Indirect Bankruptcy Costs and Bankruptcy Law

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November 2013

Abstract

We use a simple model to predict how creditor rights in bankruptcy affect the accumulation and magnitude of indirect bankruptcy costs. We empirically identify these effects by using two matched samples of bankrupt firms, which provide us with variation in creditor rights. Consistent with our model, we find that, if creditor rights are stronger, indirect bankruptcy costs are lower and accumulate more slowly prior to bankruptcy. Our results are important, as the speed of cost accumulation also affects firms that eventually avoid bankruptcy.

JEL Classification: G33, K22.

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Electronic copy available at: http://ssrn.com/abstract=1101696

1 Introduction

One of the biggest challenges of a firm in financial distress is to persuade its customers, employees, suppliers, and trade creditors to continue doing business with it. As bankruptcy becomes more likely, these stakeholders start abandoning the firm, as they fear that their claims will be stopped or renegotiated down if the firm files for bankruptcy. The result is a further deterioration in operating performance and shareholder value. These costs are known as indirect bankruptcy costs (e.g., Altman, 1984; Opler and Titman, 1994; Bris et al., 2006; Almeida and Philippon, 2007; Hortacsu et al., 2013). While direct bankruptcy costs, such as legal fees and administrative expenses, have been studied extensively in the literature, much less is known about indirect bankruptcy costs, especially about their accumulation over time and their determinants.[1]

Our paper provides an analysis of the effects of creditor rights in bankruptcy on indirect bankruptcy costs.[2] In contrast to previous studies, we do *not* attempt to quantify the magnitude of indirect bankruptcy costs, but we focus on the speed of accumulation. Since indirect bankruptcy costs are often irreversible, the speed of accumulation is of first-order importance for firms that seek to avoid bankruptcy.[3]

We first develop a model that guides our empirical analysis. It shows that workouts are more, and bankruptcies less, likely when creditor rights are stronger. The model rests on the idea that the expected proceeds from bankruptcy constitute the outside option to shareholders and creditors when negotiating a workout. Stronger creditor rights induce shareholders to become more willing to reach a workout agreement since they know that

[1] Direct bankruptcy costs have been calculated to range between 1 and 10% of a company's value (e.g., Warner, 1977; Ang et al., 1982; Weiss, 1990; Bris et al., 2006; Thorburn, 2000). Indirect bankruptcy costs have been estimated to vary between 10 and 20% of firm value given default (e.g. Andrade and Kaplan, 1998; Bris et al., 2006). More recently, bankruptcy costs have also been estimated for top executives (Eckbo et al., 2012). For a recent survey, see Altman and Hotchkiss (2006).

[2] With "creditor rights," we refer to the rights defining a creditor's bargaining position in bankruptcy.

[3] Anecdotal evidence is abundant. In a 2009 conference call Ray Young, then CFO of GM, spoke of the irreversible loss to GM shareholders, caused by the loss of customers to competitors due to fears of a potential bankruptcy filing. Clearly, the problem is more severe the earlier such costs accumulate.

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their bargaining power is weaker once the firm is in bankruptcy. Hence, for the same probability of default, the probability of entering bankruptcy becomes lower. This has implications for how indirect bankruptcy costs accumulate before bankruptcy. Specifically, since the chances for a workout are greater at any point prior to bankruptcy if creditor rights are stronger, indirect bankruptcy costs accumulate more slowly and only once bankruptcy becomes inevitable.

The main contribution of our paper lies in the empirical identification of this effect, which is complicated by several factors. First, indirect bankruptcy costs and creditor rights may be endogenously determined, making it difficult to identify the causal effect. Second, indirect bankruptcy costs are generally not observable and, therefore, are difficult to measure. Third, the intuitive approach of inferring indirect bankruptcy costs by studying whether workouts are more likely in a country with more-creditor-friendly bankruptcy law is likely to be biased. Workouts are often not made public, and different countries have different contractual, disclosure, and workout practices.

We empirically identify the effects of creditor rights by using two samples of bankrupt firms that provide us with largely exogenous variation in creditor rights.[4] The first sample identifies the effects of creditor rights by comparing matched firms from two bankruptcy regimes: Germany (relatively higher creditor rights) and the U.S. (relatively lower creditor rights). Naturally, the challenge is to find "similar" firms from different countries. German firms may, for example, use more bank debt, which may be easier to renegotiate than public debt. This problem is mitigated in the second sample, which compares matched firms from the same country—the U.S.—but from a period with relatively higher (after the bankruptcy reform of 2005) and relatively lower (before the reform) creditor rights. This approach is similar to that of Vig (2013), who exploits a legal reform in India to obtain variation in creditor rights within one country. We match firms so as to isolate

[4] Conditioning on bankruptcy is similar to the approaches in Davydenko et al. (2012) and Maksimovic and Phillips (1998).

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the effects of creditor rights by accounting for other factors that affect the bankruptcy probability.[5] Indeed, we show that the eventual shareholder losses and the emergence rates from bankruptcy are comparable across matched firms, suggesting that they are similar not only before, but also at, the filing date.

We start by comparing how shareholder losses accumulate in the year preceding a bankruptcy filing. Our model predicts that shareholders *initially* lose less in creditor-friendly regimes, as indirect bankruptcy costs accumulate only at a later point in time, when the bankruptcy probability is higher. Consistent with this prediction, we find that stock return losses accumulate more slowly in the year leading to a bankruptcy filing when creditor rights are stronger. We identify this effect by comparing firms that are matched on the same default probability one year prior to bankruptcy.[6] As we find this effect for both samples, it is unlikely that our results are driven by confounding country-level factors. This effect of creditor rights is concentrated among industries that are more likely to suffer from indirect bankruptcy costs.

We then test a number of cross-sectional predictions relating creditor rights and indirect bankruptcy costs. First, our model predicts that if workouts are, indeed, less costly, firms that face higher workout expectations for a given default probability should disappoint the stock market more by eventually failing to implement a workout. Hence, such firms should see lower (i.e., more negative) stock returns once they file for bankruptcy, even after controlling for the same probability of default. Our tests support this prediction.

Second, we look at a specific source of indirect bankruptcy costs: suppliers' willing-

[5] We match firms on their ex-ante default probabilities, industry, and total assets. We match on default probabilities, as the essence of our model is that the likelihood of workouts and indirect bankruptcy costs differ depending on creditor rights, even after controlling for the default probability prior to bankruptcy. We match on default probabilities also because firms may file for strategic reasons and may enter bankruptcy in relatively better shape (Giammarino, 1989; Povel, 1999; Favara et al., 2012).

[6] As we do not estimate the magnitude of indirect bankruptcy costs from stock returns, we circumvent the problem that poor stock return performance could also be driven by the factors that trigger financial distress in the first place (Andrade and Kaplan, 1998). Note, also, that even if the "intrinsic quality" of bankrupt firms in the two samples and the magnitude of their losses were different, this would not explain why the *speed* of accumulation of these losses differs.

ness to continue doing business with a distressed firm. We show that, since the 2005 U.S. bankruptcy reform, suppliers have been more willing to provide trade credit prior to bankruptcy. This corroborates that the differences in stock return deteriorations reflect differences in indirect bankruptcy costs.

Third, we ask whether the incurred indirect costs are so high that the management is potentially more interested in restructuring debt down in default rather than avoiding additional indirect costs.[7] We predict that this case is more likely if creditor rights are weak. First, if creditor rights are weak, a financially distressed firm will incur indirect costs already early, as the probability that it enters bankruptcy, as opposed to restructuring debt out of court, is higher. This implies that the potential *additional* indirect costs (which the firm can still incur as a consequence of a higher default probability) are lower. Second, the benefit to shareholders from restructuring debt down in default is higher if creditor rights are weaker.

To analyze this question, we look at the effect of changes in the default probability, measured one year before bankruptcy, on the stock returns leading up to a bankruptcy filing. Our model predicts that an increase in this probability has a negative effect if defaulting (and restructuring debt down) is more attractive than avoiding default and the associated additional costs. Otherwise, the effect is positive.[8] This allows us to test whether indirect costs are initially higher when creditor rights are weaker. We find cross-sectionally that the effect of an increase in the default probability is negative in the U.S. and positive in Germany. For the U.S. sample, the effect is negative in the period before, and positive in the period after, the reform. This supports our prediction that initially incurred bankruptcy costs are lower if creditor rights are stronger.

[7] Note that if shareholders prefer defaulting, it would be difficult to convince other stakeholders, such as trade creditors, to continue their relationship with the firm, which would trigger further indirect costs.

[8] Intuitively, if the initial stock price is lower (when the probility of default is higher), the subsequent fall in price upon bankruptcy is smaller, making the return in this period less negative (e.g., -85 percent rather than -90 percent). Thus, the effect of the probability of default on the stock return is poitive. The opposite holds if the initial stock price is higher.

One concern with our bankruptcy sample is that firms self-select whether to undergo a restructuring in a workout or through bankruptcy. To address this concern, we collect data on firms that undergo out-of-court restructurings to create a sample containing both workout and bankrupt firms (these data are available for U.S. firms only). We show that our results are robust once we account for a potential self-selection.

Our contribution to the literature is threefold. First, we propose a way to infer the effect of creditor rights on indirect bankruptcy costs. Second, we show that differences in creditor rights cause indirect bankruptcy costs to accumulate at different speeds. In contrast to previous studies, we do not measure the magnitude of indirect bankruptcy costs but, rather, how their impact depends on bankruptcy regimes. Third, our finding that indirect bankruptcy costs accumulate faster when creditor rights are weaker provides new evidence on the costs of more-debtor-friendly bankruptcy law. Thus, we add to the literature on international bankruptcy law, which has provided mixed evidence on the costs and benefits of creditor-friendly codes. There is evidence that stronger creditor rights improve bankruptcy judges' incentives to resolve financial distress efficiently (Gennaioli and Rossi, 2010); lead to higher recover rates (Davydenko and Franks, 2008); and result in higher firm efficiency and performance (Benmelech and Bergman, 2011; Nini et al., 2009, 2012). However, Acharya and Subramanian (2009) show that a creditor-friendly code can also lead to less innovation. Acharya et al. (2011) argue that creditor-friendly codes create less-inefficient going-concerns, but may cause inefficient liquidations. Similar evidence comes from Vig (2013). Hackbarth et al. (2013) and Favara et al. (2012) find that equity risk decreases when codes are more favorable to shareholders. We complement this discussion by emphasizing an important aspect of the cost-benefit analysis of creditor rights—the effect on indirect bankruptcy costs. More broadly, our paper is related to Bris et al. (2006) and Loranth and Franks (2013), who analyze bankruptcy costs in going-concerns and liquidations, and Davydenko et al. (2012) and Reindl et al. (2012) who infer

bankruptcy costs from market prices.[9]

The rest of the paper is organized as follows: Section 2 discusses key features of the U.S. and German bankruptcy codes. Section 3 develops a simple model to derive empirical predictions. Section 4 describes our data and identification strategy, and Section 5 presents the empirical results. Section 6 concludes.

2 Institutional Background

German bankruptcy law provides comparatively more rights to creditors than its U.S. counterpart. For example, U.S. bankruptcy law does not require formal filing reasons; shareholders remain in charge of the firm; and shareholders have the exclusive right to propose a reorganization plan for the first 120 days after the filing, a period that is, most often, extended considerably (see Bris et al., 2006). Moreover, there is an automatic stay on all creditor claims and in some cases even a violation of the rule of absolute priority (e.g., Franks et al., 1996; Bris et al., 2006; Davydenko and Franks, 2008). In contrast, under German bankruptcy law, a firm must be (imminently) insolvent, over-indebted, or both to file for bankruptcy. In practically all cases, control rights are taken away from shareholders and managers and given to an administrator appointed by the creditors or the court.[10] There exists an automatic stay of three months during which shareholders can propose a reorganization plan, and this period is rarely extended. A violation of the absolute priority rule is much less common than in the U.S. (Franks et al., 1996).[11] According to the creditor rights index of La Porta et al. (1998), Germany has a score of

[9] Rodano et al. (2013) study the effects of changes in Italian bankruptcy procedures.

[10] According to the German Federal Statistical Authority, debtor control ("Eigenverwaltung") has been allowed in only 0.6% of bankruptcies since 1999. A new law attempts to change this by making it easier to file under "imminent insolvency" and to pass a reorganization plan. This law came into effect in March 2012 and does not affect our sample.

[11] In Germany, a majority voting procedure can dilute the rights of dissenting creditors. Nevertheless, a reorganization plan requires approval of a majority of secured creditors in order to be passed by the court. See, however, Strömberg (2000) for a view that there can also be an effective violation of the APR under a creditor-friendly bankruptcy law.

three out of four (high creditor rights), while the U.S. has a score of only one (low creditor rights).

The 2005 U.S. bankruptcy reform, which is part of the Bankruptcy Abuse Prevention and Consumer Protection Act, provides us with an increase in U.S. creditor rights from before to after the reform. Important features affecting firms filing under Chapter 11 include a mandatory cap on a debtor's exclusive period to file a reorganization plan; an enhanced protection of trade creditors and utilities; and substantial curtailment of bankruptcy judges' discretion in dismissing or converting cases to Chapter 7 (Haines and Hendel, 2005; Miller, 2007). Further changes include a restriction on the use and size of management bonuses and severance payments, an extension of the fraudulent conveyance look-back period, and a reduction in the time that a debtor has to assume or reject leases. Despite these changes, creditor rights remain relatively weaker than in Germany.

Our model incorporates key features of the different bankruptcy procedures in a stylized way. In particular, it shows how an increase in creditor rights affects the probability of a workout. This has implications for how indirect costs accumulate and how one can test for their accumulation and magnitude.

3 Model and Hypotheses

3.1 Model

Our model has three time periods. We assume that the sole source of funding for a firm, owned by an owner-manager ("she"), is debt with outstanding payments D_1 in $t = 1$ and D_2 in $t = 2$. The debt has been provided by a creditor ("he") to fund a risky project at the initial date $t = 0$.[12] At $t = 1$, the project returns 0 with probability β_1, and $X_1 > D_1$ otherwise. At $t = 2$, it returns 0 with probability β_2, and X_2^θ otherwise, where $\beta_t \in [0, 1]$.

[12] Our focus on indirect bankrutpcy costs only 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 also need to endogenize D_t and the probability of default, which we take here as given.

It is without loss of generality to set $\beta_2 = 0$. However, X_2^θ depends on the state of nature $\theta = \{H, L\}$ with $X_2^H > X_2^L$. The ex-ante probability of $\theta = L$ is $q \in [0, 1]$. Cash flows are verifiable, so that the firm must repay its creditors if it has sufficient cash.

At $t = 0$, there is symmetric information. At $t = 1$, the owner-manager becomes privately informed about θ—i.e., whether the project returns X_2^H or X_2^L in the high-cash-flow state. All informational asymmetry is resolved at $t = 2$. Agents are risk-neutral and protected by limited liability, and there is no discounting.

Bankruptcy vs. Workout The owner-manager must repay D_1 in the high-cash-flow state at $t = 1$. In the low-cash-flow state, the firm either files for bankruptcy or $D := D_1 + D_2$ is restructured out of court in a workout. The first difference between these two alternatives is that bankruptcy is associated with bankruptcy costs K, which represent the sum of all direct and indirect costs of bankruptcy upon a filing. Crucially, the firm has already incurred parts of these costs $k \in [0, K]$ irreversibly between $t = 0$ and $t = 1$.[13] The second difference is that renegotiations in bankruptcy proceed under less information asymmetry (which could be the cause of part of the direct cost-component of K). To simplify exposition, we assume that bankruptcy is resolved under no information asymmetry (cf. discussion in the Appendix) and that firms attempt an out-of-court restructuring before filing for bankruptcy.

Creditor Rights in Bankruptcy To obtain an intuitive representation for creditor rights in bankruptcy, we introduce an additional time period $t = 1.5$ (e.g., Bebchuk and Chang, 1992). A firm in bankruptcy that has not reached a reorganization agreement until $t = 1.5$ incurs, with probability $(1 - \varepsilon)$, large additional costs (a negative shock) that wipe out the whole value of the firm. With a small probability ε, a positive shock occurs and firm value increases to Y, such that $Y > K + D$.[14] We also assume that waiting to reorganize

[13] It is straightforward to endogenize a deterioration in the operating performance (i.e., k) due to bankruptcy fears. For brevity, we do not do this explicitly, but we suggest how to test for k empirically.

[14] An example of a negative shock is that all employees leave the firm. A positive shock might be that the government decides to subsidize the firm to keep employment.

in bankruptcy until $t = 1.5$ is not socially optimal. We assume that the owner-manager can choose to wait to offer or accept a workout plan until $t = 1.5$ with probability ν. Hence, high (low) values of ν reflect low (high) creditor rights in bankruptcy. The ability of the owner-manager to "protract" negotiations reflects bankruptcy law features such as the automatic stay on creditor claims or the time available to debtors to propose a reorganization plan.

In what follows, we first show that the probability of a workout, which we denote by $\lambda \in [0, 1]$, endogenously depends on creditor rights in bankruptcy. We then show how to test whether early-incurred bankruptcy costs k are lower if the probability of a workout λ is higher.

3.2 Workouts and Indirect Bankruptcy Costs

To solve the bargaining game in a workout in the low-cash-flow state at $t = 1$, we first derive the expected payoffs of both parties at $t = 2$ following a bankruptcy filing. These payoffs are the "outside options" of both parties if they fail to reach a workout. We can differentiate between two cases in bankruptcy. If $X_2^\theta - K > D$, both parties prefer an immediate repayment of debt. On the contrary, if $X_2^\theta - K < D$, the owner-manager, in principle, receives nothing in bankruptcy. However, because the owner-manager can wait to offer or accept a bankruptcy plan until $t = 1.5$, which is beneficial for her with probability ε, the creditor must pay ("bribe") her to avoid a costly delay. (Proofs are in the Appendix.)

Lemma 1 *The owner-manager's share of cash flows in bankruptcy increases if creditor rights decrease.*

Since bankruptcy is costly, a workout is always the more efficient solution. However, workout negotiations may fail as the owner-manager is privately informed about X_2^θ. As the proceeds from bankruptcy represent the outside options of both parties when negotiating

a workout, she has an incentive to claim that her outside option is higher. This may cause a breakdown in the bargaining game. If the bargaining power of the owner-manager *in bankruptcy* increases, the difference between her outside options in the high and in the low state increases as well, which increases her incentives to cheat. This makes a breakdown more likely, since also the "bribe" that the creditor needs to pay weighs more relative to the potential costs savings from avoiding bankruptcy. The following proposition formalizes this intuition.

Proposition 1 *A bargaining outcome is more likely to be ex-post efficient if creditor rights are high.*

It may seem surprising that giving more bargaining power to the informed party does not improve efficiency. However, bankruptcy law governs negotiations only if workouts fail. Hence, the effect of bargaining power in bankruptcy affects workout negotiations only over the outside options. Instead of specifying a bargaining protocol for the workout negotiations, Proposition 1 addresses when a protocol that leads to efficiency exists in the first place. Thus, the driving force behind Proposition 1 is that the outside options of both parties–i.e., their expected proceeds in bankruptcy–are different.

Though Proposition 1 does not explicitly derive the probability of a workout, it shows that bankruptcies (workouts) are less (more) likely for *any* bargaining game when bankruptcy law gives more rights to creditors.

Corollary 1 *For the same probability of default, the probability of bankruptcy is lower if creditor rights are stronger.*

Corollary 1 has important implications. If the early-incurred costs k increase in the probability of bankruptcy (as we assume), then these costs are lower under a creditor-friendly bankruptcy law for any given default probability. In fact, we can go a step further and ask when the burden of early-incurred costs becomes so large that the owner-manager

becomes less concerned about incurring additional costs and more interested in potentially restructuring debt down in default.

We can test this question by looking at stock returns prior to a bankruptcy filing. Stock returns are defined as $\frac{p_1 - p_0}{p_0}$, with p_0 being the stock price at some point before the bankruptcy filing ($t = 0$), and p_1 being the one at the bankruptcy announcement ($t = 1$). The stock price should reflect early-incurred bankruptcy costs k and expectations about potential debt restructuring. In particular, to assess whether the cost-benefit ratio of incurring *additional* costs $(K - k)$ relative to the benefit of debt restructuring in default has reached an inflection point, we can calculate the derivative of the stock return with respect to the probability of default at $t = 1$ to obtain:

$$\frac{\partial}{\partial \beta_1}\left(\frac{p_1 - p_0}{p_0}\right) = \frac{p_1}{p_0^2}(Z^{ND} - Z^D), \tag{1}$$

where Z^{ND} and Z^D denote the manager's ex-ante expected payoff $t = 1$ in case of no default (Z^{ND}) and default (Z^D) (i.e., $p_0 = (1 - \beta_1) Z^{ND} + \beta_1 Z^D$; cf. Appendix). Hence, (1) is negative if $Z^D > Z^{ND}$, and positive otherwise.

The intuitive interpretation of the sign of (1) is that an increase in the default probability entails both a cost and a benefit for the owner-manager. The cost is that it becomes more likely that the firm will incur the bankruptcy costs that it has not incurred so far $(K - k)$. The benefit is that default can lead to a debt reduction. The sign of (1) can be interpreted as a reflection of this cost-benefit trade-off. If the *additional* costs are larger than the benefit (i.e., if the early-incurred indirect costs k are low), the sign is positive; otherwise, it is negative.

Formally, if the cost of default exceeds the benefit ($Z^{ND} > Z^D$) in $t = 1$, increasing the ex-ante default probability reduces the initial price p_0. Then, bankruptcy is not a big surprise when it occurs and the downward correction to p_1 is not large. This makes the return higher (less negative) and (1) becomes positive. This reasoning is reversed

if the benefit of default exceeds the cost ($Z^D > Z^{ND}$), which happens if the benefit of restructuring is high and the early-incurred bankruptcy costs k are large. Therefore, if the firm has already scared most of its stakeholders away (i.e., when $k \to K$) and default helps to reduce the creditor's claim, the sign is negative. Figure A.I presents graphical illustrations for both cases.

Proposition 2 *If early-incurred indirect bankruptcy costs are high, the additional indirect bankruptcy costs that the owner-manager incurs from a higher default probability are low relative to the benefit of restructuring debt down. Then, the owner-manager is better off defaulting rather than not defaulting and the sign of (1) is negative. Otherwise, the sign of (1) is positive.*

Another implication of our reasoning is that the stock return is lower (more negative) if a firm has a higher ex-ante probability of reaching a workout (i.e., $\frac{\partial}{\partial \lambda}\left(\frac{p_1 - p_0}{p_0}\right) < 0$; see Appendix). Intuitively companies with higher workout expectations are initially valued higher and experience a larger price correction when they have to file for bankruptcy.

3.3 Testable Predictions

The implication of Proposition 1 is that, for the same default probability, bankruptcy is less likely if creditor rights are stronger. Hence, indirect bankruptcy costs will be lower prior to a bankruptcy filing if creditor rights are stronger. The data should reflect this in two ways. First, a lower bankruptcy probability means that anticipated bankruptcy costs will accumulate at a later point in time and only once it becomes clear that bankruptcy is inevitable. This implies that shareholder losses in regimes with stronger creditor rights—and, hence, with higher workout expectations—accumulate only relatively close to a bankruptcy filing (even if bankruptcy costs eventually are the same). Second, lower indirect bankruptcy costs should manifest themselves in the cross-section. In particular, access to trade credit prior to bankruptcy—the lack of which causes indirect bankruptcy

costs—should be higher if creditor rights are stronger.

Hypothesis 1. *(i) If creditor rights are stronger, firms accumulate indirect bankruptcy costs at a later stage in the period prior to a bankruptcy filing. This is reflected in the speed of the accumulation of negative stock returns over the period prior to a filing. (ii) It is also reflected in more trade credit prior to a filing.*

We test the first part by looking at the speed at which negative stock returns accumulate in the year leading up to a bankruptcy announcement. In particular, we identify the effects of bankruptcy costs by comparing the return patterns of matched bankrupt firms in Germany (higher creditor rights) and the U.S. (relatively lower creditor rights), and of matched bankrupt U.S. firms from before (lower creditor rights) and after (relatively higher creditor rights) the bankruptcy reform of 2005. We also expect the differences to be more pronounced in industries more likely to suffer from indirect bankruptcy costs. We test the second part of the hypothesis by analyzing the level of trade credit of bankrupt U.S. firms one year prior to bankruptcy, both before and after the 2005 bankruptcy reform.

Proposition 2 suggests another way to test if indirect bankruptcy costs are lower when creditor rights are stronger. As explained above, if the early incurred indirect costs are high, shareholders are more likely to prefer default over avoiding default prior to bankruptcy. We can test this by analyzing the sensitivity of stock returns over the one-year period prior to bankruptcy to the probability of default one year before bankruptcy.[15]

Hypothesis 2. *The magnitude of the indirect bankruptcy costs incurred prior to a bankruptcy filing is reflected in the relation between the ex-ante default probability and the stock return over the period leading to a bankruptcy filing. This relation is stated in Proposition 2.*

[15] A negative sign suggests, on the one hand, that the already incurred indirect costs are high. On the other hand, it also suggests that other stakeholders, such as trade creditors, are less likely to continue doing business with the firm, causing further indirect costs.

This hypothesis implies that expression (1) should be positive (negative) if early-incurred indirect bankruptcy costs are low (high), which should be the case if creditor rights are strong (weak). To test this hypothesis, we estimate for a cross-section of firms the sensitivity of stock returns, estimated over the one-year period leading to bankruptcy, to the default probability one year before the bankruptcy filing. We then compare the sign of this sensitivity between German and U.S. firms and between U.S. firms before and after the 2005 reform.

The preceding hypotheses are based on the assumption that workouts are less costly than bankruptcies. Since this assumption is crucial for our results, we test it in the following way. If firms for which there are higher workout expectations are valued higher prior to bankruptcy, they should experience a larger negative correction in the stock price once they have to file for bankruptcy.

Hypothesis 3. *Firms for which there are higher ex-ante workout expectations experience more negative stock returns in the period prior to a bankruptcy filing.*

One implication of this hypothesis is that, within the same bankruptcy environment, firms with higher market-to-book ratios one year prior to bankruptcy (reflecting high workout expectations and low bankruptcy costs) should experience more negative stock returns over the period leading up to a bankruptcy filing. Second, firms with a higher proportion of intangible assets should also show lower returns. This rests on the idea that firms with high intangibles have a higher ex-ante probability of a workout because intangible assets are more likely to erode in bankruptcy (e.g., Gilson et al., 1990). Third, firms whose returns show a more concave trend prior to bankruptcy—indicating a stronger accumulation at a later point and, thus, a higher initial workout probability—should also show lower returns.

Our model is very stylized, but it allows us to derive empirical predictions in a simple way. In the Appendix, we discuss the robustness of our results and relate them to other

existing theories.

4 Data and Identification

4.1 Sample Construction and Identification

To construct the two matched samples, we start with all firms in the U.S. and Germany that filed for bankruptcy between 1999 and 2010. This initial sample comprises 1,522 bankrupt U.S. and 162 bankrupt German firms. The U.S. sample is larger due to differences in stock market capitalization and the fact that bankruptcy filing rates are higher in the U.S. (Claessens and Klapper, 2005). We collect balance sheet and stock price data from Datastream, Worldscope, and Compustat, which are available for approximately 70% of all firms. Information on bankruptcy filing dates and the fate of bankruptcy comes from press articles in LexisNexis and Factiva. We cross-check and complement these data with information from bankruptcydata.com, which collects information on U.S. bankruptcies.

We next construct two matched samples.[16] The first matched sample contains bankrupt German and U.S. firms, while the second contains bankrupt U.S. firms before and after the 2005 bankruptcy reform. The first sample identifies the effects of creditor rights by comparing German bankrupt firms (treatment firms) with U.S. bankrupt firms (control firms), while the second sample identifies the same effects by comparing U.S. firms that filed for bankruptcy after (treatment firms) or before (control firms) the reform. For both samples, we match firms based on three variables measured one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. We match firms based on the ex-ante default probabilities since the essence of our model is that indirect costs (the likelihood of workouts) differ depending on creditor rights even after controlling

[16] We employ a Caliper matching algorithm without replacement (Cochran and Rubin, 1973). This method imposes a tolerance on the maximum distance $||P_i - P_j|| < \varepsilon$ allowed between a "treated" and a "control" firm. "Treated" firms for which no matches can be found within the caliper are excluded from the analysis.

for the default probability. We calculate the default probability using the Black-Scholes-Merton model.[17] Note that matching based on default probabilities estimated in this way ensures that we compare firms with the same default probability as assessed by the *market*. Furthermore, this default (and not bankruptcy) probability is based on a model that does *not* account for direct or indirect bankruptcy costs. Hence, differences in returns prior to bankruptcy are likely to result from differences in bankruptcy law. We match firms based on two-digit SIC codes to account for industry effects. All firms are then matched based on their total assets to control for size effects. Matching on size also accounts for differences in workout expectations; larger firms usually have more creditors, which can complicate creditor coordination during financial distress (Eberhart et al., 1990; Franks et al., 1996; Jostarndt and Sautner, 2010). When matching firms, we use a tolerance bound of up to 25% deviation between matched firms for the probability of default, and up to 50% for total assets. Our first sample includes 136 U.S. firms and 83 German firms; the second sample contains 135 U.S. firms from before and 93 U.S. firms from after the reform.

4.2 Descriptive Statistics

Table I provides summary statistics. Panel A reports variables for bankrupt U.S. and German firms and Panel B for U.S. firms before and after the bankruptcy reform. Correlations are provided in Table A.II. All variables are calculated one year prior to bankruptcy.[18] The table shows that treatment and control firms in both samples are, by construction, similar in terms of default probability and size.[19] A first look at the market-to-book ratios suggests that German firms are more highly valued prior to bankruptcy, consistent with

[17] To this end, we calculate a distance-to-default measure, which compares the market net worth of a firm to the effect of a one standard deviation move in asset value. Thus, the probability of default is lower for a larger distance-to-default. Following the related literature, we use the negative of the distance-to-default to approximate the default probability (e.g., Hillegeist et al., 2004).

[18] We do not have data for all firms on their buy-and-hold abnormal returns (BHARs) because, for some firms, the shares stopped trading prior to bankruptcy or were delisted.

[19] As we define the default probability using the distance-to-default, less-negative (i.e., larger) numbers indicate a higher probability of default.

the view that indirect bankruptcy costs of U.S. firm may initially be higher, leading to lower valuations. Other variables are roughly similar across treatment and control firms, although German firms have less negative EBITDAs, while U.S. firms are more highly levered. These differences are generally smaller for the U.S. sample, suggesting that this sample helps to account for differences in these variables. We account for differences between treatment and control firms by directly controlling for various variables in the regressions.

Table II Panel A shows that the distribution of bankruptcy filings over time is comparable for German and U.S. firms. Not surprisingly, there is a peak in bankruptcy announcements in 2001 to 2002 and in 2008 to 2009; these years coincide with recessions in both countries. There is a reduction in bankruptcy filings in the boom years 2003 through 2007. Table II Panel B shows that the vast majority of U.S. firms (94%) file for bankruptcy under Chapter 11. Interestingly, more firms file for Chapter 7 after the 2005 reform, which supports the claim that the U.S. bankruptcy code has become less debtor friendly. There is almost no difference between U.S. and German firms in terms of successful emergence out of bankruptcy (16% versus 12%).

5 Empirical Results

5.1 Stock Return Accumulation before Bankruptcy

We start with a long-term event study to investigate the evolution of stock returns prior to bankruptcy. We study the accumulation of abnormal returns from 250 days before to ten days after a bankruptcy filing. We compare these return patterns between U.S. and German firms, and between U.S. firms before and after the reform. Abnormal returns are calculated with market model parameters estimated over the prior one-year interval. We apply the Scholes-Williams (1977) correction to account for stock illiquidity, and we

aggregate returns geometrically, as proposed in Ritter (1991). As we do not estimate the *magnitude* of indirect bankruptcy costs, we circumvent the difficulty of distinguishing whether poor stock return performance is driven by indirect bankruptcy costs or by factors that trigger financial distress in the first place (Andrade and Kaplan, 1998). Instead, we exploit the idea that differences in creditor rights can explain why stock returns across bankruptcy regimes deteriorate at different *speeds* prior to bankruptcy.

Illustrating one of the main results, Figure I plots the accumulation of daily buy-and-hold abnormal returns (BHARs) of German and U.S. firms in the period leading up to a bankruptcy filing. Panel A reports mean values of the BHARs separately for U.S. (dashed line) and German (solid line) firms, while Panel B reports the differences (German BHAR – U.S. BHAR). We find that shareholders of bankrupt U.S. firms eventually do not lose more than those of German firms, but losses in Germany accumulate much later. This supports the hypothesis that, when creditor rights are weaker, shareholder losses accumulate only once it becomes clear that a workout cannot be achieved. This is the case even if the overall bankruptcy costs eventually end up being the same. The pattern is similar when we compare U.S. firms before and after the bankruptcy reform. Figure II Panel A reports the mean values of the accumulated BHARs for U.S. firms before (dashed line) and after (solid line) the reform, while Panel B again reports the differences. As in the first sample, losses accumulate much faster before the reform when creditor rights are weaker. The results in both figures support Hypothesis 1.

Table III reports more formal tests of the differences in the accumulation of BHARs, using monthly rather than daily returns. Panel A shows that stock returns of U.S. firms are statistically significantly lower than those of German firms in nine out of 12 months, with the difference closing in the bankruptcy-filing month. Similar patterns arise in Panel B, which compares U.S. firms before and after the reform. As in the previous figures, the results in both panels suggest that the gap in returns starts to build up around ten months before the filing. Once in bankruptcy, shareholders of U.S. firms (U.S. firms before the

reform) eventually do not lose statistically significantly more than those of German firms (U.S. firms after the reform).

Section 5.4 provides robustness tests that support our argument that these patterns are due to indirect bankruptcy costs—to be precise, the above pattern is more pronounced in industries more likely to suffer from indirect bankruptcy costs. Furthermore, note that—by using matched firms—we address the concern that our samples contain firms with different characteristics. In fact, as documented, firms in the two samples are not only similar prior to bankruptcy (see Table I), but the magnitude of their overall shareholder losses and their bankruptcy emergence rates also are comparable. More importantly, even if the "intrinsic quality" (e.g., the chance of survival when entering bankruptcy) or the losses were different, there is no obvious reason why the *speed* of the loss accumulation should be systematically different in an efficient market. However, our model provides an explanation for this differential effect.

5.2 Explaining Stock Returns before Bankruptcy

We next run regressions to test Hypotheses 2 and 3. The first regressions use German and U.S. firms (Table IV), while the second ones use U.S. firms before and after the bankruptcy reform (Table V). The dependent variable in all regressions is the BHAR of a firm, calculated over the period from 250 days before to ten days after a bankruptcy filing. To test Hypothesis 2, we interact the default probability in Table IV with a dummy that equals one if a firm is from Germany (GER). Similarly, we interact the default probability in Table IV and Table V with a dummy that takes the value one if a firm filed for bankruptcy after the reform (Post). To test Hypothesis 3, we include the market-to-book ratio (MTB), the fraction of intangibles (Intangibles/TA), and a concavity measure (Beta Time Squared). While the first two variables proxy for ex-ante workout expectations, Beta Time

Squared captures the concavity of the trend at which shareholder losses accumulate.[20] As discussed above, a more concave accumulation indicates that a bankruptcy filing comes as a greater surprise to shareholders. Hence, a positive coefficient would indicate that firms with higher ex-ante workout expectations initially have higher valuations. To account for remaining differences across matched firms, we control for firm size (log(Sales)), leverage (Total Debt/TA), debt structure (Fraction Debt), profitability (EBITDA/TA), and changes in profitability.[21] The regressions include industry fixed-effects and standard errors are clustered at the matched-pair level.

The regressions provide evidence consistent with Hypothesis 2. Table IV shows that an increase in the default probability of U.S. firms has a *negative* effect on stock returns, whereas it has a strong *positive* effect for German firms. The intuition behind this result, derived from our model, is that shareholders in Germany cannot expect to extract much from debt renegotiations. Hence, a higher default probability prior to bankruptcy translates into a lower initial stock price, and, thus, into a smaller price correction upon an eventual bankruptcy filing. In contrast, the *additional* costs of default seem low in the U.S., as the negative sign indicates that shareholders prefer the benefit of restructuring their debt down over avoiding default and repaying creditors in full. This benefit outweighs the costs of a higher default probability, as high indirect bankruptcy costs have already been incurred and priced into the stock early on.

The same effect is observed in Table V. A higher default probability has a negative effect on stock returns prior to the U.S. reform, but a slightly positive one thereafter. Hence, the negative U.S. effect documented in Table IV seems to have changed over time and is no longer present after 2005. Overall, the estimates are consistent with the view that the initially incurred indirect bankruptcy costs are lower if creditor rights are stronger.

[20] We include two variables, Beta Time and Beta Time Squared, that are the coefficients from a regression of BHARs for each firm on a time trend variable and its squared values.

[21] The fraction of debt is only an imperfect approximation of bank debt, which is usually used to assess the probability of out-of-court restructuring (Gilson et al., 1990).

Consistent with Hypothesis 3, we find in Table IV that—within the same bankruptcy environment—shareholders of firms with more intangibles experience more-negative stock returns prior to a bankruptcy filing. Firms with higher initial workout expectations are, hence, punished more for not restructuring out of court. We find a similar effect for the market-to-book ratio. Our measure of the concavity of the trend at which shareholder losses accumulate also has the predicted positive sign. This confirms that firms that surprise the market more by entering into bankruptcy (i.e., firms with initially high workout expectations) must have been valued higher initially. The results in Table V for U.S. firms provide slightly weaker evidence for Hypothesis 3. However, the sign of the intangibles variable remains negative, and the concavity of the trend remains both positive and statistically significant.

To show that our results are not confined to matched firms, we also run regressions for all firms in the initial samples. This leaves us with 895 bankrupt U.S. and 111 bankrupt German firms when we include all control variables. Table A.III shows that our results hold for the wider set of U.S. firms. In particular, the default probability has a significant negative effect on stock returns prior to the reform, but a positive one thereafter. Similarly, Table A.IV shows that the default probability and stock returns are positively related in Germany.

5.3 Evidence From Trade Credit

We use trade credit data to test the second part of Hypothesis 1—i.e., that suppliers provide more trade credit if creditor rights are stronger.[22] We are able test this prediction for our sample of matched U.S. firms for which we can obtain data on trade credit. We follow the related literature and approximate trade credit with accounts payables (e.g.,

[22] Suppliers may offer new or additional trade credit, or they can extend the term of payment. Since distressed firms have more restricted access to competitive financing, the increase in trade credit is in line with Petersen and Rajan's (1997) argument that firms use more trade credit when credit from financial institutions is unavailable.

Fishman and Love, 2003). Table VI provides regressions similar to those in Table V but uses accounts payables over total assets (Trade Credit/TA) as the dependent variable, measured one year prior to a bankruptcy filing. To test for Hypothesis 1, we include a dummy that takes the value one if a firm files for bankruptcy after the reform (Post). We further control for other variables that may affect the amount of trade credit, such as firm size, default probability, leverage, profitability, and the level of tangibles (PPE/TA) and intangibles (Intangibles/TA). Consistent with Hypothesis 1, we find that distressed firms have access to more trade credit after the reform. In terms of economic significance, the estimates in Column (3) imply that trade credit is about 0.056 higher after 2005, which is a substantial one-third of the variable's standard deviation in the period before 2005.

5.4 Robustness Checks

5.4.1 Stock Return Accumulation Across Industries

We interpret our results as evidence consistent with Hypothesis 1; stronger creditor rights lead to a significantly slower accumulation of shareholder losses prior to bankruptcy. But this interpretation implicitly assumes that higher indirect bankruptcy costs go hand in hand with a higher bankruptcy probability. While this assumption may be reasonable, it could be that the losses documented in Figures I and II reflect that *future* direct bankruptcy costs—rather than already-incurred indirect bankruptcy costs—increase with a higher bankruptcy probability. To address this concern, we look at the accumulation of losses across industries that are likely to suffer more (or less) from indirect bankruptcy costs. If our interpretation of the return losses is plausible, we expect that the previously documented differences in the speed of loss accumulation are stronger (weaker) in industries that suffer more (less) from indirect bankruptcy costs. Cleanly identifying industries that suffer differentially from indirect bankruptcy costs is challenging due to confounding behavior of different stakeholders when firms are in distress. Specifically, it is possible that

certain industry characteristics cause one type of stakeholder (e.g., customers) to abandon a firm, while another type (e.g., suppliers) remains engaged.[23]

Such confounding behavior is relatively unproblematic in the services sector, where suppliers are generally less important and customer behavior is, thus, the main determinant of indirect bankruptcy costs. Building on this idea, Figure III shows stock return patterns across two service industries. The first service industry is firms with SIC codes starting with 4 (services in transportation, communications, electricity, gas, and sanitary products), while the second one is firms with SIC codes starting with 7 (services in hotels, automotive repair, and personal products). We assume that indirect bankruptcy costs in the first industry are larger, as customers sign more long-term contracts and have more repeated interaction with firms (e.g., with gas suppliers or mobile phone carriers). Bankruptcy concerns should, therefore, lead to relatively large numbers of customers avoiding these firms. However, firms in the second service industry should face lower indirect costs as customers usually rely more on short-term, one-off contracts and less repeated interaction (e.g., hotel visits or car repairs). Consistent with the idea that firms in this industry suffer more from indirect bankruptcy costs, Figure III shows for the Germany-U.S. (Panel A) and the pre-post-reform samples (Panel B) that the differences in the speed of loss accumulation are larger for firms with SIC codes starting with 4. This corroborates the idea that the previously reported differences in stock returns reflect differences in indirect bankruptcy costs.

5.4.2 Accounting for Selection Effects: Workout Data

Of concern to our analysis is that firms self-select whether to undergo a restructuring in a workout or through a formal bankruptcy procedure, which may lead to a sample-selection

[23] For example, compared to distressed non-durable goods firms, durable-goods firms may experience larger demand shocks from customers that worry about the value of warranties (e.g., Hortacsu et al., 2013). At the same time, however, it is possible that suppliers of durable-goods firms increase their support more than those of non-durable goods producers. (e.g., if their supplies are very buyer-specific and tailored towards the distressed firm; Wilner, 2000; Giannetti et al., 2011).

bias since we include only bankrupt firms. To address this concern, we collect data on firms that undergo out-of-court debt restructurings to create a sample with both workout and bankrupt firms. We identify workout firms as those in Capital IQ that perform a debt restructuring (maturity year coded as "7777") but do not file for bankruptcy. These data are available for U.S. firms only and contain 120 workout and 228 bankrupt firms.[24] As Capital IQ does not report workout dates, we use LexisNexis to identify the debt restructuring years.

We then perform regressions (see Table A.V) that account for the self-selection into our bankruptcy sample (see Heckman, 1979). We first estimate a selection model in which we use as the dependent variable a dummy that takes the value one if a firm filed for bankruptcy, and zero if it restructured in a workout. The estimates, reported in Column (1) show that smaller firms, firms with more debt, and less-profitable firms are less likely to restructure in bankruptcy. Interestingly, bankruptcy filings of distressed firms are less likely after the reform, consistent with our argument that stronger creditor rights make it less attractive for shareholders to file for bankruptcy. We use this selection model to estimate in Columns (2) to (7) second-stage regressions that explain, as in Table V, the BHARs of U.S. firms. The regressions continue to show that an increase in the default probability has a negative effect on stock returns prior to the U.S. reform, but a positive effect thereafter. The Inverse Mills Ratio is statistically insignificant across all specifications, indicating that selection issues are unlikely to be present. We also verify that our trade credit regressions are robust to controlling for the self-selection.

While analyzing workout data is useful in estimating the magnitude of the cost of default, a word of caution is in order when comparing workout-bankruptcy choices to estimate the effects of creditor rights. First, public information on workouts tends to be

[24] We have fewer observations once we require availability of control variables to estimate the first-stage regressions. For consistency, we use the matched sample of bankrupt firms for this analysis. The sample size is comparable to those in other recent papers analyzing workout and distressed firms (e.g., Davydenko et al., 2012).

biased towards larger firms—certainly also a limitation to our Heckman selection model. Thus, it is difficult to assess how the likelihood of a workout depends on creditor rights. Second, it is difficult to find a "starting date" for workout firms when comparing the accumulation of BHARs between bankrupt and workout firms.[25] Third, many distressed firms are restructured after being taken private. Thus, there is often little financial information about such firms.

5.4.3 Further Robustness Checks

Figure A.II and Table A.VI show that return accumulation and regression results are similar if we employ matching procedures that use tighter (Match 20) or more relaxed (Match 40) tolerance bounds. In particular, while the matching for Figures I and II is based on a tolerance bound of up to 25% (Match 25) for the default probability, Match 20 (Match 40) uses 20% (40%).

To see whether the differences in the return accumulation starts at an earlier point in time, we use an event window that starts two years prior to bankruptcy and match firms at this point in time. The results in Figure A.III show that the divergence in returns between U.S. and German firms starts about 460 days before bankruptcy and that the differences level out around 180 to 150 days before the filing. Interestingly, in contrast to Germany, the effect in the U.S. seems concentrated mainly in the last twelve months. This is not surprising given that the overall difference in return accumulation between U.S. firms before and after the reform is not as large as that between the U.S. and German firms. Moreover, it is more difficult to identify effects in such a long-term event study for the U.S. sample as an extended event window implies that some of the return accumulations in the post-reform sample had already occurred during the pre-reform period.

Results are also similar if we match German and U.S. firms separately pre- and post

[25] Distressed firms often have a similar default probability for years before they recover (if at all). Moreover, they tend to default on different classes of debt at different points in time.

reform, though the difference in BHARs after the reform is then smaller than the one before the reform (not reported). Furthermore, our results are robust to using alternative methods for computing and accumulating abnormal returns, which is not surprising since our analysis requires only that returns be consistently calculated for both treatment and control firms. Moreover, they are robust to using raw instead of abnormal returns, and to using different methods for calculating abnormal returns (not reported).

Finally, we ensure that the slower speed of accumulation in the U.S. after the reform is not due to an overall time trend. For this purpose, we compare German firms before and after the 2005 U.S. reform. When we split the German sample into two matched subsamples, we do not find statistically significant differences in the speed of the BHAR accumulation. Similarly, we also compute the difference between the before-and-after differences in the U.S. and in Germany. We find that this "difference in differences" is positive and statistically significant for the majority of days before the bankruptcy announcements, suggesting, again, that our results are not driven by time trends.

6 Conclusion

Building on a simple model, we empirically estimate the effects of creditor rights on the accumulation and magnitude of indirect bankruptcy costs. Our identification comes from two matched samples that provide us with variation in creditor rights. The first sample compares firms from countries with high (Germany) and relatively lower (U.S.) creditor rights, whereas the second sample compares U.S. firms in periods with relatively lower (before the 2005 U.S. bankruptcy reform) and relatively higher (after the reform) creditor rights.

We show that, compared to bankrupt U.S. firms, stock return losses of German firms accumulate more slowly prior to bankruptcy. If workouts are less costly than bankruptcies, this indicates that shareholders of German firms place more hope in an out-of-court work-

out. As a result, indirect bankruptcy costs in Germany are initially lower and accumulate at a later point, when not only default, but also bankruptcy, is unavoidable. We find similar results when comparing U.S. firms before and after the bankruptcy reform. Corroborating that indirect bankruptcy costs do, indeed, drive this effect, we show that firms have better access to trade credit before bankruptcy when creditor rights are stronger.

Next, we find that firms with higher ex-ante workout expectations show more negative stock returns in the year leading to a bankruptcy filing. This indicates that firms that face higher workout expectations for a given default probability disappoint the stock market more by not negotiating a successful workout; this finding supports the assumption that the market prefers workouts over bankruptcies.

Finally, we calculate the effect of increases in the probability of default one year prior to bankruptcy on the one-year stock returns before a bankruptcy filing. We do this to indirectly infer the magnitude of early-incurred bankruptcy costs. Our model predicts that increases in the default probability have a negative effect on stock returns when early-incurred bankruptcy costs are high, and a positive effect otherwise. We test this prediction by performing a cross-sectional analysis that shows that an increase in the ex-ante probability of default has a negative effect on stock returns prior to bankruptcy in the U.S., and a positive effect on stock returns in Germany. For the matched U.S. sample, the effect of increases in the default probability is negative in the period before, and positive in the period after, the reform. Consistent with our model, this implies that initially-incurred bankruptcy costs are lower if creditor rights are stronger.

Our results suggest that giving more rights to creditors in bankruptcy induces a more efficient environment for the restructuring of distressed firms, as it economizes on indirect bankruptcy costs. Further research may investigate this issue as part of an overall welfare analysis. In particular, we currently have little evidence on systematic differences in post-workout performance across bankruptcy regimes. Furthermore, it could be that the threat of higher indirect bankruptcy costs has a positive effect on ex-ante incentives prior to

bankruptcy.

Appendix A Proofs

Proof of Lemma 1. Given limited liability, the option value of waiting to the owner-manager 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 is: $O := \nu \max\{0, \varepsilon (Y - K - D) - \max\left[0, X_2^\theta - K - D\right]\}$. We assume that ε is small, i.e. $\varepsilon < \left|\frac{X_2^\theta - K - D}{Y - K - D}\right|$, so that protracting is not worthwhile for the owner-manager if she can get a positive payoff at $t = 2$. Hence, she will wait whenever $X_2^\theta - K < D$. To induce resolution at $t = 2$, the investor must therefore additionally offer her 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, implying that it is optimal to offer the smallest "bribe"–i.e., $\alpha^\theta = \frac{\max\left[0, X_2^\theta - K - D\right] + O}{X_2^\theta - K}$. **Q.E.D.**

Proof of Proposition 1. The proof is a straightforward application of the Revelation Principle. A direct revelation procedure is a pair of functions $\left(\omega^{\theta'}, R_{WO}^{\theta'}\right)$, where $\omega^{\theta'}$ is the probability that the creditor agrees to a workout in which he receives $R_{WO}^{\theta'}$ given that the owner-manager sends a message $\theta' = \{H, L\}$. The proof shows that the bargaining outcome can be ex-post efficient only for low values of ν. The outcome is ex-post efficient if there exists a bargaining procedure (a mechanism), in which both parties agree on the more efficient outcome—i.e., a workout.

Taking into account the outside options in bankruptcy, the incentive constraints in this

direct revelation procedure can be simplified to[26]

$$\begin{aligned} & \omega^{\theta}\left[\left(X_2^{\theta}-k-R_{WO}^{\theta}\right)-\left(X_2^{\theta}-K-R_B^{\theta}\right)\right] \qquad (\mathrm{IC_M}) \\ \geq\ & \omega^{\theta'}[(X_2^{\theta}-k-R_{WO}^{\theta'})-\left(X_2^{\theta}-K-R_B^{\theta}\right)],\quad \forall\theta',\theta\in\{H,L\} \end{aligned}$$

where we have used that without loss of generality $\beta_2 = 0$ as stated in the main text. The participation constraints of the owner-manager and the creditor are

$$\begin{aligned} \omega^{\theta}\left[\left(X_2^{\theta}-k-R_{WO}^{\theta}\right)-\left(X_2^{\theta}-K-R_B^{\theta}\right)\right] &\geq 0,\quad \forall\theta\in\{H,L\} \qquad (\mathrm{IR_M}) \\ \omega^{\theta}E\left[R_{WO}^{\theta}-R_B^{\theta}\right] &\geq 0. \qquad (\mathrm{IR_C}) \end{aligned}$$

According to the Revelation Principle, if there exists some bargaining mechanism that achieves ex-post efficiency, then there exists a direct revelation procedure that achieves ex-post efficiency as well (e.g., Samuelson, 1984). As bankruptcy is inefficient, ex-post efficiency is given if and only if $\omega^{\theta} = 1$ for $\theta \in \{H, L\}$–i.e., there is an out-of-court workout with probability one. Together with the incentive constraint of the owner-manager this implies that $R_{WO}^{\theta} = const.$ (Observe that efficiency implies that k will be at its lowest value, which we denote with $\underline{k}$.) The participation constraints ($\mathrm{IR_C}$) and ($\mathrm{IR_M}$) can now be rewritten as $\min_{\theta}\left[R_B^{\theta}+K-\underline{k}\right] \geq R_{WO} \geq E\left[R_B^{\theta}\right]$. As R_B^{θ} is nondecreasing in the cash flow state θ,[27] a necessary condition for efficiency is, therefore, that $R_B^L + K - \underline{k} \geq E\left[R_B^{\theta}\right]$. More concretely, the following condition should hold

$$R_B^L + K - \underline{k} \geq E\left[R_B^{\theta}\right] \Leftrightarrow \frac{K-\underline{k}}{(1-q)} \geq R_B^H - R_B^L. \qquad (\mathrm{A.1})$$

This condition is quite intuitive. Agreeing on a workout becomes more difficult as the incentive to cheat increases in the difference between what the owner-manager needs

[26] Recall that k is incurred at $t = 0$, so that in $t = 1$ it is taken as given.

[27] This is a standard security design argument, see e.g. Innes (1990), DeMarzo and Duffie (1999).

to pay the creditor in the high and low state in bankruptcy (RHS of (A.1)), and as the additional costs of avoiding bankruptcy, $K-k$, decrease (LHS of (A.1)).

We can now derive a number of comparative statics results. Observe first that higher K (such as in firms with more intangible assets) makes it more likely that a workout will be reached – just as claimed in the main text. Further, using the expression for α^{θ} from Lemma A.1, we have that LHS of (A.1) is constant in ν, while for the RHS it holds:

$$\begin{aligned}
& \frac{\partial}{\partial \nu}\left(R_B^H - R_B^L\right) \\
= & \frac{\partial}{\partial \nu}\left(\left(1-\alpha^H\right)\left(X_2^H - K\right) - \left(1-\alpha^L\right)\left(X_2^L - K\right)\right) \\
= & -\frac{\partial}{\partial \nu}\left(\max\{\nu\varepsilon\left(Y-K-D\right), X_2^H - K - D\} - \max\{\nu\varepsilon\left(Y-K-D\right), X_2^L - K - D\}\right) \\
= & \varepsilon\left(Y-K-D\right)\left(I_{\nu\varepsilon(Y-K-D)\geq X_2^L-K-D} - I_{\nu\varepsilon(Y-K-D)\geq X_2^H-K-D}\right)
\end{aligned}$$

where I is an indicator function, which takes the value of 1 if $\nu\varepsilon\left(aX_2^{\theta} - K - D\right) \geq X_2^{\theta} - K - D$ and zero otherwise. Clearly, the above expression is positive, implying that (A.1) is more difficult to satisfy as v increases.

Finally, it should be stressed that $\lambda \neq \omega$: while λ depends on the rules of the specific bargaining game, ω is the probability of an out-of-court settlement in the optimal mechanism that leads to ex-post efficiency ($\omega = 1$). For use in the main text, we therefore state that λ is *in general* higher if ν is higher, as the existence of an ex-post efficient solution (workout) is more likely. **Q.E.D.**

Proof of Proposition 2. The expected value of equity in $t=0$ and $t=1$ is

$$\begin{aligned}
p_0 \quad : & = \left(1-\beta_1\right) Z^{ND} + \beta_1 Z^D \\
= & \left(1-\beta_1\right)\left(X_1 - k\left(\lambda\right) - D_1 + E\left[X_2^{\theta} - D_2\right]\right) \\
& + \beta_1 E\left[X_2^{\theta} - \lambda\left(R_{WO}^{\theta} + k\left(\lambda\right)\right) - \left(1-\lambda\right)\left(R_B^{\theta} + K\right)\right] \\
p_1 \quad : & = \left(X_2^{\theta} - R_B^{\theta} - K\right).
\end{aligned}$$

Note that in bankruptcy all indirect and direct costs are fully realized and add up to K. Taking the derivative of the equity return with respect to β_1 we have

$$\frac{\partial}{\partial \beta_1}\left(\frac{p_1 - p_0}{p_0}\right) = \frac{p_1}{p_0^2}(Z^{ND} - Z^D). \tag{A.2}$$

This effect is positive whenever $Z^{ND} - Z^D$ is positive. But note that

$$Z^{ND} - Z^D = X_1 + (1-\lambda)(K-k) - D + E\left[R_B^\theta + \lambda\left(R_{WO}^\theta - R_B^\theta\right)\right] \tag{A.3}$$

The second term $(1-\lambda)(K-k)$ represents thereby the benefit of avoiding default, while $E\left[R_B^\theta + \lambda\left(R_{WO}^\theta - R_B^\theta\right)\right] - D$ represents the benefit of incurring default and restructuring down debt (note that $E\left[R_B^\theta\right], E\left[R_{WO}^\theta\right] < D$). Furthermore, observe that this difference decreases in the amount of early-incurred bankruptcy costs k

$$\frac{\partial\left(Z^{ND} - Z^D\right)}{\partial k} = -1 + \lambda\left(\frac{\partial}{\partial k}E\left[R_{WO}^\theta\right] + 1\right) < 0$$

where the inequality follows from the fact that $\frac{\partial}{\partial k}E\left[R_{WO}^\theta\right] \leq 0$, i.e. the creditor's expected workout-payoff is non-increasing in the already incurred (indirect) costs. Similarly, we can show that the difference decreases in the benefit from incurring default and restructuring down debt.

Finally, note that as the indirect costs of bankruptcy decrease in the probability of an out-of-court workout, $\partial k(\lambda)/\partial\lambda < 0$, it should also hold

$$\begin{aligned} & \frac{\partial}{\partial \lambda}\left(\frac{p_1 - p_0}{p_0}\right) \\ = \; & \frac{p_1}{p_0^2}\left[\frac{\partial k(\lambda)}{\partial \lambda} + \beta_1\left(E\left[R_{WO}^\theta\right] - E\left[R_B^\theta\right]\right) - (K - k(\lambda))\right] < 0 \end{aligned}$$

as claimed in the main text. The inequality follows from the fact that $E\left[R_{WO}^\theta\right] - E\left[R_B^\theta\right] \leq K - k(\lambda)$ ($K-k$ is the surplus, which is split in the workout negotiations). Hence, if

the data support our model we should observe that firms towards which there are higher reorganization expectations experience higher losses (cf. Hypothesis 3). **Q.E.D.**

Discussion

The advantage of our stylized model is that it allows us to derive empirical predictions in a simple way. We could obtain similar predictions also differently. For example, we employ a "waiting option" for the owner-manager during bankruptcy to capture creditor rights; alternatively, we could assume that, once in bankruptcy, creditors can enforce liquidation with probability $(1 - \nu)$, which is again determined by the bankruptcy law.[28] Our model also assumes that bankruptcy negotiations proceed under less information asymmetry than workouts do. While this simplifies our analysis, we do not think this is problematic in light of the formal transfer of information and of (some) control rights to creditors upon bankruptcy.

It is interesting to compare our model to those of 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. First, we explicitly model workouts as an alternative to bankruptcy and show that workouts are more likely if creditor rights are stronger. Second, we endogenize the effect of workouts on equity returns and argue that the ability to renegotiate out of court allows firms to save on indirect bankruptcy costs. Our model can be modified to make 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

[28] Assume, then, that liquidation is (in some cases) socially inefficient: Without debt restructuring, 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.

workout fails. Since a workout creates lower bankruptcy costs, this implies that the effect of creditor rights on the strategic default barrier (i.e., timing of default) and equity risk is weaker than in a model that does not account for such costs and considers only payoffs to shareholders *in bankruptcy*.[29] Furthermore, the probability of strategic default (and bankruptcy) in these papers is higher when creditor rights in bankruptcy are low. Thus, if indirect bankruptcy costs are considered, they would accumulate earlier—for better values of the fundamentals—than would be the case under a creditor-friendly law, which is consistent with our argument.

[29] Similarly to us, Garlappi et al. (2008) also find that the probability of default has a positive effect on equity returns when shareholder bargaining power in bankruptcy is strong, and it may have a negative effect otherwise. By endogenizing workouts and bankruptcy costs we stress an additional channel why the effect on returns may be negative.

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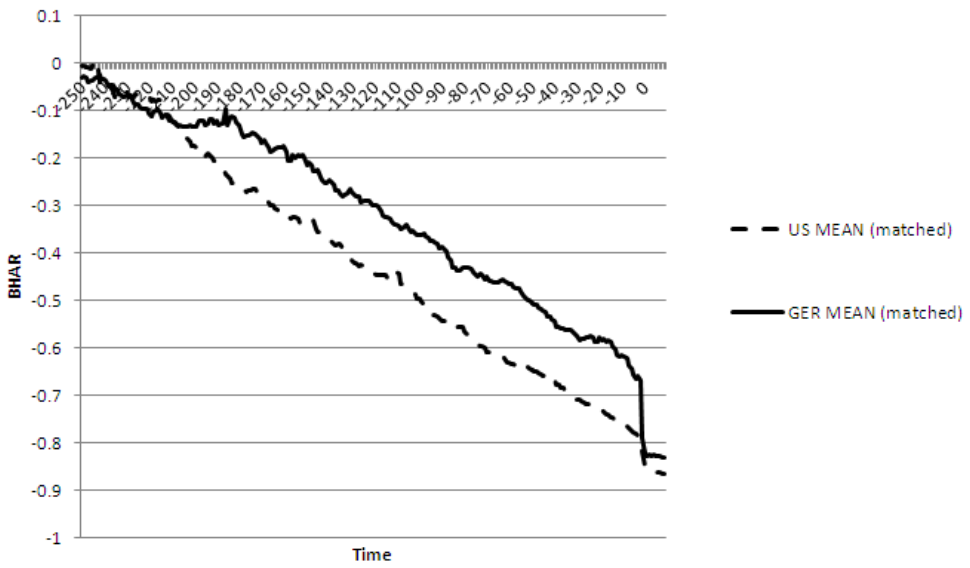
Figure I
Buy-And-Hold Abnormal Returns of Bankrupt U.S. and German Firms

Panel A plots the accumulation of daily buy-and-hold abnormal returns (BHAR) (*y*-axis) of a matched sample of bankrupt U.S. and German firms. The sample includes 136 U.S. firms and 83 matched German firms. The matching is done based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The accumulation of the abnormal returns is reported from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing (*x*-axis). The figure separately reports the mean values of the BHARs for U.S. (dashed line) and German (solid line) firms. Panel B reports the difference in mean BHARs between the German and U.S. firms (GER BHAR – U.S. BHAR). The sample period is 1999 to 2010.

Panel A: BHARs for U.S. and German Firms



Panel B: BHAR Difference between U.S. and German Firms

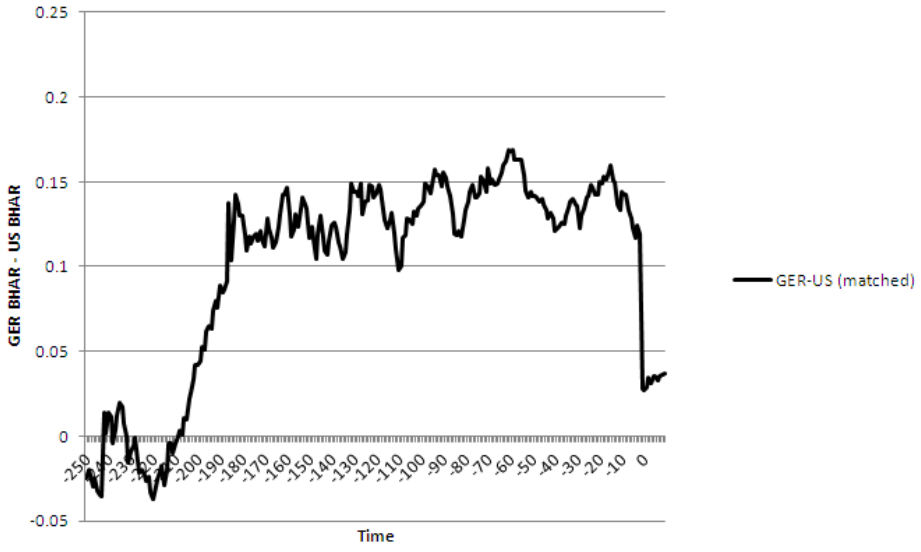
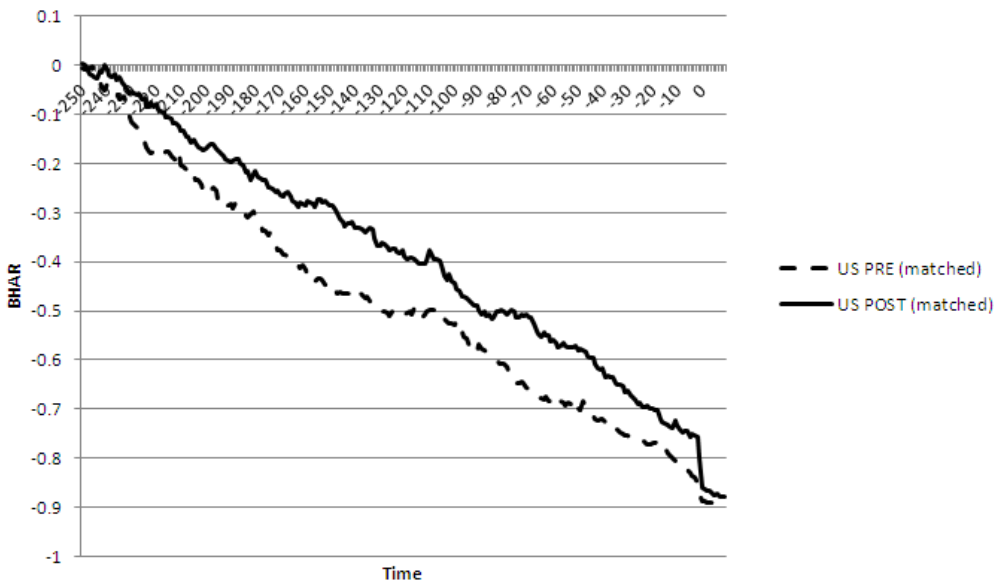


Figure II

Buy-And-Hold Abnormal Returns of Bankrupt U.S. Firms Before and After the Bankruptcy Reform

Panel A plots the accumulation of daily buy-and-hold abnormal returns (BHAR) (*y*-axis) of a matched sample of bankrupt U.S. firms before and after the 2005 bankruptcy reform. The sample includes 135 U.S. firms from the period before and 93 U.S. firms from the period after the reform. The matching is done based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The accumulation of the abnormal returns is reported from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing (*x*-axis). The figure separately reports the mean values of the BHARs for U.S. firms before (dashed line) and after (solid line) the reform. Panel B reports the difference in mean BHARs between bankrupt U.S. firms before and after the bankruptcy reform (Post BHAR – Pre BHAR). The sample period is 1999 to 2010.

Panel A: BHARs for U.S. Firms Before and After the 2005 Bankruptcy Reform



Panel B: BHAR Difference between U.S. Firms Before and After the 2005 Bankruptcy Reform

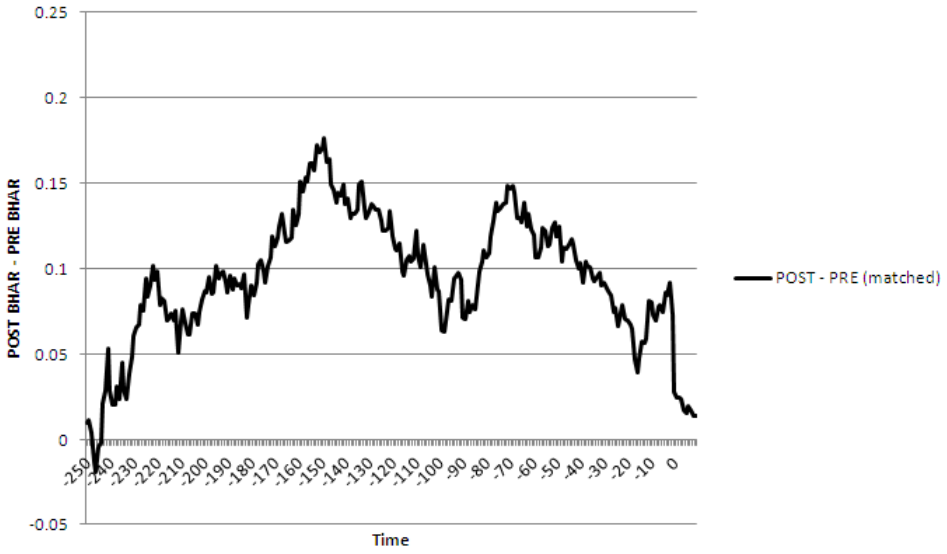
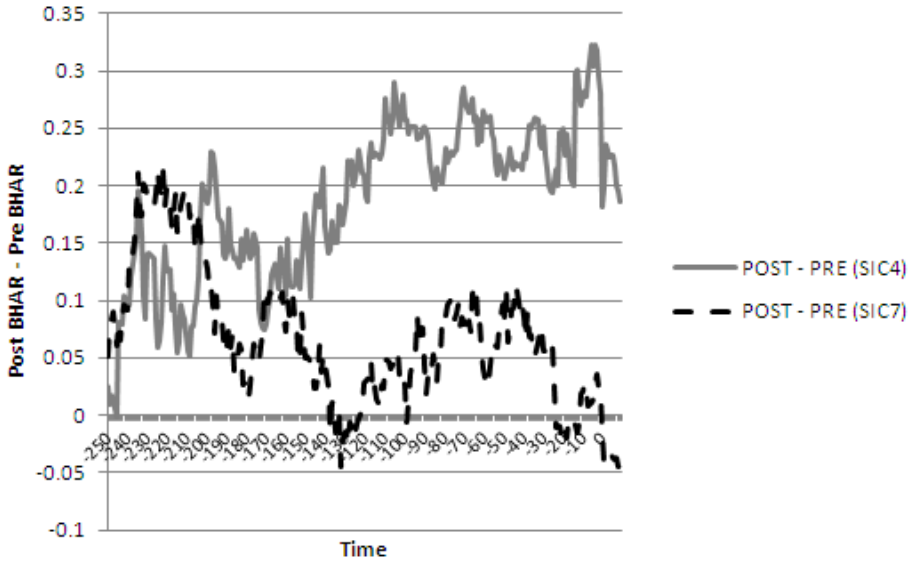


Figure III
Buy-And-Hold Abnormal Returns for Different Industries

Panel A and B plot the difference in the accumulation of daily buy-and-hold abnormal returns (BHAR) (*y*-axis) of matched samples of bankrupt firms from two different industries. The differences in both panels are reported for firms with SIC codes that start with 7 (SIC 7), and for firms with SIC codes that start with 4 (SIC 4). SIC 4 include services firms in the areas communications, electricity, gas, and sanitary products. SIC 7 include services firms in the areas hotels, automotive repair, and personal products. Panel A reports the difference in mean BHARs between the German and U.S. firms (GER BHAR–U.S. BHAR), while Panel B reports the difference in mean BHARs between the bankrupt U.S. firms before and after the bankruptcy reform (Post BHAR–Pre BHAR). The accumulation of the abnormal returns is reported from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing (*x*-axis).

Panel A: BHAR Difference between U.S. and German Firms: SIC 4 versus SIC 7



Panel B: BHAR Difference between U.S. Firms Before and After the 2005 Bankruptcy Reform: SIC 4 versus SIC 7

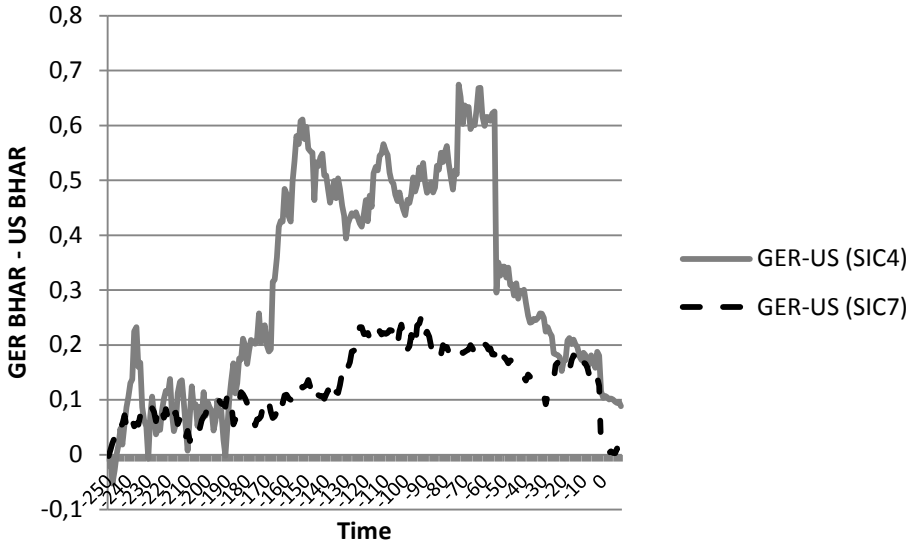


Table I
Descriptive Statistics

Panel A provides summary statistics for a set of variables of the matched sample of bankrupt U.S. and German firms. The sample period is 1999 to 2010. All variables are calculated one year prior to a bankruptcy filing. The sample includes 136 U.S. firms and 83 matched German firms. Panel B reports summary statistics for a set of variables of the matched sample of U.S. firms before and after the 2005 bankruptcy reform. All variables are calculated one year prior to a bankruptcy filing. The sample includes 135 U.S. firms from the period before and 93 U.S. firms from the period after the reform. The number of observations is smaller for some variables due to missing data. Both tables also report *p*-values of difference-in-means and difference-in-medians tests between matched German and U.S. firms (Panel A), and between matched U.S. firms before and after the 2005 bankruptcy reform (Panel B). For both panels, the matching is done based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The data sources are Datastream and Worldscope. Variables are defined in Table A.I.

Panel A: Bankrupt U.S. and German Firms

	U.S. (1999-2010)				GER (1999-2010)				Difference (GER - U.S.)			
	Mean	**Median**	**Std.dev.**	**Obs.**	**Mean**	**Median**	**Std.dev.**	**Obs.**	**Mean**	***p*-value**	**Median**	***p*-value**
BHAR	-0.887	-0.954	0.195	122	-0.844	-0.891	0.155	71	0.044	0.109	0.064	0.006
Default Probability	-4.231	-3.676	2.739	136	-4.175	-3.945	2.512	83	0.057	0.879	-0.269	0.434
Total Assets [tUSD]	116,320	59,709	145,113	136	80,301	36,764	108,457	83	-36,019	0.052	-22,945	0.821
Sales [tUSD]	135,925	39,614	540,132	136	101,420	34,170	146,621	83	-34,505	0.570	-5,444	0.180
EBITDA/TA	-0.431	-0.229	0.621	136	-0.162	-0.047	0.418	83	0.269	0.001	0.182	0.001
ΔEBITDA/TA	1.561	0.316	11.215	126	0.319	0.113	3.065	77	-1.241	0.344	-0.203	0.416
Intangibles/TA	0.235	0.161	0.244	134	0.213	0.139	0.202	83	-0.023	0.479	-0.022	0.613
MTB	0.130	0.057	0.547	136	0.325	0.122	0.556	83	0.196	0.011	0.066	0.005
Fraction Debt	0.467	0.502	0.276	136	0.376	0.401	0.254	83	-0.091	0.016	-0.101	0.003
Total Debt/TA	0.478	0.378	0.503	136	0.269	0.247	0.259	83	-0.209	0.001	-0.130	0.014
Sales/TA	1.055	0.789	1.066	136	1.221	1.002	1.046	83	0.166	0.262	0.212	0.740

Panel B: Bankrupt U.S. Companies Before and After the 2005 Bankruptcy Reform

	Pre Reform (1999-2005)				Post Reform (2006-2010)				Difference (POST - PRE)			
	Mean	**Median**	**Std.dev.**	**Obs.**	**Mean**	**Median**	**Std.dev.**	**Obs.**	**Mean**	***p*-value**	**Median**	***p*-value**
BHAR	-0.891	-0.955	0.151	123	-0.882	-0.965	0.221	76	0.009	0.729	-0.010	0.500
Default Probability	-3.407	-2.967	2.620	135	-3.347	-3.059	2.442	93	0.059	0.863	-0.092	0.590
Total Assets [tUSD]	351,010	35,631	2,421,677	135	429,270	30,483	2,802,932	93	78,260	0.912	-5,148	0.590
Sales [tUSD]	180,110	27,977	790,722	135	218,863	16,871	926,608	93	38,753	0.735	-11,107	0.059
EBITDA/TA	-0.581	-0.323	0.999	135	-0.713	-0.355	1.280	92	-0.133	0.383	-0.032	0.726
ΔEBITDA/TA	0.589	0.313	7.394	126	0.172	0.144	1.551	90	-0.418	0.599	-0.169	0.129
Intangibles/TA	0.170	0.062	0.221	135	0.225	0.130	0.256	83	0.056	0.091	0.068	0.163
MTB	0.118	0.047	0.559	134	0.175	0.034	0.667	93	0.057	0.484	-0.013	0.830
Fraction Debt	0.465	0.493	0.302	135	0.480	0.524	0.286	93	0.015	0.711	0.032	0.788
Total Debt/TA	0.524	0.334	0.682	135	0.549	0.425	0.564	93	0.025	0.773	0.091	0.281
Sales/TA	1.153	0.768	1.542	135	0.969	0.753	0.976	93	-0.183	0.311	-0.014	1.000
Trade Credit/TA	0.167	0.107	0.166	108	0.193	0.138	0.160	64	0.027	0.299	0.031	0.083

Table II
Matched Sample Distribution over Time, Filing Reasons, and the Fate of Bankruptcy

Panel A provides an overview of the distribution of bankruptcies over time for two matched samples. The first matched sample consists of bankrupt U.S. and German firms, while the second matched sample consists of bankrupt U.S. firms before or after the 2005 U.S. bankruptcy reform. The first matched sample includes 136 U.S. firms and 83 matched German firms. The second matched sample includes 135 U.S. firms from the period before and 93 U.S. firms from the period after the reform. The matching is done based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The sample period is 1999 to 2010. Panel B provides information on the bankruptcy filing type and the fate of bankruptcy. "Chapter 7" indicates that a U.S. firm filed for bankruptcy under Chapter 7 of the U.S. bankruptcy law. The remaining firms filed under Chapter 11. The table also indicates if a firm successfully emerged from bankruptcy as a private or public firm ("Emerged"). Note that we use the actual month (October 2005) of the 2005 U.S. bankruptcy reform to split the matched U.S. sample into the pre and post periods, the figures reported for the year 2005 therefore contain some overlapping observations.

Panel A: Matched Sample Distribution over Time

Year	Bankrupt U.S. and German Firms				Bankrupt U.S. Firms Before and After the Bankruptcy Reform			
	U.S.		GER		Pre		Post	
	#	%	#	%	#	%	#	%
1999	12	9%	0	0%	16	12%	0	0%
2000	12	9%	1	1%	20	15%	0	0%
2001	42	31%	16	19%	41	30%	0	0%
2002	21	15%	27	33%	27	20%	0	0%
2003	4	3%	7	8%	19	14%	0	0%
2004	4	3%	4	5%	3	2%	0	0%
2005	5	4%	2	2%	9	7%	1	1%
2006	4	3%	2	2%	0	0%	16	17%
2007	11	8%	4	5%	0	0%	23	25%
2008	12	9%	6	7%	0	0%	22	24%
2009	8	6%	9	11%	0	0%	28	30%
2010	1	1%	5	6%	0	0%	3	3%
Total	136	100%	83	100%	135	100%	93	100%

Panel B: Filing Reasons and Fate of Bankruptcy

Year	Bankrupt U.S. and German Firms			Bankrupt U.S. Firms Before and After the Bankruptcy Reform			
	U.S.		GER	Pre		Post	
	Chapter 7	Emerged	Emerged	Chapter 7	Emerged	Chapter 7	Emerged
1999	0	1	0	1	3	0	0
2000	1	1	0	3	4	0	0
2001	0	2	1	1	8	0	0
2002	0	3	3	3	4	0	0
2003	0	0	1	1	6	0	0
2004	1	1	0	1	1	0	0
2005	0	2	0	0	6	0	1
2006	1	0	1	0	0	3	5
2007	1	4	2	0	0	3	4
2008	1	5	0	0	0	3	5
2009	2	2	1	0	0	4	4
2010	1	0	1	0	0	1	0
Total	8	21	10	10	32	14	19
%*	6%	16%	12%	7%	24%	15%	20%

* Relative to corresponding Panel A Total

Table III
Monthly Buy-And-Hold Abnormal Returns over Time

Panel A reports the accumulation of monthly buy-and-hold abnormal returns (BHAR) of a matched sample of bankrupt U.S. and German firms, while Panel B reports the same statistics for a matched sample of bankrupt U.S. firms before and after the 2005 bankruptcy reform. The first sample includes 136 U.S. firms and 83 matched German firms, while the second sample includes 135 U.S. firms from the period before and 93 U.S. firms from the period after the reform. For both samples, the matching is done based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The table reports the accumulation of the abnormal returns from 12 months prior to a bankruptcy filing until the month of a bankruptcy filing. Panel A reports the mean values of the accumulated monthly BHARs separately for U.S. and German firms. It further reports the differences in the mean values and the *p*-values of difference-in-means tests. Similarly, Panel B reports the mean values of the accumulated monthly BHARs separately for U.S. firms before and after the 2005 bankruptcy reform. It further reports the differences in the mean values and the *p*-values of difference-in-means tests.

Panel A: BHAR Difference between U.S. and German Firms

	Mean BHAR		Difference (GER - U.S.)	
Month	**U.S. (1999-2010)**	**GER (1999-2010)**	**Mean**	***p*-value**
-12	-0.040	-0.032	0.007	0.466
-11	-0.087	-0.098	-0.011	0.750
-10	-0.180	-0.135	0.046	0.444
-9	-0.265	-0.133	0.132	0.041
-8	-0.324	-0.168	0.156	0.019
-7	-0.391	-0.235	0.156	0.019
-6	-0.452	-0.292	0.160	0.011
-5	-0.524	-0.362	0.162	0.011
-4	-0.591	-0.426	0.164	0.008
-3	-0.645	-0.477	0.168	0.003
-2	-0.702	-0.553	0.148	0.004
-1	-0.760	-0.619	0.141	0.036
0	-0.858	-0.826	0.031	0.376

Panel B: BHAR Difference between U.S. Firms Before and After the 2005 Bankruptcy Reform

	Mean BHAR		Difference (POST - PRE)	
Month	**Pre Reform (1999-2005)**	**Post Reform (2006-2010)**	**Mean**	***p*-value**
-12	-0.048	-0.025	0.024	0.526
-11	-0.173	-0.095	0.078	0.150
-10	-0.256	-0.172	0.084	0.153
-9	-0.334	-0.235	0.099	0.107
-8	-0.429	-0.282	0.147	0.014
-7	-0.481	-0.342	0.138	0.025
-6	-0.504	-0.393	0.111	0.116
-5	-0.558	-0.476	0.082	0.234
-4	-0.643	-0.516	0.126	0.046
-3	-0.694	-0.577	0.117	0.045
-2	-0.749	-0.660	0.089	0.067
-1	-0.805	-0.736	0.069	0.129
0	-0.889	-0.865	0.024	0.474

Table IV
Determinants of Buy-And-Hold Abnormal Returns of Bankrupt U.S. and German Firms

This table provides OLS regressions for a matched sample of bankrupt U.S. and German firms. The matching is done based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The sample period is 1999 to 2010. The dependent variable is the buy-and-hold abnormal return (BHAR), calculated from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing. "GER" is a dummy variable that takes the value one if a firm is from Germany; and zero if it is from the U.S. The independent variables are measured one year prior to bankruptcy. The data sources are Datastream and Worldscope. Variables are defined in Table A.I. *t*-statistics, which are based on robust standard errors clustered at the matched-pair level, are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

	Dependent Variable: BHAR					
	(1)	(2)	(3)	(4)	(5)	(6)
Default Probability * GER	0.0318***	0.0346***	0.0349***	0.0233**	0.0221**	0.0219**
	(4.86)	(5.10)	(5.11)	(2.60)	(2.55)	(2.49)
Default Probability	-0.0148***	-0.0196***	-0.0193**	-0.0145**	-0.0138	-0.0132
	(-3.56)	(-2.85)	(-2.48)	(-2.04)	(-1.64)	(-1.51)
Default Probability * Post	0.0216***	0.0266***	0.0237**	0.0241***	0.0207**	0.0205**
	(2.92)	(3.12)	(2.44)	(3.79)	(2.47)	(2.44)
Post	0.1001**	0.1256**	0.1166**	0.1054**	0.0934**	0.0952**
	(2.02)	(2.40)	(2.40)	(2.45)	(2.14)	(2.12)
GER	0.1676***	0.1808***	0.1898***	0.1207**	0.1251**	0.1220**
	(3.82)	(3.99)	(4.25)	(2.04)	(2.23)	(2.08)
Log(Sales)	0.0125*	0.0148	0.0138	0.0086	0.0060	0.0067
	(1.68)	(1.55)	(1.41)	(1.06)	(0.67)	(0.76)
EBITDA/TA		-0.0018	-0.0025	-0.0007	-0.0020	0.0042
		(-0.10)	(-0.12)	(-0.04)	(-0.11)	(0.21)
ΔEBITDA/TA		0.0001	0.0003	0.0019**	0.0019*	0.0019*
		(0.32)	(0.60)	(2.07)	(1.70)	(1.72)
Intangibles/TA		-0.1292***	-0.1445***	-0.1037**	-0.0992**	-0.0859**
		(-2.66)	(-2.88)	(-2.17)	(-2.22)	(-2.05)
MTB				-0.0030***	-0.0031***	-0.0033***
				(-3.37)	(-2.84)	(-2.84)
Beta Time				0.1405***	0.1485***	0.1470***
				(3.22)	(3.64)	(3.63)
Beta Time Squared				0.1313***	0.1413***	0.1390***
				(3.07)	(3.29)	(3.27)
Total Debt/TA						0.0230
						(0.52)
Fraction Debt						-0.0585
						(-1.13)
Constant	-1.0794***	-1.0986***	-1.0148***	-0.9027***	-0.8305***	-0.8181***
	(-12.71)	(-9.88)	(-7.43)	(-8.42)	(-5.73)	(-5.34)
Industry Fixed Effects	NO	NO	YES	NO	YES	YES
Obs.	190	178	178	178	178	178
Adj. R-sq.	0.056	0.116	0.143	0.243	0.277	0.271

Table V
Determinants of Buy-And-Hold Abnormal Returns of Bankrupt U.S. Firms Before and After the Bankruptcy Reform

This table provides OLS regressions for a matched sample of bankrupt U.S. firms before and after the 2005 bankruptcy reform. The matching is done based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The sample period is 1999 to 2010. The dependent variable is the buy-and-hold abnormal return (BHAR), calculated from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing. "Post" is a dummy that takes the value one for the years after the 2005 U.S. bankruptcy reform (i.e., the years 2006 to 2010); and zero otherwise. The independent variables are measured one year prior to bankruptcy. The data sources are Datastream and Worldscope. Variables are defined in Table A.I. *t*-statistics, which are based on robust standard errors clustered at the matched-pair level, are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

	Dependent Variable: BHAR					
	(1)	(2)	(3)	(4)	(5)	(6)
Default Probability * Post	0.0148*	0.0202**	0.0184*	0.0173**	0.0170*	0.0162*
	(1.98)	(2.01)	(1.71)	(2.07)	(1.93)	(1.78)
Default Probability	-0.0119***	-0.0176**	-0.0191***	-0.0154**	-0.0170***	-0.0152**
	(-2.68)	(-2.58)	(-2.83)	(-2.54)	(-2.84)	(-2.36)
Post	0.0592	0.0752	0.0644	0.0624	0.0590	0.0570
	(1.33)	(1.54)	(1.17)	(1.47)	(1.23)	(1.18)
Log(Sales)	0.0185***	0.0191***	0.0217***	0.0167**	0.0192***	0.0202***
	(2.97)	(2.66)	(2.88)	(2.46)	(2.73)	(2.88)
EBITDA/TA		0.0059	0.0057	0.0057	0.0032	0.0061
		(0.58)	(0.47)	(0.39)	(0.20)	(0.37)
ΔEBITDA/TA		-0.0005	-0.0005	0.0037**	0.0036**	0.0036**
		(-0.85)	(-0.70)	(2.59)	(2.42)	(2.47)
Intangibles/TA		-0.0757	-0.0655	-0.0445	-0.0287	-0.0200
		(-1.64)	(-1.26)	(-1.11)	(-0.65)	(-0.43)
MTB				-0.0000	-0.0000	0.0003
				(-0.01)	(-0.02)	(0.11)
Beta Time				0.1625**	0.1596**	0.1597**
				(2.50)	(2.42)	(2.44)
Beta Time Squared				0.1460**	0.1430**	0.1430**
				(2.21)	(2.14)	(2.15)
Total Debt/TA						0.0047
						(0.38)
Fraction Debt						-0.0519
						(-1.01)
Constant	-1.1162***	-1.1216***	-1.0461***	-0.9627***	-0.8995***	-0.8687***
	(-16.52)	(-13.63)	(-10.15)	(-13.25)	(-9.93)	(-8.85)
Industry Fixed Effects	NO	NO	YES	NO	YES	YES
Obs.	193	179	179	178	178	178
Adj. R-sq.	0.041	0.047	0.046	0.205	0.201	0.195

Table VI
Determinants of Trade Credit of Bankrupt U.S. Firms Before and After the Bankruptcy Reform

This table provides OLS regressions for a matched sample of bankrupt U.S. firms before and after the 2005 bankruptcy reform. The matching is done based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The sample period is 1999 to 2010. The dependent variable is trade credit over total assets one prior to a bankruptcy filing. "Post" is a dummy that takes the value one for the years after the U.S. bankruptcy reform (i.e., the years 2006 to 2010); and zero otherwise. The independent variables are measured one year prior to bankruptcy. The data sources are Datastream and Worldscope. Variables are defined in Table A.I. *t*-statistics, which are based on robust standard errors clustered at the matched-pair level, are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

	Dependent Variable: Trade Credit/TA		
	(1)	(2)	(3)
Post	0.0382	0.0523*	0.0567**
	(1.41)	(1.90)	(2.04)
Default Probability	0.0086**	0.0065	0.0079*
	(2.00)	(1.36)	(1.84)
Log(Sales)	-0.0095*	-0.0002	-0.0047
	(-1.96)	(-0.03)	(-0.72)
EBITDA/TA		0.4431**	0.4283**
		(2.59)	(2.46)
Intangibles/TA		-0.0064	-0.0018
		(-0.33)	(-0.09)
Total Debt/TA		0.6234***	0.5864***
		(3.52)	(3.21)
PPE/TA		0.0209	-0.0054
		(0.39)	(-0.10)
Constant	0.1599***	0.1188	0.0673
	(3.13)	(1.29)	(0.79)
Industry Fixed Effects	YES	NO	YES
Obs.	171	135	135
Adj. R-sq.	0.053	0.120	0.149

Table A.I
Definition of Variables

Variable	Definition
BHAR	Buy-and-hold abnormal returns, calculated using the Scholes and Williams (1977) correction to account for illiquidity of shares. The time-frame to calculate the abnormal returns comprises 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing. The abnormal returns are calculated using standard event study methodology with market model parameters estimated over the prior one year interval. This variable is winsorized at 1-99%.
GER	Dummy variable that takes the value one if a firm is from Germany; zero if it is from the U.S.
Post	Dummy variable that takes the value one for the years after the U.S. bankruptcy reform (i.e., the years 2006 to 2010); zero otherwise.
Default Probability	Probability of default, approximated by the negative of the distance-to-default 250 days before a bankruptcy filing.
Total Assets (TA)	Total assets measured one year prior to a bankruptcy filing and reported in thousands of USD. We use end-year exchange rates to convert the assets of German firms into USD. The variable is inflation-adjusted and expressed in 1999 USD.
Sales	Total sales measured one year prior to a bankruptcy filing and reported in thousands of USD. We use end-year exchange rates to convert the assets of German firms into USD.
Sales/TA	Total sales to total assets measured one year prior to a bankruptcy filing.
Intangibles/TA	Fraction of intangible assets to total assets measured one year prior to a bankruptcy filing. The variable is inflation-adjusted and expressed in 1999 USD.
MTB	Market to book ratio measured one year prior to a bankruptcy filing. This variable is winsorized at 5-95%.
Total Debt/TA	Total debt to total assets measured one year prior to a bankruptcy filing.
EBITDA/TA	Earnings before interest, taxes, depreciation and amortization to total assets measured one year prior to a bankruptcy filing.
ΔEBITDA	Change in EBITDA/TA over the period from two years to one year prior to a bankruptcy filing.
PPE/TA	Property, plant and equipment to total assets measured one year prior to a bankruptcy filing.
Fraction Debt	Fraction of total debt to total liabilities measured one year prior to a bankruptcy filing.
Beta Time	Coefficient from regressing the BHAR of a firm on a time trend variable that runs from 250 days prior to a bankruptcy (Time=0) to the bankruptcy announcement date (Time=250).
Beta Time Squared	Coefficient from regressing the BHAR of a firm on the squared values of a time trend variable that runs from 250 days prior to a bankruptcy (Time=0) to the bankruptcy announcement date (Time=250).
Trade Credit/TA	Accounts payables to total assets measured one year prior to a bankruptcy filing. This variable is winsorized at 5-95%.
Bankruptcy	Dummy variable that takes the value one if a distressed firm filed for bankruptcy; zero if it restructured its debt out of court in a workout.

Table A.II
Correlations of Variables

Panel A reports pairwise correlations for a set of variables of the matched sample of bankrupt U.S. and German firms. The sample period is 1999 to 2010. All variables are calculated one year prior to a bankruptcy filing. The sample includes 136 U.S. firms and 83 matched German firms. Panel B reports pairwise correlations for a set of variables of the matched sample of U.S. firms before and after the 2005 bankruptcy reform. The sample includes 135 U.S. firms from the period before and 93 U.S. firms from the period after the reform. The data sources are Datastream and Worldscope. Variables are defined in Table A.I. * indicates variables that are significant at least at the 10% level.

Panel A: Correlations for Bankrupt U.S. and German Firms

	BHAR	Default Probability	Sales	EBITDA/TA	ΔEBITDA/TA	Intangibles/TA	MTB	Fraction Debt	Total Debt/TA	Sales/TA
BHAR	1									
Default Probability	0.056	1								
Sales	0.1227*	0.2507*	1							
EBITDA/TA	0.1151	0.0564	0.4017*	1						
ΔEBITDA/TA	-0.0507	0.0889	0.0438	0.0115	1					
Intangibles/TA	-0.1980*	-0.0243	-0.0132	0.0027	0.1256*	1				
MTB	-0.0269	-0.0223	-0.1215*	0.1294*	-0.0043	-0.0646	1			
Fraction Debt	-0.0668	0.3230*	0.1936*	0.0621	0.0924	0.0502	-0.0926	1		
Total Debt/TA	-0.0168	0.2653*	0.0614	-0.1519*	-0.0043	-0.0541	-0.0559	0.6592*	1	
Sales/TA	0.2243*	0.0898	0.5341*	0.1289*	-0.0479	-0.2103*	-0.0017	-0.0623	0.0272	1

Panel B: Correlations for Bankrupt U.S. Companies Before and After the Bankruptcy Reform

	BHAR	Default Probability	Sales	EBITDA/TA	ΔEBITDA/TA	Intangibles/TA	MTB	Fraction Debt	Total Debt/TA	Sales/TA
BHAR	1									
Default Probability	-0.0427	1								
Sales	0.2070*	0.1469*	1							
EBITDA/TA	0.0819	0.03	0.4210*	1						
ΔEBITDA/TA	-0.0306	0.0109	0.0159	-0.0082	1					
Intangibles/TA	-0.0903	0.052	0.0095	0.1036	0.1209*	1				
MTB	0.0741	0.0323	-0.0442	0.0888	-0.0091	-0.0588	1			
Fraction Debt	0.0177	0.3294*	0.1878*	0.1635*	-0.009	0.0899	0.0354	1		
Total Debt/TA	-0.061	0.2501*	-0.0441	-0.1031	-0.0605	0.0116	-0.0177	0.5534*	1	
Sales/TA	0.0445	0.0413	0.3456*	0.2036*	-0.1848*	-0.1452*	-0.0239	0.0616	0.2804*	1

Table A.III
Determinants of Buy-And-Hold Abnormal Returns of Bankrupt U.S. Firms

This table provides OLS regressions for bankrupt U.S. firms. The sample period is 1999 to 2010. The sample consists of all U.S. firms that filed for bankruptcy during this period and for which we have data to run these regressions (i.e., we use our initial sample before applying the matching algorithm). The dependent variable is the buy-and-hold abnormal return (BHAR), calculated from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing. The independent variables are measured one year prior to bankruptcy. "Post" is a dummy that takes the value one for the years after the U.S. bankruptcy reform (i.e., the years 2006 to 2010); and zero otherwise. The data sources are Datastream and Worldscope. Variables are defined in Table A.I. *t*-statistics, which are based on robust standard errors, are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

	Dependent Variable: BHAR				
	(1)	(2)	(3)	(4)	(5)
Default Probability * Post	0.0091**	0.0102**	0.0103**	0.0102**	0.0108**
	(2.16)	(2.27)	(2.18)	(2.52)	(2.58)
Default Probability	-0.0088***	-0.0090***	-0.0085***	-0.0093***	-0.0089***
	(-3.05)	(-3.11)	(-2.98)	(-3.65)	(-3.49)
Post	0.0023	0.0067	0.0000	0.0171	0.0117
	(0.12)	(0.33)	(0.00)	(0.91)	(0.56)
Log(Sales)	0.0127***	0.0133***	0.0145***	0.0112***	0.0121***
	(5.55)	(5.58)	(5.73)	(5.11)	(5.29)
EBITDA/TA		0.0004	-0.0003	-0.0011	-0.0015
		(0.27)	(-0.19)	(-0.54)	(-0.78)
ΔEBITDA/TA		0.0019***	0.0018***	0.0016***	0.0016***
		(5.84)	(6.71)	(11.40)	(10.30)
Intangibles/TA		-0.0283	-0.0147	-0.0063	0.0076
		(-0.90)	(-0.45)	(-0.22)	(0.26)
Total Debt/TA				-0.0001	-0.0000
				(-0.09)	(-0.07)
Fraction Debt				0.0250*	0.0135
				(1.67)	(0.93)
MTB				-0.0000***	-0.0000***
				(-6.39)	(-4.93)
Beta Time				0.1698***	0.1649***
				(7.94)	(7.89)
Beta Time Squared				0.1556***	0.1505***
				(7.67)	(7.61)
Constant	-1.0347***	-1.0417***	-0.9166***	-0.8983***	-0.8038***
	(-43.84)	(-39.52)	(-18.67)	(-31.38)	(-17.37)
Industry Fixed Effects	NO	NO	YES	NO	YES
Obs.	975	907	904	898	895
Adj. R-sq.	0.042	0.088	0.114	0.290	0.302

Table A.IV

Determinants of Buy-And-Hold Abnormal Returns of Bankrupt German Firms

This table provides OLS regressions for bankrupt German firms. The sample period is 1999 to 2010. The sample consists of all German firms that filed for bankruptcy during this period and for which we have data to run these regressions (i.e., we use our initial sample before applying the matching algorithm). The dependent variable is the buy-and-hold abnormal return (BHAR), calculated from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing. The independent variables are measured one year prior to bankruptcy. The data sources are Datastream and Worldscope. Variables are defined in Table A.I. *t*-statistics, which are based on robust standard errors, are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

	Dependent Variable: BHAR				
	(1)	(2)	(3)	(4)	(5)
Default Probability	0.0164***	0.0161***	0.0178***	0.0112**	0.0121***
	(3.28)	(3.56)	(3.89)	(2.24)	(2.85)
Log(Sales)	-0.0011	0.0060	-0.0011	-0.0032	-0.0111
	(-0.11)	(0.53)	(-0.09)	(-0.31)	(-0.94)
EBITDA/TA		-0.0446	-0.0393	-0.0312	-0.0227
		(-1.44)	(-1.49)	(-1.12)	(-1.14)
ΔEBITDA/TA		0.0019	0.0019	0.0043	0.0052
		(0.33)	(0.41)	(0.87)	(1.23)
Intangibles/TA		-0.3247***	-0.1815***	-0.2314***	-0.0944
		(-5.25)	(-2.83)	(-3.61)	(-1.43)
Total Debt/TA				0.1885**	0.1916**
				(2.00)	(2.31)
Fraction Debt				-0.2081**	-0.2137**
				(-2.29)	(-2.29)
MTB				-0.0020	-0.0037
				(-0.46)	(-0.89)
Beta Time				0.1528***	0.1754***
				(3.77)	(4.91)
Beta Time Squared				0.1301***	0.1589***
				(2.96)	(4.17)
Constant	-0.7165***	-0.7373***	-0.6310***	-0.5555***	-0.3838**
	(-6.12)	(-5.54)	(-3.73)	(-3.71)	(-2.26)
Industry Fixed Effects	NO	NO	YES	NO	YES
Obs.	116	112	111	112	111
Adj. R-sq.	0.072	0.201	0.245	0.321	0.393

Table A.V
Self-Selection Model for Abnormal Returns of Bankrupt U.S. Firms

This table provides results from self-selection models. The sample period is 1999 to 2010. The sample consists of U.S. distressed firms. The dependent variable in Column (1) is a dummy variable that takes the value one if a firm filed for bankruptcy; and zero if it restructured out of court in a workout. The dependent variable in Columns (2) to (7) is the buy-and-hold abnormal return (BHAR), calculated from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing. The regressions in Column (2) to (7) are the second-stage equations of a Heckman (1979) self-selection model. The first-stage regression is reported in Column (1), estimated using a probit model. The independent variables are measured one year prior to bankruptcy. Firms in the second-stage are matched based on the following three variables one year prior to bankruptcy: (i) default probability; (ii) two-digit SIC codes; and (iii) total assets. The data sources are Capital IQ, Datastream and Worldscope. Variables are defined in Table A.I. *t*-statistics, which are based on robust standard errors, are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

Dependent Variable:	**Bankruptcy**	**BHAR**					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Default Probability * Post		0.0162	0.0221*	0.0198*	0.0190*	0.0180*	0.0175*
		(1.50)	(1.93)	(1.74)	(1.80)	(1.72)	(1.67)
Default Probability		-0.0135**	-0.0189**	-0.0203***	-0.0165**	-0.0178**	-0.0160**
		(-2.01)	(-2.48)	(-2.66)	(-2.38)	(-2.57)	(-2.23)
Post	-1.8167***	0.0487	0.0698	0.0566	0.0582	0.0524	0.0500
	(-2.91)	(1.10)	(1.53)	(1.22)	(1.40)	(1.24)	(1.18)
Log(Sales)	0.1698***	0.0235***	0.0237***	0.0258***	0.0207**	0.0220**	0.0239***
	(3.32)	(3.15)	(2.74)	(2.80)	(2.51)	(2.52)	(2.66)
EBITDA/TA	0.0555**		0.0075	0.0077	0.0071	0.0046	0.0068
	(1.96)		(0.48)	(0.48)	(0.48)	(0.30)	(0.44)
ΔEBITDA/TA			-0.0004	-0.0003	0.0038*	0.0037*	0.0037*
			(-0.17)	(-0.15)	(1.78)	(1.75)	(1.74)
Intangibles/TA	-0.0836		-0.0673	-0.0600	-0.0384	-0.0255	-0.0170
	(-0.22)		(-1.11)	(-0.96)	(-0.69)	(-0.45)	(-0.29)
MTB					-0.0002	-0.0001	0.0001
					(-0.07)	(-0.05)	(0.05)
Beta Time					0.1624***	0.1594***	0.1592***
					(5.63)	(5.47)	(5.47)
Beta Time Squared					0.1464***	0.1431***	0.1428***
					(4.86)	(4.67)	(4.67)
Total Debt/TA	-0.4523***						-0.0061
	(-3.80)						(-0.23)
Fraction Debt	0.2670						-0.0402
	(0.67)						(-0.64)
Inverse Mills Ratio		0.0583	0.0615	0.0541	0.0507	0.0365	0.0537
		(0.99)	(1.00)	(0.86)	(0.89)	(0.63)	(0.80)
Constant	-5.4096***	-1.1915***	-1.1944***	-1.1795***	-1.0248***	-1.0141***	-1.0145***
	(-7.65)	(-12.14)	(-10.26)	(-8.82)	(-9.11)	(-7.92)	(-7.67)
Industry Fixed Effects	YES	NO	NO	YES	NO	YES	YES
Obs.	308	193	179	179	178	178	178
Pseudo R-sq./Prob.>Chi-sq.	0.4162	0.0212	0.0309	0.0596	0.0000	0.0000	0.0000

Table A.VI
Robustness Tests: Determinants of Buy-And-Hold Abnormal Returns

This table provides OLS regressions for a matched sample of bankrupt U.S. and German firm (Columns (1) and (2)), and for a matched sample of bankrupt U.S. firms before and after the 2005 bankruptcy reform (Columns (3) and (4)). The dependent variable is the buy-and-hold abnormal return (BHAR), calculated from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing. "GER" is a dummy variable that takes the value one if a firm is from Germany; and zero if it is from the U.S. "Post" is a dummy that takes the value one for the years after the U.S. bankruptcy reform (i.e., the years 2006 to 2010); and zero otherwise. The independent variables are measured one year prior to bankruptcy. The regressions report results from two different matching procedures that match on the same variables as in Table IV and V, but use tighter (Match 20) and more relaxed (Match 40) tolerance bounds. While the matching for Table IV and V are performed based on a tolerance of a maximum of 25% deviation between matched firms for the probability of default, Match 20 (Match 40) uses 20% (40%). Variables are defined in Table A.I. *t*-statistics, which are based on robust standard errors clustered at the matched-pair level, are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

	Dependent Variable: BHAR			
	Bankrupt U.S. and German Firms		**Bankrupt U.S. Firms Before and After the 2005 Bankruptcy Reform**	
	Match 20	**Match 40**	**Match 20**	**Match 40**
	(1)	(2)	(3)	(4)
Default Probability * GER	0.0182*	0.0183**		
	(1.87)	(2.42)		
Default Probability * Post	0.0230**	0.0167**	0.0186*	0.0136
	(2.59)	(2.21)	(1.94)	(1.49)
Default Probability	-0.0128	-0.0095	-0.0184***	-0.0137**
	(-1.47)	(-1.20)	(-2.71)	(-2.07)
GER	0.0904	0.0953*		
	(1.43)	(1.94)		
Post	0.1216**	0.0669	0.0535	0.0419
	(2.36)	(1.61)	(1.07)	(1.00)
Log(Sales)	0.0041	0.0053	0.0180**	0.0160***
	(0.46)	(0.71)	(2.43)	(2.63)
EBITDA/TA	0.0149	-0.0060	0.0102	0.0033
	(0.69)	(-0.40)	(0.49)	(0.27)
ΔEBITDA/TA	0.0025*	0.0017	0.0033**	0.0026*
	(1.86)	(1.45)	(2.29)	(1.91)
Intangibles/TA	-0.1061**	-0.1280***	-0.0419	-0.0353
	(-2.36)	(-3.26)	(-0.63)	(-0.86)
MTB	-0.0028**	-0.0017	-0.0001	-0.0003
	(-2.29)	(-0.90)	(-0.03)	(-0.13)
Beta Time	0.1533***	0.1674***	0.1182**	0.1211**
	(3.72)	(3.97)	(2.07)	(2.28)
Beta Time Squared	0.1389***	0.1636***	0.0997*	0.1019*
	(3.22)	(3.62)	(1.72)	(1.89)
Total Debt/TA	0.0667**	-0.0077	0.0103	0.0020
	(2.01)	(-0.33)	(0.58)	(0.19)
Fraction Debt	-0.1119**	0.0004	-0.0304	-0.0277
	(-2.03)	(0.01)	(-0.45)	(-0.58)
Constant	-0.7360***	-0.7931***	-0.9405***	-0.9571***
	(-3.89)	(-5.93)	(-8.72)	(-10.05)
Industry Fixed Effects	YES	YES	YES	YES
Obs.	161	206	152	215
Adj. R-sq.	0.320	0.261	0.167	0.153

Figure A.I
Effects of Increases in the Default Probability: Graphical Illustration

These graphs provide examples to illustrate that the stock return over the period leading to a bankruptcy filing can be related in a positive or a negative way to increases in the default probability. The *x*-axis plots time, while the *y*-axis plots the stock price (not the stock returns). The arrow along the *y*-axis indicates the direction of the change in the initial stock price as the probability of default increases. As in our model, Z^{ND} is the expected equity value if there is no default, while Z^{D} is the expected equity value if there is default. Thus, Z^{D} is the expected value between the equity value in bankruptcy (Z^{B}) and the equity value in a workout (Z^{WO}). Case 1 illustrates the case in which $Z^{ND} > Z^{D}$ (i.e., shareholder prefer avoiding default). Then, an increase in the default probability leads to a lower stock price, and the subsequent change in the stock price in the period leading to bankruptcy is smaller. This implies that the stock return is larger (i.e., less negative)—e.g., a return of -85% (dotted line) rather than -90% (solid line). Hence, there is a *positive* relation between the default probability and the stock return. In contrast, Case 2a and Case 2b illustrate the case in which $Z^{ND} < Z^{D}$ (i.e., shareholder prefer default). We see that an increase in the default probability leads to a higher initial stock price (since *additional* bankruptcy costs are low, shareholders expect to benefit from restructuring down their debt upon default). Hence, the subsequent stock return is lower. In Case 2a, the return is then more negative—e.g., a return of -80% (dotted line) rather than -75% (solid line). Similarly, in Case 2b the return is less positive—e.g., a return of +1% (dotted line) rather than +5% (solid line). Hence, there is a *negative* relation between the default probability and the stock return. To see that Case 2b is also possible, suppose that there are no additional costs upon default (i.e., $k = K$ and so $Z^{B} = Z^{WO} = Z^{D}$) and that repaying creditors in full implies $Z^{ND} = 0$. In this case, we may have $Z^{D} > 0$ if restructuring down debt in default is possible.

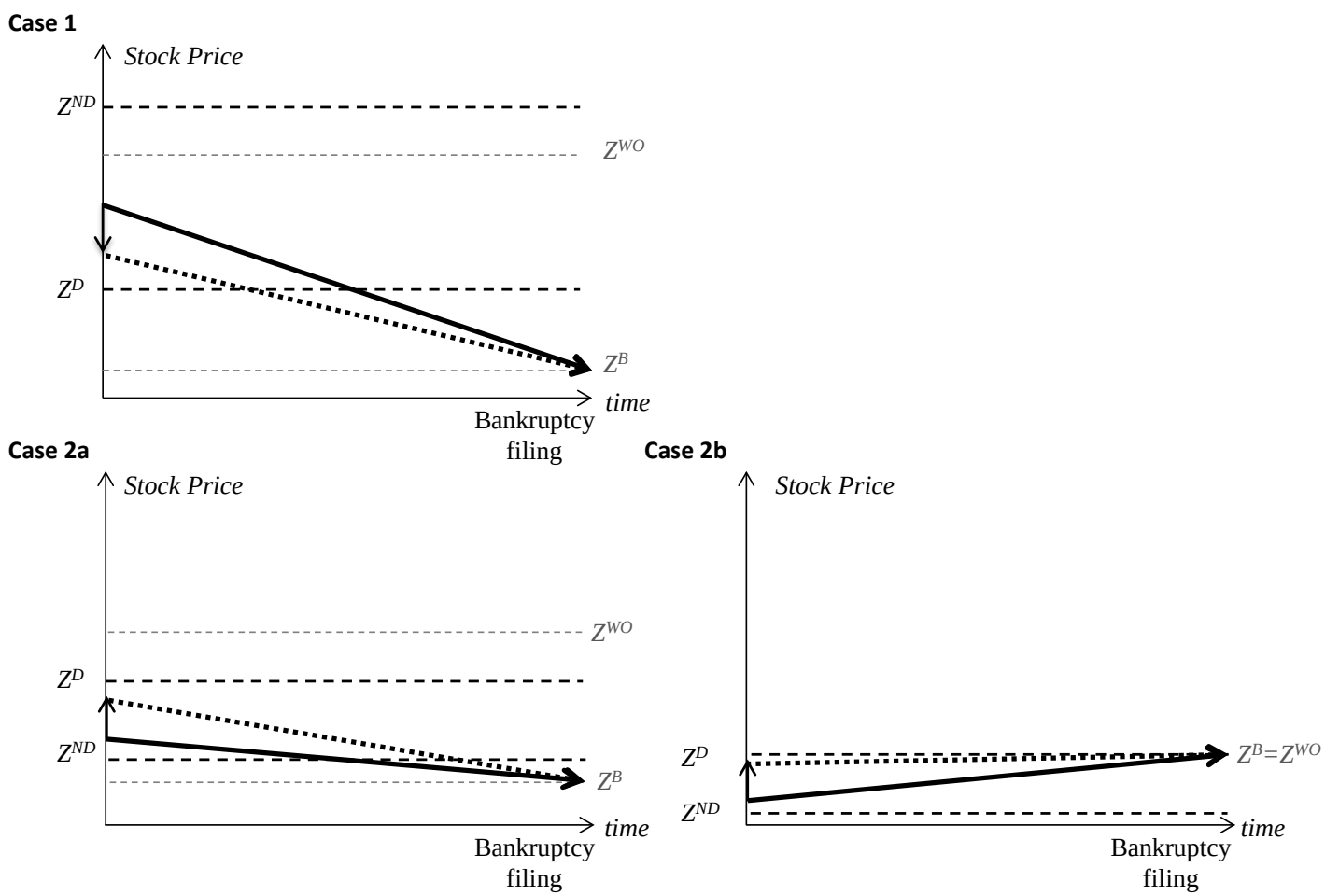
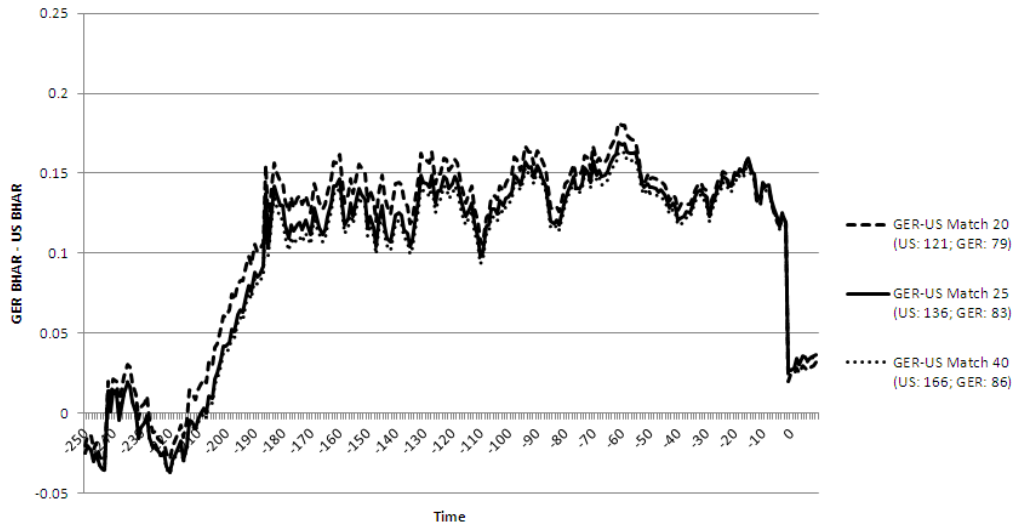


Figure A.II
Robustness Tests: Buy-And-Hold Abnormal Returns for Different Matched Samples

Panel A plots the difference in the accumulation of daily buy-and-hold abnormal returns (BHAR) (*y*-axis) of a matched sample of bankrupt U.S. and German firms. The panel reports the difference in mean BHARs between the German and U.S. firms (German BHAR – U.S. BHAR). Panel B plots the accumulation of buy-and-hold abnormal returns (BHAR) (*y*-axis) of a matched sample of bankrupt U.S. firms before and after the 2005 bankruptcy reform. The panel reports the difference in mean BHARs between the bankrupt U.S. firms before and after the bankruptcy reform (Post BHAR–Pre BHAR). The accumulation of the abnormal returns is reported from 250 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing (*x*-axis). Each panel reports results from three different matching procedures. The first matching procedure (Match 25) provides, for comparison, results from the initial matching procedure that was used for Figures I and II. The second and third matching procedure (Match 20 and Match 40) match on the same variables as in Figure I and II, but use tighter (Match 20) and more relaxed (Match 40) tolerance bounds. In particular, while the matching for Figure I and II are performed based on a tolerance of a maximum of 25% deviation between matched firms for the probability of default, Match 20 (Match 40) uses 20% (40%). The table legend indicates in brackets the number of firms that were used for the respective matching procedures.

Panel A: BHAR Difference between U.S. and German Firms



Panel B: BHAR Difference between U.S. Firms Before and After the 2005 Bankruptcy Reform

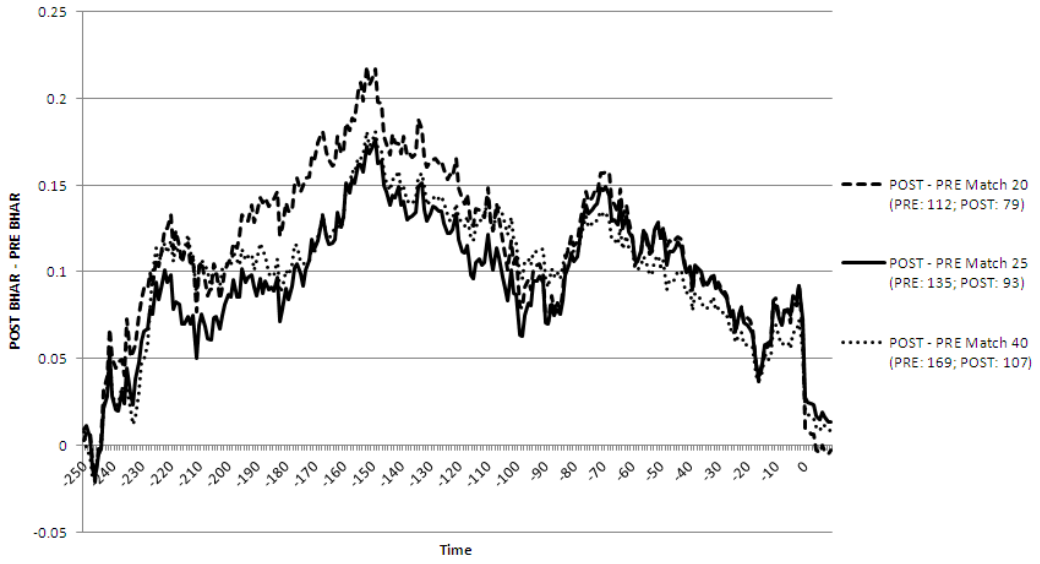
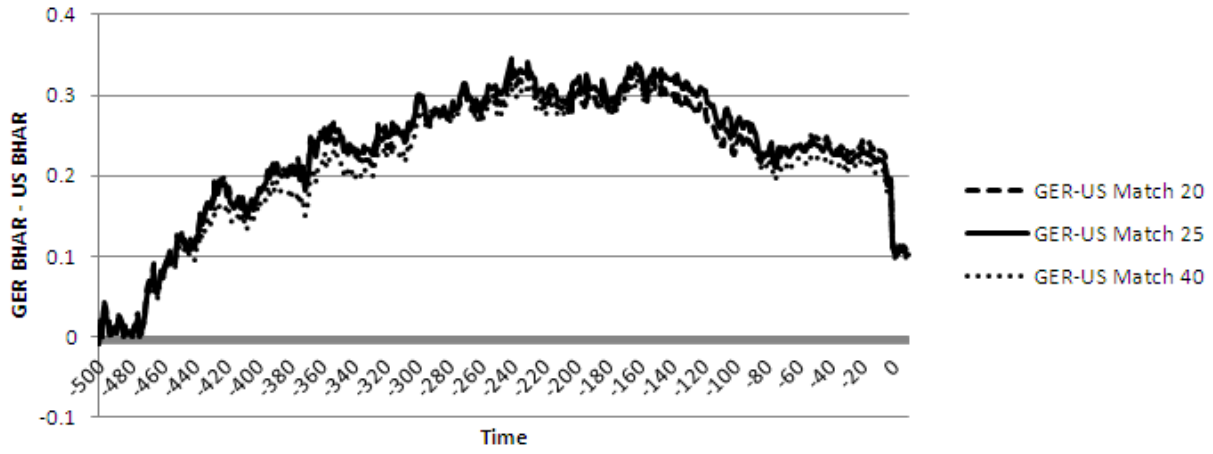
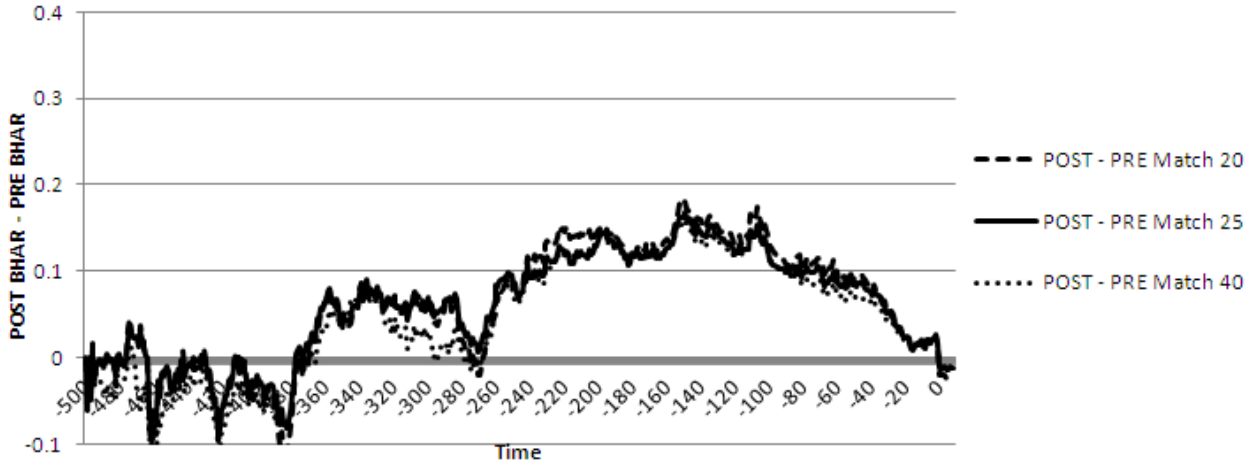


Figure A.III
Robustness Tests: Two-Year Buy-And-Hold Abnormal Returns

Panel A plots the two-year difference in the accumulation of daily buy-and-hold abnormal returns (BHAR) (*y*-axis) of a matched sample of bankrupt U.S. and German firms. The panel reports the difference in mean BHARs between the German and U.S. firms (GER BHAR–U.S. BHAR). Panel B plots the accumulation of buy-and-hold abnormal returns (BHAR) (*y*-axis) of a matched sample of bankrupt U.S. firms before and after the 2005 bankruptcy reform. The panel reports the difference in mean BHARs between the bankrupt U.S. firms before and after the bankruptcy reform (Post BHAR–Pre BHAR). The accumulation of the abnormal returns is reported from 500 trading days prior to a bankruptcy filing until 10 days after a bankruptcy filing (*x*-axis). Each panel reports results from three different matching procedures. The first matching procedure (Match 25) provides, for comparison, results from the initial matching procedure that was used for Figures I and II. The second and third matching procedure (Match 20 and Match 40) match on the same variables as in Figure I and II but use tighter (Match 20) and more relaxed (Match 40) tolerance bounds. In particular, while the matching for Figure I and II are performed based on a tolerance of a maximum of 25% deviation between matched firms for the probability of default, Match 20 (Match 40) uses 20% (40%).

Panel A: Two-Year BHAR Difference between U.S. and German Firms



Panel B: Two-Year BHAR Difference between U.S. Firms Before and After the 2005 Bankruptcy Reform