal year starting from 1999 and zero otherwise. Refer to Table 1 for detailed variable definitions. All estimations include the interaction of industry and year fixed-effects. All firm-level data are from the COMPUSTAT industrial database. The sample includes non-financial firms. Standard errors reported in parentheses are based on heteroskedastic consistent errors adjusted for clustering across observations of a given firm (Petersen, 2009).

	1998-2001		1997-2002		1995-2006	
	W/out Trend Effect	W/ Trend Effect	W/out Trend Effect	W/ Trend Effect	W/out Trend Effect	W/ Trend Effect
LowVerifiability × *SupremeCourt1999*	0.406**	0.413**	0.453***	0.462***	0.282*	0.291**
	(0.190)	(0.189)	(0.175)	(0.175)	(0.146)	(0.146)
Marginal Effects [%]	[1.1%]***	[1.1%]***	[0.8%]***	[0.9%]***	[0.3%]*	[0.4%]**
	(0.4%)	(0.4%)	(0.3%)	(0.3%)	(0.2%)	(0.2%)
LowVerifiability	-0.109	-0.060	-0.242*	-0.155	-0.178	-0.122
	(0.150)	(0.184)	(0.142)	(0.166)	(0.121)	(0.140)
SupremeCourt1999	-0.352	-0.361	-0.343	-0.358	-0.209	-0.222
	(0.644)	(0.646)	(0.638)	(0.640)	(0.628)	(0.629)
LowVerifiability × *Trend*		-0.004		-0.007		-0.005
		(0.008)		(0.007)		(0.006)
Leverage	2.564***	2.549***	2.554***	2.526***	2.569***	2.552***
	(0.265)	(0.266)	(0.235)	(0.236)	(0.189)	(0.191)
TobinsQ	-0.612***	-0.614 ***	-0.591***	-0.593***	-0.602***	-0.604
	(0.129)	(0.129)	(0.108)	(0.107)	(0.090)	(0.090)
LnSize	0.124***	0.127***	0.117***	0.121***	0.099***	0.102***
	(0.040)	(0.040)	(0.034)	(0.034)	(0.027)	(0.027
Profitability	-3.616***	-3.605***	-3.514***	-3.484***	-3.286***	-3.269***
	(0.411)	(0.412)	(0.359)	(0.362)	(0.289)	(0.291)
DispersedDebt	0.428***	0.430***	0.361***	0.365***	0.355***	0.358***
	(0.117)	(0.117)	(0.100)	(0.100)	(0.083)	(0.083)
Obs.	10,603	10,603	14,605	14,605	25,729	25,729
Pseudo-R^2	0.297	0.297	0.295	0.295	0.290	0.290

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 4 – Market Performance around the Supreme Court Ruling on May 3, 1999

This table reports Cumulative Average Abnormal Returns (CAARs) around the Supreme Court Ruling on May 3, 1999 ("event date"). Low (High) Verifiability Group includes firms for which industry-year sales of Property, Plant, & Equipment as a percentage of their book value are below (above) the sample median and zero otherwise. Z-score is the Alman's z-score (Altman, 1969). Abnormal returns are estimated using the standard event study methodology with the Fama-French plus momentum factors and the CRSP equally-weighted Index. *t*-statistics (in parentheses) are based on standard errors adjusted for cross-sectional correlation of security returns due to event-date clustering (Brown and Warner, 1980).

Panel A – Cumulative Average Abnormal Returns (CAARs) [time windows in days]	Affected Firms			Comparison Firms
	Full Sample	Low Verifiability	High Verifiability	ADRs
[-10; -5]	0.16% (0.29)	0.09% (0.16)	0.22% (0.37)	-1.02% (-0.66)
[0; 0]	0.42% (1.90)*	0.46% (1.94)*	0.39% (1.60)	-0.37% (0.59)
[0; +1]	0.83% (2.64)***	0.84% (2.53)**	0.82% (2.38)**	-0.34% (-0.38)
[-1; +1]	0.56% (1.45)	0.58% (1.42)	0.54% (1.28)	0.14% (0.13)
[-3; +3]	1.50% (2.55)**	1.52% (2.44)**	1.49% (2.30)**	0.81% (0.48)
[-5; +5]	1.62% (2.19)**	1.68% (2.15)**	1.57% (1.93)*	0.31% (0.15)

Panel B – Cumulative Average Abnormal Returns (CAARs): by Verifiability and Z-score [time window: -5; +5]	Full Sample	Low Verifiability	High Verifiability
Financial Soundness – Z-score>3	1.28% (1.47)	1.39% (1.46)	1.19% (1.29)
Financial Alert – Z-score<=3	1.65% (2.16)**	1.95% (2.35)**	1.30% (1.29)
Low Alert – Z-score (from 2.7 to 3)	3.10% (2.39)**	2.92% (1.73)*	3.31% (1.86)*
Medium Alert – Z-score (from 1.8 to 2.7)	2.73% (2.97)***	2.25% (1.96)**	3.27% (2.82)***
High Alert – Z-score (less than 1.8)	0.57% (0.59)	1.53% (1.45)	-0.55% (-0.39)

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 5 – Bankruptcy Filings and Asset Verifiability by Debt Ownership Dispersion and Debt Mix

This table reports PROBIT estimation results (marginal effects) from chapter 11 filing regressions, for various samples based on debt ownership dispersion. The dependent variable is *Chapter11*. *LowVerifiability* is a dummy variable that takes a value of 1 if industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median and zero otherwise. *SupremeCourt1999* is a dummy variable equal to 1 for the fiscal year starting from 1999 and zero otherwise. *Mixed Debt* is a dummy variable that takes a value of 1 if the firm utilizes at least 3 of the following four debt instruments, and zero otherwise (Mortgages & Other Secured Debt – COMPUSTAT item *dm*, excluding capital leases; Capital Leases – item *dclo*; Convertible Debt – item *dcvt*; Non-Convertible Unsecured Debt, defined as *dm* – *dclo* – *dcvt*). Refer to Table 1 for detailed variable definitions. All firm-level data are from the COMPUSTAT industrial database. The sample includes non-financial firms. Standard errors reported in parentheses are based on heteroskedastic consistent errors adjusted for clustering across observations of a given firm (Petersen, 2009).

Panel A: Dispersed and Mixed Debt	Full Sample	Dispersed Debt		Mixed Debt	
		Yes	No	Yes	No
LowVerifiability × *SupremeCourt1999*	[1.1%]*** (0.3%)	[2.7%]*** (0.7%)	[0.1%] (0.2%)	[2.9%]*** (0.9%)	[0.5%] (0.3%)
Controls	Yes	Yes	Yes	Yes	Yes
Obs.	11,400	4,244	7,156	2,165	7,241
Pseudo-R^2	0.256	0.206	0.256	0.231	0.233

Panel B: Dispersed × Mixed Debt	Full Sample	Dispersed/Mixed Debt			
		Yes/Yes	Yes/No	No/Yes	No/No
LowVerifiability × *SupremeCourt1999*	[1.1%]*** (0.3%)	[6.3%]*** (2.3%)	[1.6%]** (0.8%)	[0.7%] (1.1%)	[-0.1%] (0.3%)
Controls	Yes	Yes	Yes	Yes	Yes
Obs.	11,400	987	2,753	1,268	4,488
Pseudo-R^2	0.256	0.166	0.205	0.305	0.193

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 6 – Bankruptcy Filings and Asset Verifiability by Financial Conditions

This table reports PROBIT estimation results (marginal effects) from chapter 11 filing regressions, for various samples based on financial conditions. The dependent variable is *Chapter11*. *LowVerifiability* is a dummy variable that takes a value of 1 if industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median and zero otherwise. *SupremeCourt1999* is a dummy variable equal to 1 for the fiscal year starting from 1999 and zero otherwise. Refer to Table 1 for detailed variable definitions. All firm-level data are from the COMPUSTAT industrial database. The sample includes non-financial firms. Standard errors reported in parentheses are based on heteroskedastic consistent errors adjusted for clustering across observations of a given firm (Petersen, 2009).

	Full Sample	Financial Alert			Financial Soundness
		Z-Score <=1.8	Z-Score <=2.7	Z-Score <=3	Z-Score >3
LowVerifiability × *SupremeCourt1999*	[1.1%]*** (0.3%)	[4.2%]*** (1.2%)	[3.2%]*** (0.9%)	[2.8%]*** (0.7%)	[0.2%] (0.2%)
Controls	Yes	Yes	Yes	Yes	Yes
Obs.	11,400	2,080	3,340	3,774	5,997
Pseudo-R^2	0.256	0.104	0.139	0.141	0.189

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 7 – Bankruptcy Filings and Asset Verifiability: Different Sample Periods

This table reports PROBIT estimation results (marginal effects) from chapter 11 filing regressions, for various sample periods. The dependent variable is *Chapter11*. *LowVerifiability* is a dummy variable that takes a value of 1 if industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median and zero otherwise. *SupremeCourt1999* is a dummy variable equal to 1 for the fiscal year starting from 1999 and zero otherwise. Refer to Table 1 for detailed variable definitions. All estimations include the interaction of industry and year fixed-effects. All firm-level data are from the COMPUSTAT industrial database. The sample includes non-financial firms. Standard errors reported in parentheses are based on heteroskedastic consistent errors adjusted for clustering across observations of a given firm (Petersen, 2009).

	1998-2001	1999-2000	1997-2002	1996-2003	1995-2006
LowVerifiability × *SupremeCourt1999*	[1.1%]***	[1.4%]**	[0.8%]***	[0.5%]**	[0.3%]*
	(0.4%)	(0.5%)	(0.3%)	(0.2%)	(0.2%)
Controls	Yes	Yes	Yes	Yes	Yes
Obs.	10,603	5,510	14,605	18,255	25,729
Pseudo-R^2	0.297	0.281	0.295	0.293	0.290

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 8 – Bankruptcy Filings and Asset Verifiability: Placebo Tests

This table reports PROBIT estimation results (marginal effects) from chapter 11 filing regressions, for various samples based on financial conditions. The dependent variable is *Chapter11*. In the interest of space, we report the coefficient estimate only for the interaction term. *LowVerifiability* is a dummy variable that takes a value of 1 if industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median and zero otherwise. *After1996* is a dummy variable equal to 1 for the fiscal year starting from 1996 and zero otherwise. *After1997 – After2008* are defined similarly. *SupremeCourt1999* is a dummy variable equal to 1 for the fiscal year starting from 1999 and zero otherwise. Refer to Table 1 for detailed variable definitions. All firm-level data are from the COMPUSTAT industrial database. The sample includes non-financial firms. Standard errors reported in parentheses are based on heteroskedastic consistent errors adjusted for clustering across observations of a given firm (Petersen, 2009).

	Full Sample	Obs.	Sample Period
LowVerifiability × *After1996*	[-0.2%]		
	(0.2)	10,794	1995 - 1998
LowVerifiability × *After1997*	[0.03%]		
	(0.2)	11,219	1996 - 1999
LowVerifiability × *After1998*	[0.4%]		
	(0.3)	11,480	1997 - 2000
LowVerifiability × *SupremeCourt1999*	[1.1%]***		
	(0.3)	11,400	1998 - 2001
LowVerifiability × *After2000*	[0.3%]		
	(0.4)	11,132	1999 - 2002
LowVerifiability × *After2001*	[-1.1%]		
	(1.0)	10,897	2000 - 2003
LowVerifiability × *After2002*	[-0.8%]		
	(0.8)	10,613	2001 - 2004
LowVerifiability × *After2003*	[-0.03%]		
	(0.3)	10,463	2002 - 2005
LowVerifiability × *After2004*	[0.1%]		
	(0.1)	10,432	2003 - 2006
LowVerifiability × *After2005*	[0.2%]		
	(0.3)	10,406	2004 - 2007
LowVerifiability × *After2006*	[0.2%]		
	(0.3)	10,346	2005 - 2008
LowVerifiability × *After2007*	[0.1%]		
	(0.2)	10,210	2006 - 2009
LowVerifiability × *After2008*	[-0.2%]		
	(0.6)	9,969	2007 - 2010

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 9 – Bankruptcy Filings and Asset Verifiability: Using Different Cutoffs of Industry Sales of PP&E to Define Asset Verifiability

This table reports PROBIT estimation results (marginal effects) from chapter 11 filing regressions, using different cutoffs of industry sales of PP&E to define Asset Verifiability. The dependent variable is *Chapter11*. *LowVerifiability* is a dummy variable that takes a value of 1 if industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median (alternatively, the 25th and 15th percentiles of the sample distribution) and zero otherwise. *SupremeCourt1999* is a dummy variable equal to 1 for the fiscal year starting from 1999 and zero otherwise. Refer to Table 1 for detailed variable definitions. All firm-level data are from the COMPUSTAT industrial database. The sample includes non-financial firms. Standard errors reported in parentheses are based on heteroskedastic consistent errors adjusted for clustering across observations of a given firm (Petersen, 2009).

	Low Verifiability – Basic Measure: Industry PP&E Sales < 50th Pctile	Low Verifiability – Alternative Cutoff 1: Industry PP&E Sales < 25th Pctile	Low Verifiability – Alternative Cutoff 2: Industry PP&E Sales < 15th Pctile
LowVerifiability × *SupremeCourt1999*	[1.1%]***	[1.3%]***	[1.4%]***
	(0.3%)	(0.5%)	(0.5%)
Controls	Yes	Yes	Yes
Obs.	11,400	11,400	11,400
Pseudo-R^2	0.256	0.255	0.258

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 10 – Bankruptcy Filings and Asset Verifiability: Controlling for Debt Structure

This table reports PROBIT estimation results (marginal effects) from chapter 11 filing regressions. The dependent variable is *Chapter11*. *LowVerifiability* is a dummy variable that takes a value of 1 if industry-year sales of Property, Plant, & Equipment as a percentage of book assets are below the sample median and zero otherwise. *SupremeCourt1999* is a dummy variable equal to 1 for the fiscal year starting from 1999 and zero otherwise. Refer to Table 1 for detailed variable definitions. All firm-level data are from the COMPUSTAT industrial database. The sample includes non-financial firms. Standard errors reported in parentheses are based on heteroskedastic consistent errors adjusted for clustering across observations of a given firm (Petersen, 2009).

	Basic Model	W/ Secured Debt/ Assets	W/ Secured Debt/Tot. Debt	Secured Debt/Tot. Debt<=66% Group	Secured Debt/Tot. Debt>66% Group
	(1)	(2)	(3)	(4)	(5)
LowVerifiability × *SupremeCourt1999*	[1.1%]***	[1.1%]***	[1.2%]***	[1.4%]***	[0.5%]
	(0.3%)	(0.3%)	(0.3%)	(0.4%)	(0.9%)
Controls	Yes	Yes	Yes	Yes	Yes
Obs.	11,400	10,006	8,992	7,014	1,978
Pseudo-R^2	0.256	0.262	0.248	0.249	0.286

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.