Indirect Costs of Financial Distress and Bankruptcy Law: Evidence from Trade Credit and Sales

Zacharias Sautner* Vladimir Vladimirov†

May 22, 2017

Abstract

We argue that stronger debt enforcement in bankruptcy can reduce indirect costs of financial distress: (i) by increasing the likelihood of restructuring outside bankruptcy and (ii) by improving the recovery rate of stakeholders, such as trade creditors, through explicit legal provisions. Consistent with these predictions, we find that when debt enforcement is stronger, financially distressed firms are less exposed to indirect distress costs in the form of reduced access to trade credit and forgone sales. We document these effects in a panel of firms from 40 countries with heterogeneous debt enforcement characteristics and in differences-in-differences tests exploiting several recent bankruptcy reforms.

JEL Classification: G33, K22.

Keywords: Indirect costs of financial distress, bankruptcy law, workouts, out-of-court-restructurings, financial distress.

*Frankfurt School of Finance & Management. E-mail: z.sautner@fs.de.

†University of Amsterdam, Finance Group. E-mail: vladimirov@uva.nl; Tel: +31205257317; Fax: +31205255285; Mailing Address: Plantage Muidergracht 12, 1018TV, Amsterdam, NL. We are grateful to the editor, Andrew Ellul, an anonymous referee, as well as Viral Acharya, Arturo Bris, Murillo Campello, Sergei Davydenko, Victor DiNoia, Daniel Ferreira, Jesse Fried, Nicola Gennaioli, Dimitris Georgarakos, Reint Gropp, Edith Hotchkiss, Roman Inderst, Christian Julliard, Oguzhan Karakas, Jan Pieter Krahnen, Tomislav Ladika, Florencio Lopez-de-Silanes, Edward Morrison, Mads Nielsen, Daniel Paravisini, Gordon Phillips, Stefano Rossi, Nicolas Serrano-Velarde, David Smith, Keke Song, Geoffrey Tate, Karin Thorburn, Vikrant Vig, S. Viswanathan, Wolf Wagner, Ivo Welch, David Yermack, and Paolo Zaffroni for insightful comments and discussions. We also thank seminar and conference participants at the AFA (Philadelphia), FIRS (Dubrovnik), EFA (Bergen), the Conference on Bankruptcy and Distress Resolution (Ghent), and the University of Amsterdam. All errors are our own.

1. Introduction

One of the biggest challenges to a firm in financial distress is to persuade its customers, trade creditors, employees, and suppliers to continue doing business with it. As bankruptcy becomes more likely, these stakeholders start abandoning the firm, causing an even faster deterioration in operating performance and shareholder value. These costs are commonly referred to as indirect costs of financial distress (Altman, 1984; Opler and Titman, 1994; Bris et al., 2006; Almeida and Philippon, 2007). While direct costs, such as legal fees and administrative expenses, have been studied extensively, much less is known about indirect costs prior to default.[1] In particular, a largely unexplored question is how debt enforcement in bankruptcy affects indirect costs of financial distress prior to bankruptcy. In this paper, we seek to shed light on this question by focusing on two important sources of such costs: reduced access to trade credit from suppliers and forgone sales to customers.

We argue that debt enforcement in bankruptcy has at least two effects on these sources of indirect distress costs. First, there can be a direct effect through the enforcement of explicit legal provisions in bankruptcy law that protect stakeholders. For example, provisions that make it easier to reclaim delivered goods protect trade creditors and make it less likely that they abandon a distressed firm. This leads to less additional disruption in a distressed firm's operations, implying that the indirect distress costs are lower.

Second, stricter debt enforcement in bankruptcy can lower indirect distress costs by increasing the likelihood that a distressed firm restructures out-of-court. This makes it less likely that the firm has to file for bankruptcy. To show this point, we model the out-of-court bargaining game between a firm in default and its creditor. The main trade-off that we consider is that out-of-court workouts are less costly, but the creditor has more information about the firm in bankruptcy. Stricter debt enforcement in bankruptcy affects this trade-off by placing the creditor in a stronger position in bankruptcy. Since

[1] Direct costs range between 1 and 10% of firm value (e.g., Ang et al., 1982; Weiss, 1990; Thorburn, 2000). Indirect costs have been estimated to vary between 10 and 23% of firm value given default (e.g., Andrade and Kaplan, 1998; Bris et al., 2006), hurting stakeholders at all levels, including top executives (Eckbo et al., 2015). For a survey, see Hotchkiss et al. (2008).

this is anticipated, the creditor can bargain for more also in out-of-court negotiations. This mitigates the creditor's concern that he has less information about the firm in such negotiations, which increases the likelihood that he agrees to a workout, thereby making bankruptcy less likely. As a result of the lower bankruptcy likelihood, customers and trade creditors are more likely to continue doing business with the distressed firm. Hence, we predict that indirect distress costs are lower when debt enforcement in bankruptcy is stronger.

We employ two empirical approaches to show that stricter debt enforcement reduces indirect distress costs. Our first approach is to use a large panel of firms from 40 different countries that vary across important dimensions of their bankruptcy law, as reflected by a debt enforcement index based on Djankov et al. (DHMS, 2008).[2] Since firms closer to default are more likely to be affected by the strength of debt enforcement in bankruptcy, our analysis exploits variation in firms' probabilities of facing financial distress. In particular, we test whether stronger debt enforcement is associated with better access to trade credit and higher customer sales in firms with higher default risk. Our identification strategy saturates the empirical models with different fixed effects, including country-by-industry, country-by-year, and firm fixed effects. This helps to address the concern that countries may differ across many important dimensions, and those same dimensions could drive both debt enforcement and sources of indirect distress costs.

The findings from this cross-country analysis support our predictions. In terms of economic magnitude, we show that trade credit is 1.6 percentage points higher if a firm close to default (90th percentile of the default probability) is located in a country with the highest debt-enforcement level, compared to a firm with the same default risk in a country with the lowest debt-enforcement level. This difference amounts to 13% of the sample standard deviation of trade credit. We also find meaningful economic effects for sales.

[2] Some of the components of this debt enforcement index explicitly capture aspects of debt enforcement also *outside of* bankruptcy. Moreover, there is a strong positive correlation between the index components that measure debt enforcement inside and outside of bankruptcy. Our model predictions are strengthened if we assume that a debtor's bargaining power is also weaker in out-of-court negotiations (and not just in bankruptcy).

Our estimates suggest that sales to assets are 6.3 percentage points higher if a distressed firm is located in a high-debt-enforcement country, compared to a firm with the same default probability in a low-debt-enforcement country. Importantly, what drives these findings is not merely the level of creditor rights stipulated by the countries' bankruptcy laws, but the actual enforcement of these rights.

We further study two important factors that provide us with variation in the ex-ante probability of an out-of-court restructuring in the cross-country analysis: (i) a country's financial system (bank- versus market-based); and (ii) a firm's financial constraints. Out-of-court restructurings should be more likely in bank-based systems, as debt providers are generally more concentrated in such countries, which facilitates out-of-court restructurings (Gertner and Scharfstein, 1991). Similarly, firms that face fewer credit frictions should find it easier to access alternative ways of funding in times of distress, making out-of-court restructurings more likely. Consistent with our prediction, we find that our effects are stronger for firms for which out-of-court restructurings are more likely, i.e., for firms that operate in countries with bank-based financial systems and for firms with lower financial constraints.

Our second approach is to employ a differences-in-differences analysis that exploits the changes in debt enforcement brought about by the U.S. bankruptcy reform of 2005. This analysis is designed to further alleviate concerns that some of our results might be driven by unobserved country-level heterogeneity. Though the main focus of the U.S. reform was on consumer bankruptcies, it also had important provisions that considerably strengthened debt enforcement in Chapter 11 bankruptcies (Haines and Hendel, 2005). Prior literature argues that this has led to fewer Chapter 11 filings and more out-of-court workouts (Bohn, 2007; Morrison, 2009). Our theoretical model provides one explanation for this argument and allows us to study the effects of the reform. For example, the reform introduced strict caps on a debtor's ability to protract negotiations, on the creditors' time to accept a reorganization plan, and on the debtors' time to assume or reject leases. Our model shows that curtailing a debtor's ability to demand concessions from creditors in exchange for not

protracting bankruptcy proceedings reduces the likelihood of a bankruptcy filing. As a consequence, we expect that the reform should be associated with better access to trade credit and higher customer sales at firms closer to default. Another change of the reform was the introduction of explicit provisions that strengthen both trade creditors' financial claims in bankruptcy and their ability to reclaim delivered goods. These changes should directly improve trade creditors' incentives to continue doing business with a distressed firm.

Consistent with our cross-country evidence, we show that firms with higher default probabilities obtain more trade credit and have higher sales after the 2005 reform, indicating a reduction of indirect distress costs. We then show that the increase in trade credit is strongest among distressed firms that rely on non-standardized inputs, such as services or special equipment and machinery. This finding supports our arguments as non-standardized inputs are especially likely to lose value in bankruptcy. Thus, the decision of the suppliers of such inputs to extend trade credit should be impacted more positively by the reform. Finally, we show that the increase in sales after the reform is stronger among distressed firms that offer more warranty services. This is again consistent with our arguments, as these are exactly the type of firms whose sales may suffer by customers' lack of confidence (Hortacsu et al., 2013). As a result, stronger debt enforcement should also have a more pronounced effect for such firms.

For robustness, we show similar effects when considering a bankruptcy reform in Germany in 2012, which explicitly aimed at making it easier for firms to restructure out-of-court, while strengthening creditor rights. We also study the effects of a Brazilian bankruptcy reform in 2005, as it offers a good illustration that increasing creditor rights is insufficient if it does not go hand-in-hand with strong debt enforcement (Ponticelli and Alencar, 2016).

Our paper contributes to an on-going debate about the costs and benefits of creditor-friendly bankruptcy law. On the one hand, existing theories show that stricter bankruptcy procedures can help increase investment by disciplining the firm early on and decreasing the

cost of credit (Bolton and Scharfstein, 1996). Our paper closely relates to the theoretical models in Gennaioli and Rossi (2010, 2013) who also show that debt enforcement outside of bankruptcy can affect firms' resolutions of financial distress both outside and inside of formal bankruptcy proceedings. Extending the results of their models would yield similar predictions for indirect distress costs as those derived from our model. This strengthens the robustness of our empirical predictions, and we expect both channels to be complementary in practice, though it would be hard to disentangle them empirically.[3] Existing empirical evidence shows that stronger debt enforcement leads to higher recovery rates (Davydenko and Franks, 2008), spurs investment (Rodano et al., 2016), and increases firm performance (Benmelech and Bergman, 2011).

On the other hand, there is evidence that creditor-friendly regimes can be too harsh on debtors in distress. In particular, it has been documented that a strengthening of creditor rights can lead to inefficient liquidations (Vig, 2013; Acharya et al., 2011), less innovation (Acharya and Subramanian, 2009), and less corporate investment (Favara et al., 2017).

We contribute to this debate by highlighting a new facet: stricter debt enforcement in bankruptcy can reduce distressed firms' exposure to indirect distress costs. A novel insight is that this effect leads to better access to trade credit and to higher sales for distressed firms. This focus on the effect of debt enforcement differentiates our paper from prior work on the importance of bankruptcy costs (Bris et al., 2006; Loranth and Franks, 2014) and the cost advantages of avoiding bankruptcy (Gilson et al., 1990; Hortacsu et al., 2013).[4]

Our work is closely related to the literature on the determinants of trade credit (Giannetti et al., 2011), which has documented that firms in stronger legal environments rely less on trade credit (Demirguc-Kunt and Maksimovic, 2002; Fisman and Love, 2003). Our paper contributes to this literature by analyzing how the strength of debt enforcement

[3] U.S. bankruptcy features a lot of judicial discretion. Thus, following the intuition in Gennaioli and Rossi's (2010) model, one could expect that by reducing pro-debtor discretion, the 2005 reform has also helped strengthen the creditors' position.

[4] Related also are Davydenko et al. (2012) and Reindl et al. (2016) who infer bankruptcy costs from market prices; Favara et al. (2012) who find that equity risk decreases when bankruptcy codes are more favorable to shareholders; and Hackbarth et al. (2015) who study the effects of the 1978 bankruptcy reform on equity returns.

in bankruptcy affects firms' access to trade credit in times of distress. In particular, we show a positive relation that can be explained by stronger debt enforcement making bankruptcy less likely, and recovery from bankruptcy more likely. This effect of bankruptcy law presents a novel angle relative to the prior work, which has focused on whether trade creditors or other lenders are more likely to support a firm in times of distress (Frank and Maksimovic, 2005; Wilner, 2000).

2. Hypotheses

Debt enforcement in bankruptcy can affect indirect distress costs through several channels. The most obvious channel is through concrete provisions stipulating a better treatment of stakeholders in bankruptcy. The inclusion and enforcement of such provisions in bankruptcy law should reassure stakeholders at times of distress, making it more likely that they continue doing business with a firm. In what follows, we briefly discuss an additional channel, which is derived more formally in the model presented in Appendix A. The model shows that stronger debt enforcement in bankruptcy increases the likelihood of restructuring out-of-court. This reassures stakeholders that the firm will avoid bankruptcy, contributing to lower indirect distress costs.

Our model builds on the trade-off that out-of-court restructurings are cheaper than formal bankruptcy filings, but they involve more uncertainty for the firm's creditors. The higher cost of bankrupty can be due to inefficient courts and judges presiding over in-court restructurings, as well as a plethora of legal and administrative expenses. However, bankrupty has the benefit that it allows creditors to obtain more information about the firm. This reduces the information asymmetry between creditors and the firm's management, and helps creditors make a more informed decision about the concessions they are prepared to make if the firm is to restructure as a going concern.

Stronger debt enforcement in bankruptcy tilts the scales of this trade-off towards restructuring out-of-court. The reason is that shareholders cannot hope to extract much in

bankruptcy if the enforcement of pro-creditor provisions in bankruptcy is strict. To take the extreme, if bankruptcy means that shareholders would essentially be wiped out, out-of-court renegotiations become very simple, as shareholders would be happy with any offer that allows them to retain a positive stake in the firm. By contrast, if debt enforcement in bankruptcy is weak, shareholders are in a better position in bankruptcy. Thus, the firm's management can bargain for more also in out-of-court negotiations. The management's better information now matters more, as the difference in concessions creditors need to make, depending on whether they are facing a good or a bad borrower, can be substantial. The result is a higher likelihood that creditors prefer bankruptcy (where they have more information) and a lower likelihood of a workout.

The key implication of the result that stricter debt enforcement makes workouts more likely is that a distressed firm's stakeholders would be less worried about bankruptcy. As a result, they are more likely to continue doing business with it, implying that indirect costs of distress are lower. Interestingly, this effect can become self-reinforcing: A lower exposure to indirect costs makes out-of-court restructuring even more valuable and, thus, more likely, which further reduces the likelihood of incurring such costs.

Our empirical analysis focuses on two specific sources of indirect costs of financial distress—reduced access to trade credit and lower customer sales—which emerge from the break-down of supplier or customer relationships. Since bankruptcy law should matter more for firms closer to distress, we can formulate the following testable hypotheses based on the above discussion:

HYPOTHESIS 1: *Stronger debt enforcement and better trade-creditor protection in bankruptcy are associated with better access to trade credit for firms with higher default risk.*

HYPOTHESIS 2: *Stronger debt enforcement in bankruptcy is associated with higher customer sales for firms with higher default risk.*

Observe that our hypotheses have nothing to say about whether financially distressed

firms rely more or less on trade credit than healthy firms. Instead, we only claim that financially distressed firms have better access to trade credit if debt enforcement is stronger.

The formal model behind our arguments can be extended along several dimensions. An important extension would be to endogenize how bankruptcy law affects ex-ante contracting. In a related contribution, Gennaioli and Rossi (2013) develop a model showing that the appropriate allocation of cash flow and liquidation rights can mitigate a creditor's liquidation bias in bankruptcy. Furthermore, they show that the efficiency of contractual resolution in financial distress increases with investor protection, which suggests a complementary channel for the predictions of our model. These channels reinforce our hypotheses, as they would also predict that stronger debt enforcement leads to lower indirect costs.[5]

3. Data and Empirical Methodology

3.1 Data

Our sample covers firms from 40 countries for the 15-year period between 2002-2016. For firms outside the U.S., we collect accounting data from Worldscope and stock price data from Datastream. For U.S. firms, we obtain corresponding data from Compustat and CRSP. The country-level control variables are from the World Bank. We exclude from our sample financial services firms (SIC codes starting with 6), utilities (SIC codes starting with 49), and government-related firms (SIC codes starting with 9). Our sample is further restricted to firms for which there is at least one year of stock-price and balance-sheet data; these data are needed to calculate default probabilities.

We measure debt enforcement in bankruptcy using DHMS's international survey. DHMS collect their data by asking bankruptcy experts, such as lawyers and attorneys, to provide answers to a hypothetical case in which a hotel has defaulted on its debt. The answers are used to define a number of binary variables that measure the strictness of debt en-

[5] Our model can be extended to consider the situation where debt enforcement inside and outside of bankruptcy are positively correlated. This will strengthen our analysis, as there will then be another reason why strong debt enforcement weakens debtors' bargaining power in out-of-court negotiations.

forcement, such as whether creditors can seize and sell a firm's collateral without court approval; whether they can enforce their claims both in- and out-of-court; whether they can approve and dismiss the bankruptcy administrator; and whether they can vote directly on the reorganization plan of a firm in default. Other variables capture whether there is an automatic stay on creditor claims in bankruptcy and whether the management remains in control during the resolution of an insolvency proceeding (see Appendix B for details).

We follow Favara et al. (2012, 2017) and use 16 of these variables to create an index that measures the strictness of debt enforcement in bankruptcy. This index, labeled *Debt Enforcement*, is calculated as the average of the selected 16 binary variables and ranges between 0 (weaker debt enforcement) and 1 (stronger debt enforcement).[6] Table 1 shows that *Debt Enforcement* averages 0.54, with substantial variation across sample countries. Countries with strict debt enforcement include Australia, Singapore, and the United Kingdom (index values of 1), while countries with weak debt enforcement include Chile and China (index values of 0).

The information underlying DHMS's data is from the year 2005. We follow Favara et al. (2012, 2017) and impute the corresponding numbers to all sample years. Though clearly an approximation, the persistence of economic, political, cultural, and legal factors strongly shapes the nature of bankruptcy law in a country. We expect that this limits the extent to which legal changes profoundly affect the relative nature of debt enforcement across countries in our sample period.[7] This is not to say that such changes do not exist or that they do not have an impact at the national level. In fact, below we exploit such changes to bankruptcy law to test how changes in debt enforcement within a country affect indirect distress costs.

To measure a firm's proximity to financial distress, we calculate its default probability using the method suggested by Bharath and Shumway (2008). This method is an approx-

[6] When an individual binary variable decreases debt enforcement (e.g., the presence of an autmatic stay), the index uses one minus the binary variable. Most of the variables capture debt enforcement in bankruptcy, but some also capture the strength of debt enforcement outside of it (see footnote 5).

[7] Indeed, DHMS argue that changes in bankruptcy law rarely change the index.

imation of the Merton (1974) distance-to-default model, but performs better in predicting actual defaults. Table 2 shows that the resulting variable, *Default Probability*, has a mean value of about 8.5% across our sample firms, and the U.S. figures are very comparable to those in Bharath and Shumway (2008). Importantly for our empirical strategy, the default probability shows substantial variation not just across countries (see Table 1), but also across and within firms (see Table 2).

We use two key dependent variables in our analysis to capture sources of indirect distress costs. First, we use *Trade Credit*, which we measure as accounts payable over assets (e.g., Fisman and Love, 2003). This variable averages about 0.12 across all firm-year observations in our sample. Second, we use revenues from business with customers, which we measure as *Sales/Assets*. This variable has a mean value of 0.97 in the sample.

In our U.S. analysis in Section 5, we construct a measure for a firm's dependence on non-standardized inputs (whose reclaim value to trade creditors is more likely to erode in bankruptcy). This measure is constructed using data from input-output tables from the Bureau of Economic Analysis, following the classification in Giannetti et al. (2009). An industry is considered to rely less (more) on standardized inputs if the share of inputs that comes from industries producing standardized products is less (more) than the U.S. industry median of 9%. In our U.S. analysis, we further gauge the importance of warranty services in a given industry by using data from Kale et al. (2013). This paper documents the percentage of firms offering warranties in each two-digit SIC code industry. An industry is considered to offer more (less) warranty services if the percentage of its warranty-offering firms is above (below) the U.S. industry median of 5%.

3.2 Empirical Methodology

3.2.1 Cross-Country Regression Model

We start our empirical analysis by estimating variants of the following cross-country model with different fixed effects to test our hypotheses:

$$\begin{aligned} y_{i,j,c,t} &= \beta_0 + \beta_1 Default\ Probability_{i,j,c,t} \times Debt\ Enforecement_c + \beta_2 Debt\ Enforecement_c \\ &\quad + \beta_3 Default\ Probability_{i,j,c,t} + \boldsymbol{\beta_c Controls}_{i,j,c,t} + \mu_i + \eta_t + \varepsilon_{i,j,c,t} \end{aligned}$$

where the subscripts i, j, c, and t index firms, industries, countries, and years, respectively. The dependent variable $y_{i,j,c,t}$ is either *Trade Credit* or *Sales/Assets*. $Default\ Probability_{i,j,c,t}$ is our measure of a firm's default risk and $Debt\ Enforecement_c$ captures the level of debt enforcement in a country. $\boldsymbol{Controls}_{i,j,c,t}$ is a vector of firm and country characteristics. We control for firm size (Log(*Sales*)), cash flow (*EBITDA/Assets*), leverage (*Total Debt/Assets*), intangibles (*Intangibles/Assets*), and investment (*Capex/Assets*). The country-level controls include *GDP Growth* and Log(*GDP Per Capita)* to capture cyclical factors influencing trade credit and sales. We cluster standard errors at the country level.

Our model exploits heterogeneity across firms in their probability of facing financial distress. Specifically, we predict that debt enforcement should matter most for firms with high default probabilities. As debt enforcement is time-invariant and does not vary across firms within the same country, our identification comes from how variation in default probabilities across firms in a country and within firms over time depends on the country-level of debt enforcement. The key coefficient of this empirical model is β_1. We predict a positive value for this coefficient, indicating that firms with a higher default probability have access to more trade credit and sell more to customers if debt enforcement in their country is stronger.

Importantly, we saturate our model with different fixed effects to identify the effects of debt enforcement as precisely as possible. We use these fixed-effects models to address the concern that debt enforcement in a country, and more generally bankruptcy law, is

correlated with other country or industry characteristics that affect trade credit or the ability to sell to customers.

Specifically, we include country-by-industry fixed effects to control for time-invariant characteristics that are specific to an industry when it is located in a particular country. These fixed effects allow us to compare the effects within the same industry in a given country, taking care of the concern that variation coming from countrywide industry shocks drive our results. Such shocks may include persistent unobserved differences in the economic or political importance of certain industries in a country, at least to the extent that they generate variation in access to trade credit or customer sales. Hence, our identification in regressions with country-by-industry fixed effects comes from how variation in a firm's probability of default affects trade credit and sales, after accounting for unobserved and observed differences across industries in a country.

We also report specifications that include country-by-year fixed effects, which ensure that comparisons are made within the same country at the same point in time. This specification has the advantage that it factors out average differences in trade credit or sales due to time-varying country-level variables. Examples of such variables include the quality of institutions, the political system, the level of trust among people or macroeconomic factors.

To control for time-invariant factors at the country level we include country fixed effects. These fixed effects aim at factoring out average differences in our dependent variables due to a country's general level of economic, political, or financial development. We also include industry fixed effects to account for industry-specific factors that may drive trade credit and sales. Such variables may include the nature of an industry's supplier or customer structure (e.g., trade credit is likely more important in manufacturing than in services). We further include year fixed effects to account for time-specific effects that affect all sample firms, such as global economic conditions. In some of our specifications, these individual fixed effects are spanned by the set of fixed effects that include interactions, implying that they cannot be separately identified and estimated. Finally, we include

in some specifications firm fixed effects to absorb time-invariant heterogeneity at the firm level. Firm fixed effects identify the effects of debt enforcement from changes in the default probability of the same firm over time. Note that adding these various fixed effects causes the debt-enforcement variable, unless it is interacted with the default probability, to drop out in our regression estimates.

3.2.2 Differences-in-Differences Model

A concern about our first empirical model is that country-level variables may drive our results. Our cross-country model tries to account for this possibility by saturating the model with different fixed effects. To further mitigate this concern, we exploit a 2005 bankruptcy reform in the United States. As we explain in detail in Section 5, this reform strengthened debt enforcement and we use it to run the following differences-in-differences model:

$$\begin{aligned} y_{i,t} &= \beta_0 + \beta_1 Default\ Probability_{i,t} \times Post\ Reform_t + \beta_2 Post\ Reform_t \\ &\quad + \beta_3 Default\ Probability_{i,t} + \boldsymbol{\beta_c Controls}_{i,t} + \mu_i + \varepsilon_{i,t} \end{aligned}$$

where the dependent variable $y_{i,t}$ is again either *Trade Credit* or *Sales/Assets*, and *Post Reform* is a dummy variable that equals one for the years after the reform (i.e., after 2005). $\boldsymbol{Controls}_{i,t}$ is a vector with the same firm characteristics as in the cross-country regressions. We further include firm fixed effects to absorb time-invariant heterogeneity at the firm level and cluster standard errors at the firm level. Our regressions focus on two different event windows around the reform—a wider one, spanning two years before and after the reform, and a narrower one, spanning one year before and after the reform. The key coefficient of this model is β_1. We predict a positive value for this coefficient, indicating that firms with a higher default probability have access to more trade credit and sell more to customers after the reform.

We expand this analysis to study the effects of the reform for specific industries for which we expect stronger or weaker effects once debt enforcement becomes stricter. Specif-

ically, we test whether the increase in trade credit is stronger among distressed firms that rely on non-standardized inputs, such as services or specialized machinery or equipment. We perform this sample partition since non-standardized inputs are especially likely to lose value in bankruptcy, making suppliers more sensitive to whether or not a distressed firm avoids bankruptcy. Therefore, the effect of the reform on trade credit should be stronger for distressed firms that rely more on suppliers of such non-standardized inputs. Similarly, we test whether the increase in sales is stronger among distressed firms that offer more warranty services. Here the idea is that customer fears about a firm's potential bankruptcy make a bigger difference in sales for products for which warranty services are relatively important, since they will be less willing to buy those products. Our model in the appendix formalizes the intuition for these tests. To broaden our analysis, we complement the analysis of the U.S. reform with two bankruptcy reforms in Germany and Brazil.

4. Cross-Country Evidence

4.1 Overall Effects of Stronger Debt Enforcement

We start by investigating whether firms with a higher default probability have access to more trade credit if debt enforcement in bankruptcy is stronger. Table 3 reports in Columns (1) through (7) regressions that explain *Trade Credit*. As motivated above, Columns (1) and (2) reports results that saturate our model with country-by-industry fixed effects, Columns (3) and (4) with country-by-year fixed effects; and Columns (5) through (7) with firm fixed effects. Next to using *Default Probability* directly, our regressions also include tercile dummies (calculated by country) for the probability of default. We do this to ensure that our results are driven by the subset of firms that are close to default (top tercile of *Default Probability*).

We also report in Column (6) a regression that controls for the effect of creditor rights across firms with different default probabilities, using the measure proposed in La Porta et al. (LLSV, 1998). We include this specification to contrast the effect of the DHMS debt-

enforcement variable with the one obtained using the LLSV index. As explained above, the LLSV index captures formal creditor rights in a country, but not the extent to which these rights are enforced in practice. Naturally, both indices are correlated, as reflected by the positive correlation of *Creditor Rights* and *Debt Enforcement* in Appendix Table 2. However, this correlation is only 51% in our sample, indicating that creditor rights are weakened in certain countries by a lack of enforcement.

The regression estimates in Table 3 provide across all specifications evidence consistent with Hypothesis 1. Specifically, we find strong evidence that firms with a higher default probability have access to more trade credit if debt enforcement is stronger. To evaluate the economic magnitude of the estimated effects, we compare trade credit of distressed firms (default probability in the 90th percentile, which equals 0.34) in countries with the lowest (index value of 0) and highest (index value of 1) scores for debt enforcement. The estimates in Column (1) imply that trade credit is 1.6 percentage points higher if a distressed firm is located in a country with strong debt enforcement. This is a meaningful effect, as it equals about 13% of the sample standard deviation for trade credit, which equals 0.124. This effects is estimated from a comparison of firms within the same industry in the same country, taking care of the concern that variation coming from countrywide industry shocks may drive our results. The estimates in Column (3) show similar results when comparing firms within the same country at the same point in time. While the standard errors of the estimated effect are slightly higher compared to Column (1), the magnitude of the estimated coefficient with country-by-year fixed effects is virtually identical to the one with country-by-industry fixed effects.

The results in Columns (2) and (4) further indicate that the effects are driven by firms with the highest default probability: the coefficient of the interaction term of the top-tercile dummy and *Debt Enforcement* is positive and highly statistically significant, while the corresponding coefficient for the lowest tercile dummy is statistically insignificant and close to zero. Interestingly, in the horse race between the debt enforcement and creditor rights indices in Column (6), only the interaction between *Debt Enforcement* and *Default*

Probability is positively and significantly related to trade credit. This indicates that what matters for the supply of trade credit to distressed firms is not the mere promise of strong creditor rights, but also their actual enforcement in practice.

Having looked at suppliers of trade credit, we next study whether firms closer to distress are able to sell more products to their customers if debt enforcement in bankruptcy is stronger. Table 4 reports regressions similar to those in Table 3, but replace trade credit with sales over assets. We continue to include different fixed effects to mitigate the concern that the results could be driven by heterogeneity at the country-industry, country-year, country, industry, year or firm level.

The regression estimates show that customer sales are significantly higher for firms closer to default if debt enforcement in bankruptcy is stricter. In economic terms, we again find meaningful effects, using the same comparison as above. Based on the estimates in Column (1), sales to assets are 6.3 percentage points higher if a distressed firm is located in a country with strong debt enforcement, which equals about 9% of the variable's sample standard deviation. As with trade credit, we continue to find that the interaction of debt enforcement and default probability remains positive and significant once we control for formal creditor rights.

Finally, we run our analysis for robustness on the set of single-industry firms, as sales figures for such firms closely map into their respective market shares when using industry fixed effects.[8] The regressions in Columns (8) and (9) show that stronger debt enforcement helps single-industry firms in financial distress lose less market share than single-industry firms in weaker debt enforcement countries. Overall, the results in Table 4 support Hypothesis 2.

4.2 Heterogeneity in the Effects of Debt Enforcement

We next expand our analysis to further explore how stricter debt enforcement depends on a firm characteristics and the economic environment. We study two important factors that

[8] Getting data on market shares directly is difficult, as large parts of customer markets, especially in less developed countries, are in the hands of private firms.

should provide us with variation in the ex-ante probability that a firm successfully restructures out-of-court: (i) a country's financial system (bank- versus market-based); and (ii) a firm's financial constraints. Out-of-court restructurings should be more likely in countries with bank-based financial systems, as they usually feature a higher concentration of debt providers, which facilitates out-of-court restructurings (Gertner and Scharfstein, 1991). Similarly, less-financially constrained firms should find it easier to access alternative ways of funding in times of distress, making out-of-court restructurings more likely. Hence, we predict that our results should be stronger in countries with bank-based financial systems and among less-financially-constrained firms.

To proxy for bank-based versus market-based financial systems, we use a country's ratio of bank credit to total private sector funding as a proxy (Beck et al., 2000). We use two proxies to capture the effects of financial constraints. The first measure is calculated at the firm level and measures a firm's asset tangibility. As argued in Almeida and Campello (2007), assets that are more tangible sustain more external financing because they mitigate contractibility problems. Our second measure is calculated at the industry level and measures whether a firm operates in an industry with high or low external financial dependence (Rajan and Zingales, 1998).

As predicted, the regressions in Table 5 show that our results are concentrated among firms that operate in bank-based financial systems, and among firms that are less financially constrained. The estimated coefficients for firms in bank-based systems are roughly twice the size compared to those of firms in market-based systems, for which the estimated coefficients are also statistically insignificant. Similarly, the coefficients are much larger for firms with high asset tangibility compared to those with low tangibility (effects are again insignificant for those). However, we note that the effects are somewhat less strong for our industry-level measure of financial constraints. For this measure, we find statistically significant effects for both sets of firms, though the magnitude of the effects is again larger for less-constrained firms.

5. U.S. Bankruptcy Code Reform

5.1 Institutional Details

The Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) was passed by Congress on April 14, 2005 and became effective on October 17, 2005. Though its main focus was on consumer bankruptcies, it also led to a considerable increase of creditor protection in Chapter 11. We focus on two features of this reform. First, the reform introduced a mandatory cap of 18 months on a debtor's exclusive period to file a reorganization plan, and a cap of 20 months on the plan's acceptance. Prior to the reform, courts had wide latitude in giving extensions beyond these periods. A related change was the introduction of a cap on the time debtors have to delay the decision to assume or reject leases (from unlimited to seven months).[9] Such caps are important as they cut through debtors' ability to protract bankruptcy proceedings, and hence curtail their ability to demand concessions from creditors to avoid delay.[10]

Second, BAPCPA enhanced the protection of trade creditors by increasing their chances for full repayment of goods delivered within 20 days prior to a bankruptcy filing. Additionally, the reform strengthened trade creditors' rights to reclaim goods delivered to a firm by extending the reclamation period from 10 to 45 days prior to a bankruptcy filing.

The model in Section 2 explicitly captures the effect of such changes in bankruptcy law. It shows that improving the recovery likelihood for trade creditors reduces indirect costs by improving the access to trade credit. Furthermore, it shows that setting stricter caps on debtors' abilities to protract negotiations reduces indirect distress costs in general—

[9] Leasing can be viewed as an arrangement between secured and unsecured debt financing. If the debtor assumes the lease, she has to continue the scheduled payments. Furthermore, the lease becomes a post-petition liability giving the lessor effectively a first-priority claim. If the debtor rejects the lease, she has to return the asset to the lessor, and the lessor's claims are considered unsecured in bankruptcy (see Eisfeldt and Rampini, 2009). Overall, the very existence of a cap on debtors' ability to protract negotiations significantly affects the distribution of bargaining power in restructurings.

[10] Other provisions weakening the debtors' position in bankruptcy include a restriction on the use and size of management bonuses and severance payments, and an extension of the fraudulent conveyance look-back period (Haines and Hendel, 2005; Miller, 2007). The new code also substantially curtails bankruptcy judges' discretion in dismissing or converting cases to Chapter 7.

also those related to the likelihood of retaining customers—by reducing the probability that a distressed firm files for bankruptcy. Indeed, consistent with our predictions, the bankruptcy law literature argues that the weaker position of debtors after the reform has led to more out-of-court reorganizations (Morrison, 2009). Indicative of this, Appendix Figure 1 shows that there is a sharp drop in Chapter 11 filings following the 2005 reform.

Our predictions are also consistent with the general view of practitioners regarding the consequences of the U.S. reform: "as a result, business reorganizations are down [...] and restructuring outside of bankruptcy law has increased [...]. It is clear that the time pressures and expenses BAPCPA imposes on debtors give secured lenders more power than ever to negotiate favorable workout terms and, to a large extent, control the debtor's destiny" (Bohn, 2007).

5.2 Empirical Results

Table 6 presents different regressions to test for the effects of the 2005 U.S. bankruptcy reform. Following our previous analysis, we report in Columns (1) through (3) regressions that explain trade credit, and in Columns (4) through (6) regressions that study customer sales. Hypotheses 1 and 2 imply that both measures should increase after the bankruptcy reform, especially for firms that are closer to default. The sample in these regressions consists of publicly listed firms from the United States, and we provide regressions for two event windows around the 2005 U.S. bankruptcy reform (2003 to 2007 and 2004 to 2006). All regressions include firm fixed effects as well as a set of firm-level control variables.

Table 6 provides strong evidence that firms with a higher default probability have better access to trade credit and higher sales after the reform. Specifically, we find that the differences-in-differences estimate of *Post Reform* times *Default Probability* is positive and significant for both dependent variables and across both event windows, providing further support for Hypotheses 1 and 2. As in the previous tests, we continue to find that the overall effects are driven by firms in the top tercile of *Default Probability* (see Columns (3) and (6)).

The economic effects of the reform are meaningful. The coefficient estimate in Column (3) implies that trade credit increases by 0.8% more after the reform for a firm with a high default probability (top tercile), compared to a firm with an average default probability (middle tercile). This difference equals about 9% of the pre-reform average of the trade-credit variable during the years 2003 to 2004 (0.086). For sales over assets, the coefficient estimate in Column (6) implies that Sales/Assets increases by 5.5% more after the reform for a firm with a high default probability (top tercile), compared to a firm with an average default probability (middle tercile). This difference equals about 5% of the pre-reform average of the sales-over-assets variable during the years 2003 to 2004 (1.11).

To corroborate our interpretations of the effects of the reform, we examine in Table 7 whether the previous results are concentrated among the firms for which we expect stronger effects. Specifically, we test whether the increase in trade credit is stronger among distressed firms that rely on non-standardized inputs. Trade creditors providing non-standardized goods have more to gain if a firm avoids bankruptcy, as the value of non-standardized inputs is likely to erode more strongly in bankruptcy. Thus, we expect that an increase in debt enforcement has a particularly strong effect for the firms dealing with trade creditors that supply non-standardized goods.

We find strong support for this argument in Table 7. In Columns (1) and (2) of this table, we split the sample firms based on the extent to which different industries rely more or less on standardized inputs (see Section 3.1 for definitions). The regressions show that the increase in trade credit after the reform is concentrated among the firms in industries that depend more strongly on non-standardized inputs. Specifically, the coefficient of the differences-in-differences estimator equals 0.035 and is highly significant for distressed firms relying on less-standardized inputs (Column (1)). By contrast, the same coefficient is much smaller (only 0.007) and statistically insignificant for firms operating in industries that rely on more-standardized inputs (Column (2)).

Finally, we test whether the increase in sales is stronger among distressed firms that offer more warranty services. The reason is that these firms should be more strongly

exposed to their customers' bankruptcy fears, as warranty promises have little value when firms are bankrupt. To investigate this argument, we split the sample firms based on the industry classifications in Kale et al. (2013) (see Section 3.1 for definitions). Our expectation is that the effects of the reform should be stronger for firms offering more warranty services. Consistent with this prediction, we find that the sales increase is larger among distressed firms in industries that offer more warranty services. Specifically, the differences-in-differences estimate is twice as large for high-warranty-intensity firms than low-warranty-intensity firms, and for the latter the effect is even statistically insignificant.

6. Evidence from Other Reforms

As a robustness test and to broaden our results, we study two additional major bankruptcy law reforms, one in Germany and one in Brazil. The main objective of the German reform in 2012 was the rescue and reorganization of firms in distress, by making it easier for firms to avoid inefficient liquidations and by providing incentives for out-of-court restructurings. The key change in the new bankruptcy law to achieve these objectives was the expansion of creditor rights in bankruptcy. Under the new regime, creditors had stronger control over the bankruptcy proceeding and a decisive influence on the appointment of the insolvency administrator. To facilitate out-of-court restructurings, the new law contained provisions increasing the likelihood that pre-bankruptcy agreements between debtors and creditors are honored by courts if the firm files for bankruptcy. The reform further made it more difficult to appeal a restructuring plan agreed by a majority of creditors.[11] Based on our model, we predict that these changes should lead indirect bankruptcy costs to go down after the reform.

The second legal reform that we study for robustness took place in Brazil in 2005. This reform increased the protection of secured creditors, giving them higher priority at the ex-

[11] The reform further made it more likely that a debtor stays in control of the business, allowing for a self-administered restructuring proceeding provided that a majority of creditors agree to it. This possibility was already in place prior to the reform, but rarely used as it was difficult to get the necessary court approvals.

pense of workers and tax authorities. Additionally, creditors were granted more rights in the reorganization procedures, including the negotiation and voting for a reorganization plan. Studying the Brazilian reform is interesting because it shows that strengthening bankruptcy rights has little effect if it does not go hand-in-hand with strong debt enforcement. This is for two reasons. First, the Brazilian reform introduced an automatic stay on all litigations against a debtor, which arguably weakened debt enforcement (Favara et al., 2017). Second, the reform's implementation in practice was considerably delayed by court congestion (Ponticelli and Alencar, 2016). The reform started to have an effect across the board only after a few years, but even in 2012, the average recovery rate of secured creditors was just 20% (compared to 80% in the U.S.), and the average bankruptcy case took over four years to resolve. Due to these circumstances, we expect weaker results for the Brazilian reform.

Table 8 contains differences-in-differences regressions for two event windows around the respective bankruptcy reforms (similar to Table 6). The regression estimates in Column (1) through (4) show that the German reform had a positive effect on both trade credit and customer sales. For both variables, we find that firms with a higher default probability have better access to trade credit and higher sales after the reform. These findings confirm our prediction that indirect bankruptcy costs should decrease when a restructuring out-of-court becomes more likely. Reflecting the more ambiguous nature of the Brazilian reform, we cannot find corresponding results in Columns (5) through (8).

7. Conclusion

This paper analyzes the effects of debt enforcement in bankruptcy on two important sources of indirect costs of financial distress: reduced access to trade credit from suppliers and forgone sales to customers. Our prediction is that strong debt enforcement in bankruptcy reduces indirect distress costs in two ways: (i) by increasing the likelihood of out-of-court restructurings, which makes it more likely that stakeholders like customers and trade

creditors will continue doing business with the firm; and (ii) by improving the recovery rate of trade creditors through explicit legal provisions.

We find support for this prediction both from a large panel of firms from 40 countries with heterogenous debt-enforcement characteristics, and from a differences-in-differences analysis around an important reform in U.S. bankruptcy law. We show that financially distressed firms—the firms for which the strength of debt enforcement in bankruptcy should matter the most—have better access to trade credit and higher sales when debt enforcement is stronger. In our differences-in-differences analysis, we show that these effects of stricter debt enforcement are concentrated among firms that rely more on non-standardized inputs. These are firms where trade creditors are particularly anxious that bankruptcy is avoided. We further show that the results are stronger among firms that offer more warranty services; these are firms where customers are particularly interested that the firm avoids bankruptcy as warranties are otherwise worthless.

Our results suggest that stronger debt enforcement in bankruptcy can help economize on indirect distress costs and induce a more-efficient restructuring environment prior to bankruptcy. This finding is important, as indirect distress costs can be substantial. A better understanding of their determinants should contribute to the current debate among policy makers and academics about the costs and benefits of stronger debt enforcement. Further research might investigate the role of debt enforcement as part of an overall welfare analysis. In particular, there is currently little evidence on systematic differences in post-workout performance across bankruptcy regimes. Furthermore, one could study whether the threat of higher indirect distress costs has a positive effect on ex-ante incentives prior to bankruptcy. Such aggregate welfare analyses are likely to play a central role in the design of future bankruptcy reforms.

Appendix A. Model

A.1 Model Set-Up

This appendix uses a two-period model to formalize the intuition behind our hypotheses. We assume that the sole source of funding for a firm, owned by an owner-manager ("she"), is debt with repayments D_1 at $t = 1$ and D_2 at $t = 2$. Debt is provided by a creditor ("he") to fund a risky project at $t = 0$.[12] At $t = 1$, the project returns one of three cash flows: x_l with probability β_1, and x_m or x_h, each with probability $(1 - \beta_1)/2$. We assume that $x_h > D_1 + D_2 > x_m > D_1 > x_l$. At $t = 2$, the project again returns one of three cash flows: x_l with probability β_2, x_h with probability θ, or x_m with probability $(1 - \beta_2 - \theta)$, where θ and β_t are positive and their sum is less than one. We assume that θ is distributed on $[\theta_L, \theta_H]$ according to the differentiable cumulative density function F. Cash flows are verifiable, so the firm must repay its creditor if it has sufficient cash. We employ three cash flow states, as we introduce below the possibility that the debtor gambles for resurrection after $t = 1$. At $t = 0$, there is symmetric information, but at $t = 1$ the owner-manager becomes privately informed about θ. Agents are risk-neutral and protected by limited liability, and there is no discounting.

Bankruptcy vs. Workout If the owner-manager is in the low cash flow state x_l at $t = 1$, she is in default. In this case, she first attempts to restructure $D := D_1 + D_2$ in a workout and, if negotiations fail, she files for bankruptcy. The first difference between these two alternatives is that the creditor has more information about θ in bankruptcy. This assumption is reasonable in light of the formal transfer of information and some control rights to creditors upon bankruptcy. To simplify the exposition, we assume that bankruptcy is resolved under symmetric information. The second difference is that restructuring in bankruptcy is associated with a deadweight cost of κ. One can think of κ as the cost due to inefficient courts and judges presiding over the restructuring or the cost of

[12] Our focus on indirect costs requires us to take an ex-post perspective, taking the level of debt and the probability of default as given. A more general welfare analysis would need to endogenize D_t and the probability of default.

bridging information asymmetries.[13] As an alternative to restructuring in bankruptcy, the firm can be liquidated. Liquidation precludes the chance of earning cash flows in $t = 2$, but yields $L < D$, which is payable to the creditor.

To model indirect distress costs, we assume that before the outcome of the workout negotiations becomes known, stakeholders, such as trade creditors and customers, decide on whether to abandon the firm. Their decision to withdraw business reduces the firm's cash flows by k, where $0 \leq k \leq x_l$. We add more structure in the next section to analyze how this decision is made.

Debt Enforcement in Bankruptcy To capture debt enforcement, we introduce an intermediate date $t = 1.5$ in period 2. Following a bankruptcy filing, if both parties do not agree on a reorganization or liquidation before $t = 1.5$, the owner-manager can gamble for resurrection. Gambling shifts probability mass to the tails, in that it increases the likelihood of a high cash flow to $\theta + \varepsilon$, and that of a low cash flow to $\beta_2 + \varepsilon$. This comes at the expense of reducing the likelihood of a medium cash flow x_m. We assume that such risk shifting in bankruptcy is not socially optimal, which is ensured by the following sufficient condition:

$$2x_m > x_h + x_l. \tag{A.1}$$

Furthermore, we assume that the owner-manager can delay a reorganization plan until $t = 1.5$ with probability $1-\nu$, and the creditor can avoid such protracting with probability ν. The ability of the owner-manager to "protract" reflects bankruptcy law features such as the time available to the debtors to propose a reorganization plan, or the ability of the creditors to enforce agreements made with the debtor prior to or after the bankruptcy filing. Thus, ν captures both the strength of creditor rights and their actual level of enforcement. For this reason we refer to ν as "debt enforcement" in bankruptcy.

[13] Clearly, the bankruptcy cost κ could further stand for indirect costs incurred *after* the bankruptcy filing, as well as for legal and administrative expenses.

A.2 Debt Enforcement and Workout Likelihood

We next show that the probability of a workout, denoted by $0 \leq \lambda \leq 1$, endogenously depends on debt enforcement. To solve the bargaining game following default at $t = 1$, we first derive the expected payoffs of both parties at $t = 2$ in case of bankruptcy. These payoffs are the "outside options" if the workout negotiations fail and determine the minimum both parties will bargain for in a workout. Reflected in the owner-manager's bankruptcy payoffs is her ability to delay bankruptcy negotiations until $t = 1.5$ and gamble for resurrection. Specifically, because the creditor is better off when such gambling is avoided, he needs to offer the owner-manager more than she would receive in bankruptcy if she had no ability to protract. Thus, the mere *threat* of delay is sufficient to affect the split of bankruptcy proceeds even if delays do not eventually materialize. Given that stronger debt enforcement limits the owner-manager's ability to protract, it reduces the need to offer her concessions.

LEMMA A.1 *The owner-manager's share of cash flows in bankruptcy decreases with the strength of debt enforcement in bankruptcy ν.*

Since bankruptcy is costly, a workout is the more efficient solution.[14] However, information asymmetry between the creditor and the owner-manager can cause workout negotiations to fail. Specifically, the creditor is worried that the owner-manager might exaggerate her type θ to obtain better restructuring terms. Unable to distinguish whether this is the case, the creditor might prefer bankruptcy, where he has more information. Thus, the trade-off faced by the creditor is whether the potential cost savings κ from avoiding bankruptcy will compensate him for the expected loss from treating good and bad borrowers the same in a workout. Stronger debt enforcement helps to tilt the scales of this trade-off in favor of a workout for a simple reason: It reduces the owner-manager's payoff in bankruptcy and, thus, reduces what she can bargain for in a workout. In the

[14] We assume that the expected cost savings from bankruptcy is more valuable than the option to liquidate the firm in bankruptcy.

extreme case in which the owner-manager can extract nothing in bankruptcy, she would receive a negligible claim in an out-of-court restructuring. But then the cost of treating both good and bad borrowers the same is also negligible compared to the potential cost savings from avoiding bankruptcy. Hence, a workout is more likely.

PROPOSITION A.1 *Stronger debt enforcement in bankruptcy ν makes it more likely that bargaining for a workout is successful.*

Proposition A.1 does not explicitly derive the probability of a workout, as it does not stipulate a specific bargaining protocol. However, it addresses the more general question of when a protocol leading to a workout exists in the first place. Thus, restructuring in a workout is more likely for any bargaining game if bankruptcy law specifies stricter debt enforcement, i.e., the probability of a workout λ increases in debt enforcement ν.

A.3 Determinants of Indirect Costs of Financial Distress

We now model how a representative stakeholder, such as a trade creditor or a customer, makes a decision whether to continue doing business with the firm. Let b denote the stakeholder's benefit from doing business with the firm. Furthermore, let c denote the stakeholder's cost (e.g., the cost of the supplied goods or the price of a product), and $0 \leq \varphi \leq 1$ the fraction of b that the stakeholder can recover in bankruptcy in the case of a restructuring (e.g., the recovery of trade credit or the usage of warranty services). We assume that recovery is zero in case of liquidation, which occurs for $L \geq E\left[X - \kappa - k|\theta\right]$, i.e., if θ is below some threshold θ^*.

A stakeholder agrees to do business with the firm if and only if his cost is lower than his expected benefit:

$$c \leq \lambda\left(\nu, k, \kappa\right) b + \left(1 - \lambda\left(\nu, k, \kappa\right)\right)\left(1 - F\left(\theta^*\right)\right)\varphi b. \tag{A.2}$$

The first term on the right-hand-side of (A.2) is the stakeholder's expected benefit if the firm avoids bankruptcy, while the second term is the stakeholder's expected recovery in

bankruptcy. Analyzing the factors affecting the right-hand-side of (A.2), we obtain:

PROPOSITION A.2 *A stakeholder is more likely to continue to do business with the firm if:*
(i) debt enforcement in bankruptcy ν is stronger;
(ii) his bankruptcy recovery rate φ is higher;
(iii) he expects that other stakeholders also continue doing business with the firm (k is low).
The effect in (i) is stronger if the bankruptcy recovery rate φ is lower.

Part (i) of Proposition A.2 follows directly from Proposition A.1, as stronger debt enforcement makes a workout more likely. This effect will be stronger when the stakeholder expects to recover less in bankruptcy (φ is low), as then the likelihood of bankruptcy avoidance will be of paramount importance to the stakeholder. Part (ii) is straightforward, as an increase in what the stakeholder can recover from bankruptcy makes him less concerned about it. Part (iii) highlights the importance of the market's expectations regarding the likelihood of achieving a workout. If the stakeholder believes that other stakeholders will abandon the firm (i.e., that k will be high), then he has a lower expectation of restructuring out-of-court, making it more likely that he also abandons the firm. As a result, beliefs become self-fulfilling. This implies that bankruptcy law can potentially act as a focal point for coordinating stakeholders' beliefs and, thus, for the acceleration or deceleration of the accumulation of indirect costs.

A.4 Discussion

The advantage of our model is that it allows us to derive empirical predictions in a simple way. We could obtain similar predictions also differently. For example, our model employs a "waiting option" for the owner-manager during bankruptcy to capture debt enforcement; alternatively, we could assume that, once in bankruptcy, the creditor can enforce quick

liquidation with probability ν, which is again determined by bankruptcy law.[15] It is also worth noting that the argument that the creditor is more likely to use credit default swaps when his rights in bankruptcy are weak further strengthens our results, as such insurance increases the bankruptcy probability even more (Bolton and Oehmke, 2011).

It is interesting to relate our model to Garlappi et al. (2008), Favara et al. (2012), and Davydenko and Strebulaev (2007), who study how equity and debt risk depend on bargaining power in bankruptcy. In their models, shareholders with stronger bargaining power have an incentive to default strategically, which reduces equity risk at the expense of creditors. Our model complements their setting along two dimensions, as we explicitly model workouts as an alternative to bankruptcy and show that workouts are more likely if debt enforcement is stricter.

Our model can be modified to make the timing of default a strategic choice. Strategic default, then, corresponds to the first attempt to renegotiate *out-of-court*, and the effect of bankruptcy law enters again through the outside options of both parties if a workout fails. It is straightforward to show that in such a case the owner-manager defaults earlier when she can extract more from bankruptcy (Favara et al., 2012). To the extent that creditors cannot infer all of the manager's private information from the default timing (e.g., because they do not observe the firm's day-to-day cash flows), Proposition A.1 continues to hold. Thus, default and bankruptcy are more likely under a less creditor-friendly regime also in a dynamic extension of our model. An important insight from such a dynamic extension is that indirect costs reinforce each other. Once the firm starts accumulating indirect distress costs, default and bankruptcy become even more likely. This reinforces bankruptcy fears of stakeholders, making it even more likely that they abandon the firm and triggering even more indirect distress cots.

[15] Assume, then, that quick liquidation is (in some cases) socially inefficient: It gives the creditors a higher expected repayment, as it increases the repayment in the low-cash-flow state, but, it disproportionately limits the upside and, hence, the owner-manager's expected payoff. It is now the owner-manager who must "pay" the creditors (with probability $1-\nu$) not to liquidate the firm by giving up a higher participation on the upside.

Appendix B. Proofs

Proof of Lemma A.1. Let $K := \kappa + k$ be the sum of all bankruptcy costs incurred upon a bankruptcy filing. Given limited liability, the owner-manager's option value of waiting is the difference in her expected payoff from waiting to accept/reject a reorganization plan until $t = 1.5$ and her expected payoff from not protracting:

$$O := (1-\nu)\max\{0, E\left[X - K - D|\Pi_\theta\right] - E\left[X - K - D|\theta\right]\mathbf{1}_{NL}\}, \tag{B.1}$$

where Π_θ stands for the decision to protract and gamble; the expectation is with respect to the cash flow realization $X = \{x_l, x_m, x_h\}$; and $\mathbf{1}_{NL}$ is an indicator function taking the value of one if the firm is not liquidated. Recall that $L < D$ implies that the owner-manager would receive nothing in liquidation.

Given that $D > x_m$ and the parameter restriction in (A.1), the owner-manager's payoff from protracting (B.1) is positive, while protracting is just costly for the creditor. To induce resolution at $t = 1$, the creditor must therefore additionally offer the owner-manager at least O-more than her expected payoff in bankruptcy. Without loss of generality, we assume that the creditor can make a take-it-or-leave-it offer, replacing the creditor's old claim for an equity stake $(1 - \alpha(\theta))$.[16] The stake $\alpha(\theta)$ left to the owner-manager must make her at least as well off as protracting and must, thus, satisfy

$$\begin{aligned} \alpha(\theta) &= \frac{E\left[X - K - D|\theta\right]\mathbf{1}_{NL} + O}{\max\left(L, E\left[X - K|\theta\right]\right)} \\ &= \frac{(1-\nu)E\left[X - K - D|\Pi_\theta\right] + \nu E\left[X - K - D|\theta\right]\mathbf{1}_{NL}}{\max\left(L, E\left[X - K|\theta\right]\right)}. \end{aligned} \tag{B.2}$$

where $\max\left(L, E\left[X - K|\theta\right]\right)$ takes into account that the firm is liquidated if $L > E\left[X - K|\theta\right]$. Note that there are more liquidations if the inefficiencies in bankruptcy (κ) is higher. For use below, we denote with θ^* the cutoff type above which restructuring is optimal. Taking the derivative of (B.2) with respect to ν, we have that $\alpha(\theta)$ is decreasing in ν. **Q.E.D.**

[16] Who makes the offer affects the division of surplus, but not the qualitative predictions. The same is true regarding the choice of new security.

Proof of Proposition A.1. We apply the Revelation Principle to show that there is a mechanism leading to a workout only for high values of ν. A direct revelation procedure is a pair of functions $\{\omega(\theta), R_{WO}(\theta)\}$, where $\omega(\theta)$ is the probability that the creditor agrees to a workout in which he receives $R_{WO}(\theta)$. Taking into account that a failed workout leads to bankruptcy, the incentive constraints ensuring truthful reporting can be simplified to

$$\begin{aligned} & \omega(\theta) E[X - k - R_{WO}(\theta)|\theta] + (1 - \omega(\theta))(\min(L, E[X - K|\theta]) - E[R_B(\theta)|\theta]) \quad (\mathrm{IC_M}) \\ \geq \; & \omega(\theta') E[X - k - R_{WO}(\theta')|\theta] + (1 - \omega(\theta'))(\min(L, E[X - K|\theta]) - E[R_B(\theta)|\theta]) \end{aligned}$$

where $\theta', \theta \in [\underline{\theta}, \overline{\theta}]$, $R_B(\theta)$ is the creditor's payoff in bankruptcy under symmetric information, and where the expectation is with respect to $X = \{x_l, x_m, x_h\}$. The participation constraints of the owner-manager and the creditor are

$$\begin{aligned} E[X - k - R_{WO}(\theta)|\theta] - (\min(L, E[X - K|\theta]) - E[R_B(\theta)|\theta]) &\geq 0, \quad \forall\theta \qquad (\mathrm{IR_M}) \\ \int_{\underline{\theta}}^{\overline{\theta}} \omega(\theta) E[R_{WO}(\theta) - R_B(\theta)|\theta] dF(\theta) &\geq 0. \qquad (\mathrm{IR_C}) \end{aligned}$$

From the incentive constraint ($\mathrm{IC_M}$), achieving a workout with probability one implies that the creditor must offer the same contract R_{WO} to all θ.

Suppose that the creditor and the owner-manager engage in a debt-for-equity swap. (The same argument obtains regardless of the creditor's new security). Satisfying ($\mathrm{IR_M}$) is most difficult for type $\overline{\theta}$. Hence, taking into account the manager's outside option in bankruptcy (B.2), the owner-manager's equity stake in a workout must be at least

$$\alpha_{WO} = \frac{(1 - \nu) E[X - K - D|\Pi_{\overline{\theta}}] + \nu E[X - K - D|\overline{\theta}] \mathbf{1}_{NL}}{E[X - k|\overline{\theta}]}. \qquad (\mathrm{B.3})$$

Plugging in (B.3) and (B.2) into ($\mathrm{IR_C}$), an out-of-court deal is better for the creditor

than entering bankruptcy if

$$
\begin{aligned}
0 \quad &\leq \quad (1-\alpha_{WO}) \int_{\underline{\theta}}^{\overline{\theta}} E\left[X-k|\theta\right] dF\left(\theta\right) - \int_{\underline{\boldsymbol{\theta}}}^{\overline{\theta}} \left(1-\alpha\left(\theta\right)\right) \max\left(L, E\left[X-K|\theta\right]\right) dF\left(\theta\right) \qquad \text{(B.4)} \\
&= \quad \left(\begin{array}{c} E\left[X-k|\overline{\theta}\right] \\ -\left(1-\nu\right) E\left[X-K-D|\Pi_{\overline{\theta}}\right] - \nu E\left[X-K-D|\overline{\theta}\right] \mathbf{1}_{NL} \end{array} \right) \frac{\int_{\underline{\boldsymbol{\theta}}}^{\overline{\theta}} E\left[X-k|\theta\right] dF\left(\theta\right)}{E\left[X-k|\overline{\theta}\right]} \\
&\quad - \int_{\underline{\boldsymbol{\theta}}}^{\overline{\theta}} \left(\begin{array}{c} \max\left(L, E\left[X-K|\theta\right]\right) \\ -\left(1-\nu\right) E\left[X-K-D|\Pi_{\theta}\right] - \nu E\left[X-K-D|\theta\right] \mathbf{1}_{NL} \end{array} \right) dF\left(\theta\right) \\
&= \quad \int_{\underline{\boldsymbol{\theta}}}^{\overline{\theta}} \left(E\left[X-k\right] - \max\left(L, E\left[X-K|\theta\right]\right)\right) dF\left(\theta\right) \qquad \text{(B.5)} \\
&\quad - \int_{\underline{\boldsymbol{\theta}}}^{\overline{\theta}} \left(\begin{array}{c} \left(\left(1-\nu\right) E\left[X-K-D|\Pi_{\overline{\theta}}\right] + \nu E\left[X-K-D|\overline{\theta}\right] \mathbf{1}_{NL}\right) \frac{E\left[X-k|\theta\right]}{E\left[X-k|\overline{\theta}\right]} \\ -\left(\left(1-\nu\right) E\left[X-K-D|\Pi_{\theta}\right] + \nu E\left[X-K-D|\theta\right] \mathbf{1}_{NL}\right) \end{array} \right) dF\left(\theta\right) \qquad \text{(B.6)}
\end{aligned}
$$

This expression has a simple interpretation. Expression (B.5) is the expected social surplus gained from restructuring. The term in brackets of expression (B.6) is the owner-manager's information rent, which expresses how much the owner-manager benefits from a workout over bankruptcy given her private information about θ. That information rent is zero for $\theta = \overline{\theta}$, but it increases in θ and is, thus, positive for lower types. Hence, the creditor agrees to a restructuring if the owner-manager's expected information rent in (B.6) is not larger than the expected efficiency gain from restructuring (B.5).

The likelihood λ that the firm restructures out-of-court depends on whether (B.4) can be satisfied. Taking the partial of (B.6) with respect to ν, we obtain

$$
\int_{\underline{\boldsymbol{\theta}}}^{\overline{\theta}} \left(\left(\begin{array}{c} E\left[X-K-D|\Pi_{\overline{\theta}}\right] \\ -E\left[X-K-D|\overline{\theta}\right] \mathbf{1}_{NL} \end{array} \right) \frac{E\left[X-k|\theta\right]}{E\left[X-k|\overline{\theta}\right]} - \left(\begin{array}{c} E\left[X-K-D|\Pi_{\theta}\right] \\ -E\left[X-K-D|\theta\right] \mathbf{1}_{NL} \end{array} \right) \right) dF\left(\theta\right) \qquad \text{(B.7)}
$$

Observe now that $E\left[X-K-D|\theta\right]$ and $E\left[X-k|\theta\right]$ increase in θ, while the difference $E\left[X-K-D|\Pi_{\theta}\right] - E\left[X-K-D|\theta\right]$ is negative and independent of θ. We, thus, have that expression (B.7) is positive.

The above analysis answers the question whether there is a mechanism leading to a workout. In practice, this further depends on the specific bargaining protocol. Thus, the overall predictions of the above analysis is that workouts are more likely to succeed (i.e.,

λ is higher) if (B.4) is more likely to be satisfied. Thus, we predict that $\frac{\partial\lambda(\nu,k,\kappa)}{\partial\nu} > 0$. Furthermore, the partial of the RHS of (B.4) with respect to k is negative, and with respect to κ positive, implying that $\frac{\partial\lambda(\nu,k,\kappa)}{\partial k} < 0$, and $\frac{\partial\lambda(\nu,k,\kappa)}{\partial\kappa} > 0$. **Q.E.D.**

Proof of Proposition A.2. Defining $A(\nu,\varphi,k,\kappa) := \lambda(\nu,k,\kappa)+(1-\lambda(\nu,k,\kappa))(1-F(\theta^*))\varphi$, the stakeholder's decision in (A.2) is to do business with the firm if and only if $c < A(\nu,\varphi,k,\kappa)\,b$. Thus, we only need to check the effect of the parameters on $A(\nu,\varphi,k,\kappa)$. Taking the partials of $A(\nu,\varphi,k,\kappa)$ with respect to ν and φ we obtain

$$\begin{aligned}\frac{\partial A(\nu,\varphi,k,\kappa)}{\partial\nu} &= \frac{\partial\lambda(\nu,k,\kappa)}{\partial\nu}(1-\varphi(1-F(\theta^*))) > 0\\ \frac{\partial A(\nu,\varphi,k,\kappa)}{\partial\varphi} &= (1-\lambda(\nu,k,\kappa))(1-F(\theta^*)) > 0.\end{aligned}$$

The partial with respect to κ is indeterminate as

$$\frac{\partial A(\nu,\varphi,k,\kappa)}{\partial\kappa} = \underbrace{\frac{\partial\lambda(\nu,k,\kappa)}{\partial\kappa}}_{+}(1-\varphi(1-F(\theta^*))) - (1-\lambda(\nu,k,\kappa))\,\varphi\,\underbrace{\frac{\partial F(\theta^*)}{\partial\theta^*}}_{+}\underbrace{\frac{d\theta^*}{d\kappa}}_{+}.$$

Finally, suppose that a stakeholder considers the overall size of k to be independent of his decision. We then have

$$\frac{\partial A(\nu,\varphi,k,\kappa)}{\partial k} = \frac{\partial\lambda(\nu,k,\kappa)}{\partial k}(1-(1-F(\theta^*))\varphi) < 0.$$

This leads to a self-reinforcing effect of beliefs: If all stakeholders believe that k is high, it is more likely that they view $A(\nu,\varphi,k,\kappa)$ as low, making it more like they abandon the firm, and vice versa.

Finally, we show that the effect of stronger debt enforcement is stronger when the potential for recovery in bankruptcy φ is lower:

$$\frac{\partial^2 A(\nu,\varphi,k,\kappa)}{\partial\nu\partial\varphi} = -\frac{\partial\lambda(\nu,k,\kappa)}{\partial\nu}(1-F(\theta^*)) < 0.$$

Q.E.D.

Appendix C. Debt Enforcement Index

The construction of our debt enforcement index is based on the DHMS survey data. We follow the same construction as in Favara, Schroth, and Valta (2012, 2017) and measure the level of enforcement based on 16 individual indicators. The resulting index takes values between 0 and 1 and is calculated as the average of the non-missing binary (0 if no, 1 if yes) indicators that are listed below. When a variable x decreases debt enforcement, we take $1 - x$ to construct the index (the variable names used by DHMS in their data set are included in parentheses):

Factors that strengthen debtors' bargaining power in default negotiations and, thus, weaken debt enforcement:

1. Automatic stay on enforcement: Secured creditors may enforce their security upon commencement of insolvency proceedings (1−scsstay);

2. Automatic stay on lawsuits: Lawsuits against the firm are automatically stayed upon commencement of insolvency proceedings (1−lawsc);

3. Reorganization attempt required: The firm must first attempt reorganization before proceeding to liquidation (1−attemreo);

4. Management remains: Management is not automatically dismissed or must not be supervised or seek approval from the insolvency administrator or court for decisions in the ordinary course of the business (1−mancont);

5. Case proceeds on claim amount dispute: The insolvency case is not automatically suspended when a creditor disputes a claim amount or if the claim amount cannot be appealed at all (1−disclai);

Factors that weaken debtors' bargaining power in default negotiations and, thus, strengthen debt enforcement:

1. Out of court seizure and sale: Secured creditors may seize and sell their collateral without court approval, judgement, or enforcement (ooc);

2. No judge for enforcement: Secured creditors may enforce their security either in an enforcement court or out of court without first obtaining a judgment authorizing it to do so (sumjud);

3. Floating charge: The assets or the entire business can be pledged as collateral (floating);

4. Case proceeds on appeal of insolvency: The insolvency case is not automatically suspended upon appeal of the order initiating the insolvency process or the insolvency order cannot be appealed at all (apporde);

5. Case proceeds on appeal of liquidation: The sale in liquidation is executed even on appeal of the liquidation order or a liquidation order cannot be appealed at all (appsal);

6. Automatic trigger for liquidation: An automatic trigger mechanism (e.g., based on the period of default or ratio of assets to liabilities) can initiate insolvency (trigliq);

7. Firm must cease operating: A defaulting firm must cease operations upon commencement of insolvency proceedings (opceas);

8. Creditor approves administrator: Secured creditors have the right to approve the appointment of the insolvency administrator (whoapp);

9. Creditor dismisses administrator: Secured creditors may dismiss or must approve the dismissal of the insolvency administrator (dismiss);

10. Creditor votes directly: Secured creditors vote directly (rather than in a committee or not at all) on the reorganization plan (scvotdir);

11. Proof of reorganization prospects: The firm must submit proof of reorganization prospects before reorganization proceedings may commence (proofreo).

References

Acharya, V., Sundaram, R. K., and John, K. (2011) Cross-country variations in capital structure: the role of bankruptcy codes, *Journal of Financial Intermediation* **20**, 25-54.

Acharya, V. and Subramanian, K. V. (2009) Bankruptcy codes and innovations, *Review of Financial Studies* **22**, 4949–4988.

Almeida, H. and Philippon, T. (2007) The risk-adjusted cost of financial distress, *Journal of Finance* **62**, 2557–2586.

Almeida, H. and Campello, M. (2007) Financial constraints, asset tangibility, and corporate investment, *Review of Financial Studies* **20**, 1429-1460

Altman, E. I. (1984) A further empirical investigation of the bankruptcy cost question, *Journal of Finance* **39**, 1067–1089.

Andrade, G. and Kaplan, S. N. (1998) How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed, *Journal of Finance* **53**, 1443–1493.

Ang, J. S., Chua, J. H. and McConnell, J. (1982) The administrative costs of corporate bankruptcy: a note, *Journal of Finance* **37**, 219–226.

Beck, T., Demirgüç-Kunt, A. and Levine, R. (2000) A new database on financial development and structure, World Bank Economic Review **14**, 597–605.

Benmelech, E. and Bergman, N. K. (2011) Vintage capital and creditor protection, *Journal of Financial Economics* **99**, 308–332.

Bharath, S. T. and Shumway, T. (2008), Forecasting default with the Merton distance to default, *Review of Financial Studies* **21**, 1339–1369.

Bohn, E. M. (2007) Faster, but not cheaper. Trends and decisions in business bankruptcies under BAPCPA, *Business Law Today* **17**.

Bolton, P. and Oehmke, M. (2011) Credit default swaps and the empty creditor problem, *Review of Financial Studies* **24**, 2617–2655.

Bolton, P. and Scharfstein D. (1996) Optimal debt structure and the number of creditors, *Journal of Political Economy* **104**, 1–25.

Bris, A., Welch, I. and Zhu, N. (2006) The costs of bankruptcy: Chapter 7 liquidation versus Chapter 11 reorganization, *Journal of Finance* **61**, 1253–1303.

Davydenko, S. A. and Franks, J. (2008) Do bankruptcy codes matter? A study of defaults in France, Germany and the UK, *Journal of Finance* **63**, 565–608.

Davydenko, S. A. and Strebulaev, I. A. (2007) Strategic actions and credit spreads: an empirical investigation, *Journal of Finance* **62**, 2633–2671.

Davydenko, S. A., Strebulaev, I. A. and Zhao, X. (2012) A market-based study of the costs of default, *Review of Financial Studies* **25**, 2959–2999.

Djankov, S., Hart, O., McLiesh, C., and Shleifer, A. (2008) Debt enforcement around the World, *Journal of Political Economy* **84**, 1105–1149.

Eckbo, E., Thorburn, K. and Wang, W. (2015) How costly is corporate bankruptcy for the CEO? *Journal of Financial Economics* **121**, 210–229.

Eisfeldt, A. L. and Rampini, A. (2009) Leasing, ability to repossess, and debt capacity, *Review of Financial Studies* **22**, 1621–1657.

Favara, G., Schroth, E. J. and Valta, P. (2012) Strategic default and equity risk across countries, *Journal of Finance* **67**, 2051–2095.

Favara, G., Morellec, E., Schroth, E. J. and Valta, P. (2017) Debt enforcement, investment, and risk taking across countries, *Journal of Financial Economics* **123**, 22–41.

Fisman, R. and Love, I. (2003) Trade credit, financial intermediary development, and industry growth, *Journal of Finance* **58**, 353–374.

Frank, M. and Maksimovic, V. (2005) Trade credit, collateral, and adverse selection, unpublished working paper, University of Maryland and University of Minnesota.

Garlappi, L., Shu, T. and Yan, H. (2008) Default risk, shareholder advantage, and stock returns, *Review of Financial Studies* **21**, 2743–2778.

Gennaioli, N. and Rossi, S. (2010) Judicial discretion in corporate bankruptcy, *Review of Financial Studies* **23**, 4078–4114.

Gennaioli, N. and Rossi, S. (2013) Contractual resolution of financial distress, *Review of Financial Studies* **26**, 602–634.

Gertner, R. and Scharfstein, D. (1991) A theory of workouts and the effects of reorganization law, *Journal of Finance* **46**, 1189–1222.

Giannetti, M., Burkart, M. and Ellingsen, T. (2011) What you sell is what you lend? Explaining trade credit contracts, *Review of Financial Studies* **24**, 1261–1298.

Gilson, S., John, K. and Lang, L. (1990) Troubled debt restructurings, an empirical study of private reorganization of firms in default, *Journal of Financial Economics* **27**, 315–353.

Hackbarth, D., Haselmann, R. F. H. and Schoenherr, D. (2015) Financial distress, stock returns and the 1978 bankruptcy reform act, *Review of Financial Studies* **28**, 1810–1847.

Haines, J. B. and Hendel, P. J. (2005) No easy answers: small business bankruptcies after BAPCPA, *Boston College Law Review* **70**, 71–104.

Hortacsu, A., Matvos, G., Syverson, C. and Venkataraman, S. (2013) Indirect costs of financial distress in durable goods industries: the case of auto manufacturers, *Review of Financial Studies* **26**, 1248–290.

Hotchkiss, E. S., John, K., Mooradian, R. M. and Thorburn, K. S. (2008) Bankruptcy and the resolution of financial distress, in: Handbook of Corporate Finance: Empirical Corporate Finance, Amsterdam: Elsevier/ North–Holland.

Jostarndt, P. and Sautner, Z. (2010) Out-of-court restructuring versus formal bankruptcy in a non-interventionist bankruptcy setting, *Review of Finance* **14**, 623–668.

Kale, J.R., Meneghetti, C., and Shahrur, H. (2013) Contracting with nonfinancial stakeholders and corporate capital structure: The case of product warranties, *Journal of Financial and Quantitative Analysis* **48**, 699–727.

La Porta, R., Lopez De Silanes, F., Shleifer, A., Vishny, R. (1998) Law and finance, *Journal of Political Economy* **106**, 1113–1162.

Loranth, G. and Franks, J. (2014) A study of bankruptcy costs and the allocation of control, *Review of Finance* **18**, 961–997.

Merton, R. (1974) On the pricing of corporate debt: The risk structure of interest rates *Journal of Finance* **29**, 449–470.

Miller, H. R. (2007) Chapter 11 in transition–from boom to bust into the future, *American Bankruptcy Law Journal* **81**, 375–404.

Morrison, E. R. (2009) Bargaining around bankruptcy: small business workouts and state law, *Journal of Legal Studies* **38**, 255–307.

Opler, T. C. and Titman, S. (1994) Financial distress and corporate performance, *Journal of Finance* **49**, 1015–1040.

Petersen, M. A. and Rajan, R. G. (1997) Trade credit: theories and evidence, *Review of Financial Studies* **10**, 661–691.

Ponticelli, J. and Alencar, L.S. (2016) Court enforcement, bank loans, and firm investment: Evidence from a bankruptcy reform in Brazil, *Quarterly Journal of Economics* **131**, 1365–1413.

Rajan, R. G. and L. Zingales (1998) Financial dependence and growth, *American Economic Review* **88**, 559–586.

Reindl, J., Stoughton, N. and Zechner, J. (2016) Market implied bankruptcy costs, unpublished working paper, WU-Vienna University of Economics and Business.

Rodano, G., Serrano-Velarde, N. and Tarantino, E. (2016) Bankruptcy law and bank financing, *Journal of Financial Economics* **120**, 363–382.

Thorburn, K. S. (2000) Bankruptcy auctions: costs, debt recovery, and firm survival, *Journal of Financial Economics* **58**, 337–368.

Wilner, B. (2000) The exploitation of relationships in financial distress: The case of trade credit, *Journal of Finance* **55**, 153–178.

Table 1: Summary Statistics by Country

This table reports summary statistics of key variables at the firm-year level, reported by country. *Default Probability* is a firm's probability of default using the method suggested by Bharath and Shumway (2008), who estimate an approximation of the Merton (1974) model. *Debt Enforcement* is a country-specific index of the enforcement of debt contracts based on survey data in Djankov et al. (2008). We follow Favara et al. (2012, 2016) and calculate the index as the average of 16 individual binary indicators that each take values of 0 or 1. The resulting index variable ranges between 0 (weaker debt enforcement) and 1 (stronger debt enforcement). *Trade Credit* is a firm's accounts payable over assets. *Sales/Assets* is a firm's total sales over assets. The sample consists of publicly listed firms from 40 countries between 2002 and 2016. Variable definitions are provided in Appendix Table 1.

	Debt Enforcement		Default Probability		Trade Credit		Sales/Assets	
	Obs.	Mean	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Argentina	664	0.308	0.067	0.203	0.144	0.119	1.062	0.664
Australia	10706	1.000	0.102	0.220	0.114	0.150	0.820	0.904
Austria	777	0.667	0.079	0.210	0.109	0.088	1.086	0.552
Belgium	1290	0.615	0.065	0.186	0.148	0.115	1.066	0.705
Brazil	2781	0.417	0.162	0.294	0.089	0.098	0.839	0.604
Canada	15072	0.667	0.165	0.277	0.197	0.257	0.700	0.833
Chile	1393	0.000	0.030	0.137	0.085	0.080	0.783	0.591
China	24786	0.000	0.050	0.164	0.098	0.086	0.683	0.526
Denmark	1415	0.500	0.076	0.200	0.098	0.069	1.110	0.623
Finland	1563	0.692	0.053	0.162	0.099	0.094	1.266	0.585
France	8432	0.455	0.063	0.180	0.158	0.119	1.082	0.625
Germany	6567	0.455	0.071	0.191	0.108	0.097	1.219	0.739
Greece	3202	0.417	0.208	0.319	0.130	0.114	0.710	0.604
Hong Kong	9390	1.000	0.099	0.217	0.094	0.112	0.776	0.749
Hungary	295	0.667	0.103	0.231	0.150	0.120	0.976	0.540
Ireland	639	0.615	0.074	0.197	0.121	0.111	0.993	0.799
Israel	3476	0.556	0.113	0.259	0.129	0.121	0.905	0.634
Italy	2644	0.231	0.111	0.253	0.178	0.115	0.804	0.435
Japan	41747	0.538	0.066	0.183	0.148	0.116	1.214	0.660
Korea, Rep.	16735	0.538	0.102	0.218	0.100	0.086	0.971	0.550
Malaysia	9754	0.583	0.101	0.218	0.092	0.093	0.751	0.550
Mexico	1107	0.273	0.065	0.199	0.099	0.088	0.819	0.480
Netherlands	1741	0.250	0.057	0.179	0.115	0.088	1.243	0.809
New Zealand	1191	1.000	0.043	0.152	0.107	0.119	1.115	0.893
Norway	1782	0.385	0.126	0.262	0.085	0.089	0.815	0.652
Peru	914	0.538	0.100	0.251	0.084	0.080	0.791	0.537
Philippines	1289	0.538	0.104	0.237	0.082	0.099	0.585	0.537
Poland	3218	0.417	0.083	0.212	0.176	0.149	1.191	0.786
Portugal	651	0.538	0.201	0.316	0.125	0.096	0.736	0.460
Russia	1592	0.250	0.140	0.284	0.105	0.127	0.893	0.631
Singapore	6258	1.000	0.104	0.216	0.131	0.121	0.934	0.702
South Africa	2920	0.455	0.084	0.211	0.166	0.140	1.369	0.904
Spain	1425	0.462	0.069	0.203	0.144	0.102	0.755	0.428
Sweden	3628	0.667	0.081	0.201	0.107	0.093	1.177	0.772
Switzerland	3577	0.538	0.040	0.150	0.092	0.069	1.015	0.603
Taiwan	15628	0.538	0.051	0.165	0.114	0.095	0.932	0.612
Thailand	4695	0.692	0.060	0.175	0.100	0.094	1.014	0.684
Turkey	2826	0.692	0.062	0.188	0.140	0.135	0.957	0.664
United Kingdom	16162	1.000	0.061	0.185	0.118	0.127	1.029	0.825
United States	36446	0.417	0.059	0.175	0.082	0.086	1.055	0.785
Total	270378	0.542	0.080	0.204	0.119	0.124	0.970	0.719

Table 2: Summary Statistics of Firm Characteristics

This table reports summary statistics at the firm-year level. The sample consists of publicly listed firms from 40 countries between 2002 and 2016. Variable definitions are provided in Appendix Table 1.

	Obs.	Mean	Total Std. Dev.	Between-Firm Std. Dev.	Within-Firm Std. Dev.	25%	Median	75%
Trade Credit	282131	0.120	0.124	0.126	0.062	0.042	0.087	0.158
Sales/Assets	290082	0.969	0.715	0.702	0.284	0.486	0.839	1.272
Default Probability	290238	0.085	0.212	0.157	0.172	0.000	0.000	0.014
Debt Enforcement	270378	0.542	0.265	0.272	0.000	0.417	0.538	0.667
Log(Sales)	284829	4.827	2.34	2.493	0.609	3.502	4.809	6.236
EBIDTA/Assets	283293	0.038	0.317	0.380	0.202	0.034	0.085	0.137
Total Debt/Assets	290151	0.269	0.251	0.246	0.144	0.096	0.228	0.374
Intangibles/Assets	285807	0.098	0.163	0.161	0.068	0.001	0.019	0.115
Capex/Assets	281087	0.053	0.067	0.062	0.046	0.013	0.032	0.066
GDP Growth	290193	0.033	0.034	0.026	0.021	0.016	0.027	0.053
Log(GDP per Capita)	290193	9.965	1.107	1.073	0.117	9.340	10.575	10.740
Creditor Rights	270378	2.074	1.019	1.067	0.000	1.000	2.000	3.000

Table 3: Debt Enforcement and Trade Credit

This table presents different fixed-effects regressions that explain trade credit, measured as accounts payable over assets. The sample consists of publicly listed firms from 40 countries between 2002 and 2016. *Default Probability* is a firm's probability of default using the method suggested by Bharath and Shumway (2008), who estimate an approximation of the Merton (1974) model. *Debt Enforcement* is a country-specific index of the enforcement of debt contracts based on survey data in Djankov et al. (2008). We follow Favara et al. (2012, 2016) and calculate the index as the average of 16 individual binary indicators that each take values of 0 or 1. The resulting index variable ranges between 0 (weaker debt enforcement) and 1 (stronger debt enforcement). Standard errors, reported in brackets, are clustered at the country level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are provided in Appendix Table 1.

Dependent Variable:	Trade Credit						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Default Probability * Debt Enforcement	0.046**		0.048*		0.029**	0.043**	
	(0.022)		(0.026)		(0.012)	(0.021)	
Top Tercile Default Probability * Debt Enforcement		0.019***		0.019***			0.009**
		(0.006)		(0.007)			(0.003)
Bottom Tercile Default Probability * Debt Enforcement		-0.005		-0.003			0.001
		(0.005)		(0.005)			(0.001)
Default Probability	0.014		0.015		-0.009	-0.003	
	(0.012)		(0.012)		(0.008)	(0.010)	
Top Tercile Default Probability		0.004		0.005			-0.003*
		(0.003)		(0.004)			(0.002)
Bottom Tercile Default Probability		-0.006		-0.007			0.001
		(0.004)		(0.004)			(0.001)
Log(Sales)	0.007***	0.008***	0.008***	0.009***	0.010***	0.010***	0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
EBIDTA/Assets	-0.111***	-0.111***	-0.114***	-0.113***	-0.073***	-0.073***	-0.073***
	(0.012)	(0.012)	(0.013)	(0.013)	(0.006)	(0.006)	(0.006)
Total Debt/Assets	-0.026	-0.030	-0.027	-0.031	0.008	0.007	0.010
	(0.019)	(0.024)	(0.021)	(0.025)	(0.016)	(0.016)	(0.017)
Intangibles/Assets	-0.083***	-0.083***	-0.074***	-0.075***	-0.087***	-0.087***	-0.087***
	(0.009)	(0.009)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Capex/Assets	-0.107***	-0.108***	-0.133***	-0.133***	-0.016*	-0.015*	-0.016*
	(0.030)	(0.029)	(0.036)	(0.035)	(0.009)	(0.009)	(0.009)
GDP Growth	0.082***	0.086***			0.060**	0.063**	0.056**
	(0.029)	(0.029)			(0.026)	(0.027)	(0.026)
Log(GDP per Capita)	0.017***	0.016**			0.013	0.013	0.013
	(0.006)	(0.006)			(0.009)	(0.009)	(0.009)
Default Probability * Creditor Rights						-0.007	
						(0.006)	
Country-by-Industry Fixed Effects	Yes	Yes	No	No	No	No	No
Country-by-Year Fixed Effects	No	No	Yes	Yes	No	No	No
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	No	No	No	No	Yes	Yes	Yes
Obs.	245334	245334	245334	245334	245334	245334	245334
Adj. R-sq.	0.089	0.090	0.127	0.129	0.083	0.083	0.082

Table 4: Debt Enforcement and Customer Sales

This table presents different fixed-effects regressions that explain customer sales, measured as sales over assets. The sample consists of publicly listed firms from 40 countries between 2002 and 2016. *Default Probability* is a firm's probability of default using the method suggested by Bharath and Shumway (2008), who estimate an approximation of the Merton (1974) model. *Debt Enforcement* is a country-specific index of the enforcement of debt contracts based on survey data in Djankov et al. (2008). We follow Favara et al. (2012, 2016) and calculate the index as the average of 16 individual binary indicators that each take values of 0 or 1. The resulting index variable ranges between 0 (weaker debt enforcement) and 1 (stronger debt enforcement). We report results in Columns (8) and (9) only for single-industry firms. These are firms that operate either in only one segment or in two segments but the second segment has less than 20% of the revenues of the first segment. Standard errors, reported in brackets, are clustered at the country level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are provided in Appendix Table 1.

Dependent Variable:	Sales/Assets								
								Single-Industry Firms Only	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Default Probability * Debt Enforcement	0.186**		0.184*		0.155***	0.233***		0.153**	
	(0.091)		(0.101)		(0.053)	(0.061)		(0.057)	
Top Tercile Default Probability * Debt Enforcement		0.084***		0.089***			0.059***		0.067***
		(0.024)		(0.028)			(0.018)		(0.021)
Bottom Tercile Default Probability * Debt Enforcement		-0.051		-0.046			-0.016		-0.006
		(0.036)		(0.036)			(0.014)		(0.013)
Default Probability	0.022		0.027		-0.098***	-0.066*		-0.106***	
	(0.073)		(0.072)		(0.033)	(0.036)		(0.031)	
Top Tercile Default Probability		0.023		0.024			-0.036***		-0.047***
		(0.023)		(0.024)			(0.011)		(0.013)
Bottom Tercile Default Probability		-0.008		-0.013			0.030***		0.030***
		(0.020)		(0.020)			(0.008)		(0.007)
Log(Sales)	0.078***	0.080***	0.081***	0.084***	0.176***	0.176***	0.176***	0.170***	0.170***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.011)	(0.011)	(0.017)	(0.017)
EBIDTA/Assets	-0.070	-0.066	-0.071	-0.067	-0.109***	-0.109***	-0.109***	-0.093***	-0.093***
	(0.047)	(0.048)	(0.049)	(0.050)	(0.026)	(0.026)	(0.026)	(0.025)	(0.025)
Total Debt/Assets	-0.220***	-0.258***	-0.207***	-0.248***	-0.052	-0.052	-0.038	0.097	0.110
	(0.051)	(0.062)	(0.053)	(0.065)	(0.061)	(0.060)	(0.062)	(0.076)	(0.075)
Intangibles/Assets	-0.706***	-0.706***	-0.656***	-0.656***	-0.857***	-0.856***	-0.853***	-0.816***	-0.812***
	(0.033)	(0.033)	(0.042)	(0.041)	(0.057)	(0.057)	(0.057)	(0.062)	(0.063)
Capex/Assets	-0.476***	-0.470***	-0.654***	-0.647***	0.073*	0.074**	0.070*	0.021	0.018
	(0.116)	(0.117)	(0.142)	(0.142)	(0.036)	(0.036)	(0.037)	(0.049)	(0.049)
GDP Growth	0.415*	0.473**			0.495**	0.507**	0.485**	0.401**	0.361*
	(0.220)	(0.225)			(0.213)	(0.218)	(0.219)	(0.190)	(0.189)
Log(GDP per Capita)	-0.034	-0.040			-0.164**	-0.163**	-0.164**	-0.204***	-0.203***
	(0.053)	(0.054)			(0.069)	(0.069)	(0.069)	(0.051)	(0.050)
Default Probability * Creditor Rights						-0.035*			
						(0.019)			
Country-by-Industry Fixed Effects	Yes	Yes	No	No	No	No	No	No	No
Country-by-Year Fixed Effects	No	No	Yes	Yes	No	No	No	No	No
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Obs.	251623	251623	251623	251623	251623	251623	251623	68484	68484
Adj. R-sq.	0.084	0.086	0.212	0.214	0.158	0.159	0.159	0.160	0.162

Table 5: Effects of Debt Enforcement: Heterogeneity across Firms

This table presents different fixed-effects regressions that explain trade credit, measured as accounts payable over asset, and customer sales, measured as sales over assets. The sample consists of publicly listed firms from 40 countries between 2002 and 2016. In Columns (1) through (4) we separate the sample based on whether a firm is located in a bank-based or market-based country. We consider a country as bank-based (market-based) if that country's ratio of bank credit to total private sector funding is above (below) the sample median in a given year. In Columns (5) through (8) we separate the sample based on whether a firm has high or low asset tangibility. We consider a firm to have high (low) asset tangibility if the ratio of tangible assets over total asset is above (below) the sample median in a given year. Tangible assets are all assets of a firm except for intangible assets. In Columns (9) through (12) we separate the sample based on whether a firm is operating in an industry with high or low external financial dependence. As in Rajan and Zingales (1998), we consider an industry to have a high (low) external financial dependence if that industry's ratio of capital expenditures minus operating cash flow divided by capital expenditures is above (below) the sample median in a given year. We estimate this measure using data from the United States, and then apply the resulting industry classification to the industries in all other countries in the sample. Following Rajan and Zingales (1998), we exclude firms from the United States in the regressions below. *Default Probability* is a firm's probability of default using the method suggested by Bharath and Shumway (2008), who estimate an approximation of the Merton (1974) model. *Debt Enforcement* is a country-specific index of the enforcement of debt contracts based on survey data in Djankov et al. (2008). We follow Favara et al. (2012, 2016) and calculate the index as the average of 16 individual binary indicators that each take values of 0 or 1. The resulting index variable ranges between 0 (weaker debt enforcement) and 1 (stronger debt enforcement). Standard errors, reported in brackets, are clustered at the country level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are provided in Appendix Table 1.

Dependent Variable:	Trade Credit		Sales/Assets		Trade Credit		Sales/Assets		Trade Credit		Sales/Assets	
	Financial System		Financial System		Tangibility		Tangibility		External Financial Dependence		External Financial Dependence	
	Bank-Based	Market-Based	Bank-Based	Market-Based	High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Default Probability * Debt Enforcement	0.065*	0.034	0.303*	0.136	0.064**	0.025	0.228**	0.128	0.035*	0.047*	0.173*	0.297**
	(0.033)	(0.023)	(0.166)	(0.087)	(0.028)	(0.019)	(0.110)	(0.095)	(0.018)	(0.025)	(0.094)	(0.114)
Default Probability	0.003	0.024**	-0.078	0.107	0.004	0.026***	-0.054	0.112	0.021*	0.010	-0.002	-0.098
	(0.018)	(0.010)	(0.094)	(0.105)	(0.016)	(0.009)	(0.076)	(0.080)	(0.010)	(0.015)	(0.057)	(0.080)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-by-Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-by-Year Fixed Effects	No	No	No	No	No	No	No	No	No	No	No	No
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	No	No	No	No	No	No	No	No	No	No	No	No
Obs.	119881	107156	123831	109250	113887	131447	118158	133465	98788	110312	101000	114347
Adj. R-sq.	0.092	0.090	0.077	0.090	0.102	0.076	0.091	0.098	0.088	0.097	0.075	0.101

Table 6: Trade Credit and Customer Sales: Overall Effects of the 2005 U.S. Bankruptcy Reform

This table presents different firm-fixed-effects regressions that explain in Columns (1) through (3) trade credit, measured as accounts payable over assets, and in Columns (4) through (6) customer sales, measured as sales over assets. *Post Reform* is a dummy variable that takes the value one for the years after 2005, and zero otherwise. *Default Probability* is a firm's probability of default using the method suggested by Bharath and Shumway (2008), who estimate an approximation of the Merton (1974) model. The sample consists of publicly listed firms from the United States. We provide regressions for different event windows around the 2005 U.S. bankruptcy reform. Standard errors, reported in brackets, are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are provided in Appendix Table 1.

Dependent Variable:	Trade Credit			Sales/Assets		
Event Window:	2003−2007	2004−2006	2004−2006	2003−2007	2004−2006	2004−2006
	(1)	(2)	(3)	(4)	(5)	(6)
Default Probability * Post Reform	0.016*	0.022**		0.228***	0.189***	
	(0.009)	(0.010)		(0.061)	(0.071)	
Top Tercile Default Probability * Post Reform			0.008**			0.055***
			(0.003)			(0.018)
Bottom Tercile Default Probability * Post Reform			0.001			-0.009
			(0.001)			(0.010)
Default Probability	-0.003	0.005		-0.080**	0.043	
	(0.006)	(0.007)		(0.035)	(0.060)	
Top Tercile Default Probability			-0.003			0.016
			(0.002)			(0.012)
Bottom Tercile Default Probability			0.001			0.035***
			(0.001)			(0.009)
Post Reform	-0.001	-0.001*	-0.003**	-0.000	0.003	0.004
	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)	(0.009)
Log(Sales)	0.011***	0.010***	0.010***	0.137***	0.160***	0.161***
	(0.002)	(0.002)	(0.002)	(0.012)	(0.023)	(0.023)
EBIDTA/Assets	-0.080***	-0.075***	-0.075***	0.109**	0.034	0.033
	(0.009)	(0.012)	(0.012)	(0.042)	(0.055)	(0.055)
Total Debt/Assets	-0.006	0.001	0.004	-0.047	-0.088	-0.072
	(0.007)	(0.009)	(0.010)	(0.037)	(0.056)	(0.057)
Intangibles/Assets	-0.043***	-0.033***	-0.032***	-0.757***	-0.590***	-0.571***
	(0.008)	(0.012)	(0.012)	(0.059)	(0.076)	(0.076)
Capex/Assets	0.029**	0.038**	0.037**	0.002	0.078	0.089
	(0.013)	(0.018)	(0.018)	(0.081)	(0.104)	(0.104)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	13593	8078	8078	13597	8080	8080
Adj. R-sq.	0.084	0.099	0.098	0.122	0.113	0.117

Table 7: Trade Credit and Customer Sales: Industry Effects of the 2005 U.S. Bankruptcy Reform

This table presents different firm-fixed-effects regressions that explain in Columns (1) and (2) trade credit, measured as accounts payable over assets, and in Columns (3) and (4) customer sales, measured as sales over assets. In Columns (1) and (2), we compare firms in industries that use less versus more standardized inputs based on data from the Bureau of Economic Analysis (BEA) input-output tables. An industry is considered to rely less (more) on standardized inputs if the share of inputs that comes from industries producing standardized products is less (more) than the U.S. industry median of 9%. In Columns (3) and (4), we compare firms in industries that offer more versus less product warranties to their customers based on the classifications in Kale et al. (2013). An industry is considered to offer more (less) warranty services if the percentage of warranty-offering firms in that industry is above (below) the U.S. industry median of 5%. *Post Reform* is a dummy variable that takes the value one for the years after 2005, and zero otherwise. *Default Probability* is a firm's probability of default using the method suggested by Bharath and Shumway (2008), who estimate an approximation of the Merton (1974) model. The sample consists of publicly listed firms from the United States. We provide regressions for different event windows around the 2005 U.S. bankruptcy reform. Standard errors, reported in brackets, are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are provided in Appendix Table 1.

Dependent Variable:	Trade Credit		Sales/Assets	
Industry:	Less Standardized Inputs	More Standardized Inputs	More Product Warranties	Less Product Warranties
Event Window:	2004−2006	2004−2006	2004−2006	2004−2006
	(1)	(2)	(3)	(4)
Default Probability * Post Reform	0.035**	0.007	0.274***	0.152
	(0.014)	(0.015)	(0.100)	(0.093)
Default Probability	0.003	0.011	0.063	0.021
	(0.009)	(0.012)	(0.067)	(0.094)
Post Reform	-0.003**	-0.000	-0.009	0.002
	(0.001)	(0.001)	(0.008)	(0.007)
Log(Sales)	0.015***	0.009***	0.316***	0.128***
	(0.005)	(0.002)	(0.038)	(0.021)
EBIDTA/Assets	-0.074***	-0.075***	-0.130**	0.103
	(0.014)	(0.018)	(0.063)	(0.077)
Total Debt/Assets	-0.008	0.006	-0.391***	0.039
	(0.012)	(0.013)	(0.088)	(0.067)
Intangibles/Assets	-0.027**	-0.040*	-0.706***	-0.570***
	(0.014)	(0.022)	(0.109)	(0.100)
Capex/Assets	0.024	0.047**	-0.007	0.084
	(0.034)	(0.023)	(0.139)	(0.128)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Obs.	4046	3960	3302	4778
Adj. R-sq.	0.088	0.115	0.184	0.102

Table 8: Trade Credit and Customer Sales: Effects of Bankruptcy Reform in Germany and Brazil

This table presents different firm-fixed-effects regressions that explain trade credit, measured as accounts payable over assets, and customer sales, measured as sales over assets. *Post Reform* is a dummy variable that takes for the German (Brazilian) sample the value one for the years after 2012 (2005), and zero otherwise. *Default Probability* is a firm's probability of default using the method suggested by Bharath and Shumway (2008), who estimate an approximation of the Merton (1974) model. The sample consists of publicly listed firms from the Germany (Columns (1) through (4)) and Brazil (Columns (5) through (8)). We provide regressions for different event windows around the bankruptcy reforms. Standard errors, reported in brackets, are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are provided in Appendix Table 1.

	Germany (Reform in 2012)				Brazil (Reform in 2005)			
Dependent Variable:	Trade Credit		Sales/Assets		Trade Credit		Sales/Assets	
Event Window:	2010−2014	2011−2013	2010−2014	2011−2013	2003−2007	2004−2006	2003−2007	2004−2006
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Default Probability * Post Reform	0.042*	0.053**	0.335***	0.322***	0.004	-0.008	0.035	0.044
	(0.022)	(0.026)	(0.121)	(0.104)	(0.017)	(0.018)	(0.046)	(0.060)
Default Probability	-0.012	0.000	-0.095	-0.058	0.006	0.009	0.003	0.004
	(0.008)	(0.017)	(0.059)	(0.105)	(0.009)	(0.015)	(0.027)	(0.053)
Post Reform	0.002	-0.001	0.016	0.019	-0.003	0.001	-0.156***	-0.107***
	(0.003)	(0.003)	(0.013)	(0.012)	(0.005)	(0.005)	(0.024)	(0.021)
Log(Sales)	0.008	0.025*	0.362***	0.387***	0.014	0.017	0.236***	0.250***
	(0.008)	(0.015)	(0.062)	(0.065)	(0.009)	(0.020)	(0.041)	(0.072)
EBIDTA/Assets	-0.051***	-0.075***	-0.028	-0.134	-0.005	-0.008	0.308***	0.326**
	(0.015)	(0.021)	(0.098)	(0.086)	(0.015)	(0.030)	(0.106)	(0.162)
Total Debt/Assets	-0.011	-0.088**	0.072	-0.258*	0.002	-0.041	-0.029	-0.226**
	(0.028)	(0.037)	(0.144)	(0.143)	(0.017)	(0.036)	(0.147)	(0.105)
Intangibles/Assets	-0.084**	-0.068	-0.534	-0.344	-0.028	-0.053	-0.448***	-0.414
	(0.036)	(0.051)	(0.368)	(0.487)	(0.023)	(0.075)	(0.113)	(0.295)
Capex/Assets	-0.064	0.013	-0.189	0.263	0.002	-0.062	-0.003	0.193
	(0.048)	(0.047)	(0.212)	(0.258)	(0.047)	(0.055)	(0.174)	(0.162)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2162	1306	2205	1335	772	471	774	472
Adj. R-sq.	0.048	0.102	0.219	0.220	0.013	0.032	0.336	0.348

Appendix Table 1: Variable Definitions

This table presents definitions of the variables used in the empirical analysis.

Variable	Definition	Data Source
Trade Credit	Accounts payable over assets. This variable is winsorized at 1-99%.	Worldscope / Compustat
Sales/Assets	Sales over assets. This variable is winsorized at 1-99%.	Worldscope / Compustat
Default Probability	Probability of default using the method suggested by Bharath and Shumway (2008), who estimate an approximation of the Merton (1974) model.	Worldscope / Compustat
Debt Enforcement	Country-specific index of the enforcement of debt contracts based on survey data in Djankov et al. (2008). We follow Favara et al. (2012, 2016) and calculate the index as the average of 16 individual binary indicators that each take values of 0 or 1. The resulting index variable ranges between 0 (weaker debt enforcement) and 1 (stronger debt enforcement). Details are provided in Appendix B.	Djankov et al. (2008)
Sales	Sales measured in 2010 USD.	Worldscope / Compustat
Post Reform	When studying the U.S. bankruptcy reform, this is a dummy variable that takes the value 1 for years after 2005, and 0 otherwise. When studying the German (Brazilian) bankruptcy reform, this is a dummy variable that takes the value 1 for years after 2012 (2005), and 0 otherwise.	
EBIDTA/Assets	Earnings before interest, depreciation, taxes and amortization over assets. This variable is winsorized at 1-99%.	Worldscope / Compustat
Total Debt/Assets	Total debt of a firm over assets. This variable is winsorized at 1-99%.	Worldscope / Compustat
Intangibles/Assets	Intangible assets of assets. This variable is winsorized at 1-99%.	Worldscope / Compustat
Capex/Assets	Capital expenditures over assets. This variable is winsorized at 1-99%.	Worldscope
GDP Growth	Growth rate of a country's annual gross domestic product.	World Bank
GDP per Capita	Annual gross domestic product per capita in a country, measured in 2010 USD.	World Bank
Creditor Rights	Country-specific index of creditor rights based on data in La Porta et al. (1998). This variable ranges between 0 (weaker creditor rights) and 4 (stronger creditor rights).	La Porta et al. (1998)

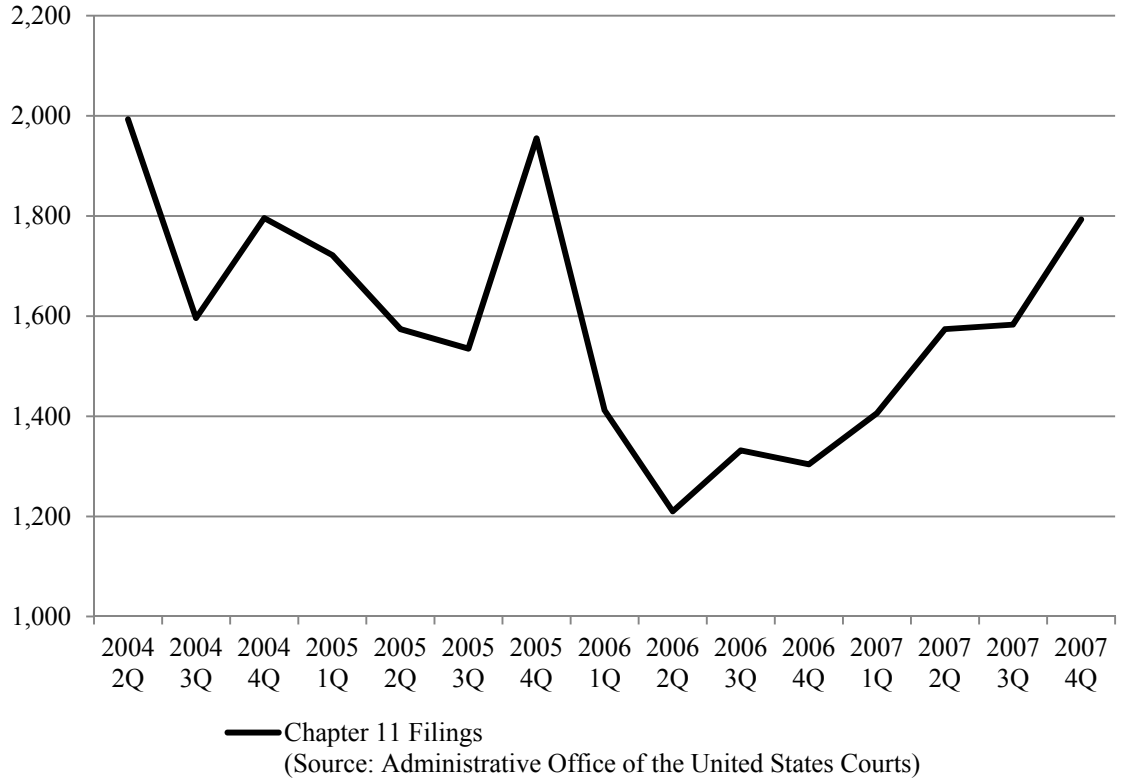
Appendix Table 2: Correlations

This table presents correlations of the variables used in the empirical analysis. The sample consists of publicly listed firms from 40 countries between 2002 and 2016. All correlations are statistically significant at the 1% level.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Debt Enforcement	(1)	1										
Creditor Rights	(2)	0.51	1									
Default Probability	(3)	0.04	-0.01	1								
Trade Credit	(4)	0.05	-0.04	0.11	1							
Sales/Assets	(5)	0.04	-0.01	-0.04	0.39	1						
Log(Sales)	(6)	-0.17	-0.12	-0.13	0.02	0.27	1					
EBIDTA/Assets	(7)	-0.1	-0.01	-0.17	-0.29	0.11	0.36	1				
Total Debt/Assets	(8)	-0.02	-0.04	0.39	0.15	-0.08	-0.03	-0.31	1			
Intangibles/Assets	(9)	0.1	-0.04	-0.04	-0.11	-0.06	0.07	0	-0.01	1		
PPE/Assets	(10)	0.03	-0.04	0.04	-0.02	-0.1	-0.05	-0.1	0.12	-0.13	1	
GDP Growth	(11)	-0.3	0.12	-0.11	-0.03	-0.1	-0.11	0.05	0.02	-0.14	0.01	1
Log(GDP per Capita)	(12)	0.5	-0.07	-0.04	0.01	0.1	0.15	-0.09	-0.06	0.22	-0.02	-0.64

Appendix Figure 1: Chapter 11 Filings around the U.S. Bankruptcy Reform

This table provides summary statistics on the number of bankruptcy filings around the 2005 U.S. Bankruptcy Reform.



(Source: Administrative Office of the United States Courts)