SOFT VS. TOUGH BANKRUPTCY LAW
EVIDENCE FROM THE U.S. AND GERMANY

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Abstract

This study compares the implications of the U.S. and German bankruptcy codes, using a matched sample of bankrupt firms from both countries. The main focus is on analyzing the abnormal returns prior to and around the firms' bankruptcy announcement. There are three new insights from the analysis. First, equity holders fare better under the creditor friendly German procedure. Not only are there fewer bankruptcy announcements, but shareholders lose less and accumulate these losses slower than their U.S. counterparts in the year prior to the bankruptcy announcement. Second, the most significant determinants of negative abnormal returns for this period in the US are the illiquidity of the stock, the size of the company, and its asset growth. In Germany, high losses are significantly correlated with a high fraction of bank debt and a low fraction of total debt. Third, there is evidence of larger shareholder losses in the U.S. due to higher agency and bankruptcy costs. It is shown that the probability of default one year prior to the bankruptcy announcement can have a negative effect on the equity returns if the magnitude of these costs is high or a positive effect if it is low. A robust result from the analysis is that the probability of default has a significant negative impact in the U.S. and a significant positive impact in Germany, indicating higher costs in the U.S.

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1 Introduction

While the need of a state imposed bankruptcy law is largely undisputed, scholars disagree on whether a creditor or a debtor friendly bankruptcy procedure is socially efficient. The topic has become even more important with the acceptance of the new EU members and the process of harmonization of the different bankruptcy codes. Observed differences include the costs of financial distress, the size of creditors' recovery rates, the possibility of super priority financing, the type of firm management during reorganization or the violation of the absolute priority rule.

This article adds to the empirical literature on the comparison of international bankruptcy law by taking the shareholder perspective. A key result is that the debtor friendly U.S. procedure may not make shareholders better off. This observation is based on a matched sample comparison of the abnormal returns of bankrupt U.S. and German companies prior and around their bankruptcy announcement. The sample consists of 1160 U.S. and 116 German firms, which have filed for bankruptcy between 1999 and 2007. In the first step, an event study is performed to measure and analyze the accumulation of the abnormal returns for different event windows around bankruptcy. In the second step, the magnitude of these returns is explained in a separate multivariate analysis for each country and in a matched sample of the two countries.

There are three main results from this procedure. Fist, bankruptcy leads to higher losses for shareholders in the U.S. and these losses are accumulated much faster than in Germany. Second, one can use balance sheet and market data to explain why some companies lose more than others around their bankruptcy announcements. Third, the results suggest that bankruptcy is associated with higher bankruptcy and agency costs in the U.S. than in Germany.

This study makes several contributions to the existing literature. It uses a much larger sample compared to prior ones, which allows for a matched sample comparison between the two bankruptcy procedures. This is crucial, as firms filing for bankruptcy under different bankruptcy regulations are often not comparable. It also allows for identifying firm specific determinants for the stock returns of bankrupt firms prior and around the announcement. It further suggests that a debtor friendly bankruptcy code such as Chapter 11 may be worse for shareholders.

A related article by Armstrong and Riddick (2000) studies bankrupt firms from six G7 countries and compares their stock behavior starting three years prior to the bankruptcy announcement. Contrary to this study, they find that shareholder losses in creditor friendly Germany are higher than those in the debtor friendly U.S. Their sample however is not matched and totals 278 bankruptcies. Similarly, Gutiérrez, Olalla, and Olmo (2005) present an unmatched sample of 248 firms from the UK, Germany, France, and Spain and seek to explain the inter-country difference in stock behavior prior to bankruptcy. They base their analysis on country specific dummy variables such as financial system orientation, the credit friendliness of domestic bankruptcy law, and the efficiency of the legal system. However, as their sample is not matched and does not contain a typical example

of a country with a shareholder friendly bankruptcy code, it does not aim at comparing soft with tough bankruptcy law.[2]

The finding that shareholders of bankrupt firms may be worse off in the U.S. than in Germany is somewhat surprising, given the fact that the U.S. bankruptcy code is more debtor friendly and offers more chances for firms to survive (Franks, Nyborg and Torous, 1996). This may explain why it is being entered much more frequently by debt holders (e.g. Povel, 1999; Claessens and Klapper, 2005).[3] In fact, a descriptive analysis of both samples shows that there are considerably more bankruptcies in the U.S. and that the emergence rate is almost three times as high. However, focusing solely at these figures can be misleading when comparing the two bankruptcy procedures.

An event study on the abnormal returns for the two samples of bankrupt companies shows that U.S. firms lose more value in the year prior to default (-91% in the U.S. compared to - 77% in Germany in the matched sample) and they also accumulate these losses at a much faster pace. One possible explanation is that the U.S. market aggregates information more efficiently. An alternative view is that shareholders in Germany are more hopeful that the distressed company will restructure out of court. The latter observation is consistent with Kaiser (1996) and Brunner and Krahnen (2008).

The study therefore seeks to explain the magnitude of these abnormal returns by means of a multivariate analysis. This is done by using balance sheet and market data for each country separately and for a matched sample of both countries. Several robustness tests are also performed, including a nonparametric test for the matched sample. The main insight from this analysis is that one can find different firm specific determinants for the magnitude of shareholder returns around the bankruptcy announcement. In the case of the U.S., shareholder losses are higher when the stock is illiquid, the company is small, and it has expanded in the previous years. In Germany, high losses are correlated, among others, with a high fraction of bank debt and a low fraction of total debt. A particular difference between the two countries is in the effect of the probability of default measured using the Black-Scholes-Merton [BSM] model one year prior to the announcement. It is negative in the U.S. and positive in Germany. This effect is robust and it allows for a comparison between the two bankruptcy procedures.

To understand why the probability of default one year prior to the announcement has a different effect in both countries, one should observe that this probability is present both in the numerator as well in the denominator, when calculating the returns of the bankrupt companies. The intuitive explanation for this twofold effect is as follows. On the one hand, there is an immediate positive effect: the market punishes companies threatened by default with a higher discount from the market price in the beginning of the event window. On the other hand, there is a long-term negative effect stemming from the bankruptcy and agency costs. While they are only in expectation in the beginning, they are actually incurred, when the company announces bankruptcy at the end of the event window. Overall the effect is positive for low bankruptcy costs, but negative for high bankruptcy costs. Therefore, by analyzing the probability of default and including it in the analysis of

[2] France is an example for a country with low creditor rights. Given the emphasis of the bankruptcy code on protecting labor, it is however not an example of a bankruptcy law, which is favorable for shareholders (Armstrong and Riddick, 2000; Davydenko and Franks, 2008).

[3] Claessens and Klapper (2005) show that, relative to the number of firms, there are almost 3.5 more bankruptcy announcements in the U.S. than in Germany.

the stock returns of bankrupt companies, one can gain an insight into the importance of these costs for each country. As pointed out above, the main new result from implementing this observation indicates that bankruptcy costs in the U.S. are higher than those in Germany.

The view that soft bankruptcy law may be worse for shareholders does not dominate the literature. A notable exception is Bebchuk (2002), who shows that deviations from the absolute priority rule [APR], a major distinction between the debtor friendly U.S. and creditor friendly German bankruptcy codes, aggravates ex ante risk shifting with the effect that equity holders bear the agency costs.[4] Kaiser (1996) and Brunner and Krahnen (2008) argue that creditor friendly bankruptcy codes allow for a better coordination among banks, which makes pre-bankruptcy workouts more probable. This would explain why the losses in the German sample are accumulated at the end of the event window, when market participants realize that bankruptcy is inevitable. It could further explain why the indirect and agency costs are smaller in Germany. As a workout is expected until shortly before the announcement, there is less time for these inefficient costs to accumulate.

The article adds to the steadily growing literature on the comparison of international bankruptcy law. Some recent contributions include Acharya, Sundaram, and John (2008), who show that debtor friendly bankruptcy codes create inefficient going-concerns, while creditor friendly procedures result in inefficient liquidations. The studies of Armstrong and Riddick (2000) and Gutiérrez, Olalla, and Olmo (2005) are related to this one and were mentioned above. Davydenko and Franks (2008) consider defaults in France, Germany and the UK and show that stronger creditor rights lead to higher recoveries in bankruptcy. This paper therefore complements their results by showing that tough bankruptcy law may be more preferable not only from the creditors' but also from shareholders' standpoint.[5]

The rest of the paper continues as follows: Section 2 gives a short theoretical background of what is being done in the empirical part. It starts with a discussion of the differences between the German and the U.S. bankruptcy codes and presents the main hypotheses. The data and methodology, the magnitude and pattern of the abnormal returns are presented in section 3. Section 4 starts with a descriptive overview of key balance sheet and market-based ratios, and presents the multivariate analysis together with some robustness checks. Section 5 concludes.

2 Institutional Background and Hypotheses

2.1 Key features of the U.S. and German bankruptcy codes

The two major bankruptcy procedures in the U.S. are Chapter 7 and Chapter 11. Chapter 7 is the liquidation provision under which a trustee is appointed by court to oversee the liquidation of the company, and Chapter 11 allows the firm to remain in operation by giving at the same time substantial rights to the directors to propose a reorganization

[4] For a non-positive view of the APR see e.g. Povel (1999) and Berkovitch and Israel (1999).

[5] Further, Franks, Nyborg, and Torous (1996) compare the U.S. code with that of Germany and the UK. White (1996) and Kaiser (1996) study Britain, France, Germany and the UK, and LoPucki and Triantis (1994) and Packer and Ryser (1992) study the U.S. and Canadian and the Japanese procedures respectively.

plan. As the majority of the U.S. sample has filed under Chapter 11, it will remain in the focus of the following discussion.

Since 1999, a new unified legal framework, *Insolvenzordnung*, has become effective in Germany. Its main purpose is to weaken the former dominant position of the creditors and present the firms with a better chance of survival. Despite the reform there are still considerable differences between Chapter 11 and *Insolvenzordnung*. [6]

Chapter 11 is considered a soft procedure, because it possesses the following features. It requires no filing reason. The shareholders remain in charge of the firm. There is an automatic stay on all creditor claims, and there is often a violation of the absolute priority rule (e.g. Davydenko and Franks, 2008; Franks, Nyborg, and Torous, 1996).

In Germany in contrast, a firm must be (imminently) insolvent, over-indebted, or both to file for bankruptcy. In 99.4% of cases the control rights of the firm go over to an administrator designated by the creditors or the court.[7] There is an automatic stay on creditor claims of only three months, in which the shareholders can propose a reorganization plan. Further, there is rarely a violation of the absolute priority rule.[8]

These differences suggest that the German and the U.S. sample will be very different in nature. It is to be expected that U.S. firms would be in a better shape when entering bankruptcy, as bankruptcy could be seen as a strategic move to seek protection from creditors while still retaining control and significant bargaining power (Giammarino, 1989; Povel, 1999; Armstrong and Riddick, 2003).

In contrast, the German firms will be "worse" in the sense that bankruptcy is seen as the last opportunity, when none others are left. The prior empirical evidence seems to confirm this.[9] Kaiser (1996) documents that virtually all reorganizations in Germany occur out of court. Similarly, Brunner and Krahnen (2008) point out that the creditor friendliness of a bankruptcy code induces coordination among banks with the effect of more out of court pre-bankruptcy workouts. This is also reflected in the fact that there are more than three times more bankruptcy announcements in the U.S. than in Germany relative to the firms in the economy (Claessens and Klapper, 2005).

To sum up, it can be expected that shareholders of U.S. firms filing for Chapter 11 will lose less around the event of bankruptcy than their German counterparts. The reason is that the market would expect a recovery with a higher probability and firms would be on average in a better shape when entering bankruptcy. The fact that the market might expect an out of court workout instead of bankruptcy in Germany only strengthens the argument of bankruptcy being worse news there.

The following study shows that this may not be the case. After deriving testable hypotheses from the arguments above, it first shows in an event study that shareholders of German firms lose less. Then in a second step it tests the hypotheses to go behind the rea-

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[6] For a thorough discussion on the differences between the German and the US bankruptcy codes, see for instance Davydenko and Franks (2008).

[7] According to Statistisches Bundesamt, a "debtor in possession" (Eigenverwaltung) has been allowed in only in 0.6% of the bankruptcy cases since 1999.

[8] In Germany, a majority voting procedures can dilute the rights of dissenting creditors. Nevertheless, a reorganization plan requires the approval of a majority of secured creditors in order to be passed by the court. According to the index of creditor rights by La Porta, Lopez de Silanes, Schleifer, and Vishny (LLSV, 1998), Germany has a score of three out of four compared to only one in the case of the U.S.

[9] See e.g. Franks, Nyborg, and Torous (1996), Landfermann (1994), Breuer (2003).

sons why some companies lose more than others not only within their country sample, but also in a matched sample from both countries.

2.2 Testable Hypotheses

Before turning to the hypotheses, it is helpful to consider a simple example, which gives an idea of the possible determinants of the shareholder returns.

Example 1: Consider a leveraged firm with cash flows of $R1 = \{CF1,0\}$ in $t = 1$ and $R2 = \{CF2,0\}$ in $t = 2$, where the low states appear with (correlated) probability β_1 and β_2 respectively. The firm owes debt equal to X. If the firm defaults on its payment in the first period, it announces bankruptcy and incurs bankruptcy costs K. K may include direct and indirect bankruptcy costs as well as agency costs. Given these settings the shareholder return of a company defaulting in $t = 1$ is

$$return = \frac{price_{t=1}}{price_{t=0}} - 1 = \max\left(-1, \frac{CF2(1-\beta_2) - X - K}{CF1(1-\beta_1) + CF2(1-\beta_2) - X - \beta_1 K}\right). \quad (1)$$

With this example it is easy to derive the following result.

Corollary to Example 1. *The effect of the probability of default on the equity returns of bankrupt companies is*
(i) positive when the bankruptcy costs are low;
(ii)negative when the bankruptcy costs are high.

Proof. See the appendix. ■

One of the main ideas in the following analysis is that bankruptcy risk one year prior to default can explain part of the risk and the return patterns of defaulting firms around the bankruptcy announcement and it can be used to compare different bankruptcy codes. Corollary 1 gives the reason for that. The effect of the probability of default on the equity returns of bankrupt companies depends on two conflicting effects.

The positive effect is obvious. A high default risk one year prior to the announcement is already mirrored by low stock price levels and therefore leads to less value destruction in the remaining year.

The second effect is long term and negative. It is due to the fact that bankruptcy costs, which are only in expectation in the beginning of the event window, are considered to be sure when the company files for bankruptcy. [10] The indirect bankruptcy costs strengthen this effect (Altman, 1984). They accumulate when stakeholders such as business partners, employees and customers, fearing bankruptcy, start abandoning the firm. Agency costs such as risk shifting may also contribute to the long term effect (Jensen and Meckling, 1976; Myers, 1977). As Bebchuk (2002) argues, risk shifting will be especially pronounced in the case of violations of the APR as under Chapter 11.

[10] The existing empirical evidence on the U.S. market by Warner (1977), Ang, Chua, and McConnell (1982), and Weiss (1990) seems to agree that these costs are in the range of 5% of the firm value for the U.S.

The statement from this corollary provides the motivation for the first hypothesis.

Hypothesis 1: *Given that bankruptcy is inefficient and is associated with direct and indirect bankruptcy costs as well as agency costs, the probability of default can have a positive or a negative effect on the stock returns of bankrupt companies. When these costs are*
(i) high, the probability of default will be negatively correlated with the equity returns.
(ii) low, the probability of default will be positively correlated with the equity returns.

In particular, if bankruptcy triggers higher costs in the U.S., it may be expected that the probability of default has a negative effect in the U.S. whereas it has a positive effect in Germany. The intuition behind this argument bases on the discussion in the previous section. First, bankruptcy is a more probable event in the U.S. than it is in Germany, because the management in the U.S. may announce bankruptcy for strategic reasons and because an out of court workout is more common in Germany. Therefore, however bad news financial distress in Germany may be, indirect bankruptcy and agency costs will be of less importance. The reason is that they start accumulating when it becomes clear that a workout cannot be reached, which is typically the case shortly before the announcement in Germany. Following the same logic, in the U.S. the negative effect may be stronger. As such an argument cannot be entirely checked in a multivariate analysis, an additional event study is needed to characterize the development of the returns prior to bankruptcy. Obviously, the results may further depend on the method for measuring bankruptcy risk. The method used in this study is bases on the Black and Scholes Merton [*BSM*] approach (e.g. Hillegeist et al., 2004). A thorough discussion and empirical support for using this approach is offered in the appendix section A.2.

Having stated the main hypothesis, it further makes sense to look at more traditional ways to characterize the value destruction around bankruptcy. The following hypothesis bases on the traditional way of identifying bankruptcy (e.g. Altman, 1968; Ohlson, 1980) and is therefore not discussed in detail.

Hypothesis 2: *Shareholders of more highly leveraged, less profitable, and small firms will lose more.*

It is to be expected that equity holders of highly leveraged firms and firms paying higher average interest will lose more. In contrast, equity holders of more profitable firms will lose less, because firms with good operating business are more likely to restructure successfully and emerge from bankruptcy.

Size pays tribute to the “too big to fail”-effect. It should be noted however that it is not obvious that it should have a positive sign. There may be also other mechanisms at work. For instance, on the one hand it may be easier for a larger firm to renegotiate privately with its creditors (Gilson, John, and Lang, 1990). On the other hand, such a firm would normally also have a larger number of creditors. This makes the coordination among them harder and thereby hinders the efficient reallocation of the company’s assets towards more profitable activities (Eberhard, Moore, and Roenefeld, 1990; Franks, Nyborg, and Torous, 1996). In their study on market valuation of bankrupt firms, Gutiérrez, Olalla, and Olmo (2005) find evidence for the latter effect. They have a negative sign for size.

It was mentioned above that there may be higher expectation towards an out of court workout in Germany. In accordance with prior literature on the probability of an out of court restructuring, this study uses the fraction of bank debt to reflect the expectations of the market towards an out of court solution (Gilson, John, and Lang, 1990; Jostarndt and Sautner 2007). It is assumed that a company, which has a higher fraction of bank debt, faces higher reorganization expectations from the market, and so disappoints more when it files for bankruptcy.

Hypothesis 3: *(For German sample only): The high fraction of bank debt has a negative impact on the valuation of bankrupt firms. It indicates unsuccessful attempts to renegotiate bank credit despite the interest of the bank in doing so and thus signals a bad firm to the market.*

Inevitably, the question on whether the filing form plays an important role needs to be touched upon as well. This issue has been addressed in the following hypothesis. It states the firms filing for liquidation in the U.S. will experience worse valuation. In contrast, firms, which file under "imminent insolvency" in Germany, will be valued higher, as this reason reflects an early bankruptcy filing and possibly a healthier firm.

Hypothesis 4: *The filing form/reason matters for the market valuation of bankrupt firms. Chapter 7 filings lead to higher value destruction in the U.S.; Filings under "imminent insolvency" lead to less value destruction in Germany.*

One final hypothesis is also tested at the end. In the spirit of Morck, Schleifer and Vishny (1988) it is tested whether the concentration of board ownership has an effect on the equity returns. Depending on whether the concentration of ownership leads to managerial entrenchment or to alignment with the shareholders' interests, the sign could be positive or negative. As the data available are limited and available only after 2002, this hypothesis is not included in the main model specification, but rather discussed as a robustness check.

The first step before the multivariate analysis is an event study to analyze the information effect that the announcement of bankruptcy has on the firm's equity returns in Germany and the U.S. This step is necessary for two reasons. First, it will give an idea about how the dynamics of the stock price differ in Germany and the U.S. one year prior to bankruptcy. Second, it will provide evidence on which Hypothesis 1 can step upon.

3 Measuring the Abnormal Returns: an Event Study

3.1 Data and Methodology

The sample consists of U.S. and German firms, which have gone bankrupt between 1/1/1999 and 7/12/2007. Four types of data have been collected for each firm: the filing date, market and balance sheet data starting in 1992, and press articles starting one year before the announcement until 7/12/2007. The source for balance sheet and market data are Thomson Financial's Datastream and Worldscope. As these data are not available for firms no longer listed, it was further amended by manually extracting the necessary in-

formation from the annual statements, which are available for download from the SEC-Edgar database. Information regarding the date of bankruptcy and the fate of the firm after the announcement was inferred from the press. The main sources in this case were LexisNexis and Factiva, but also the internet service provider bankruptcydata.com. The latter specializes on collecting information regarding bankrupt U.S. firms.

INSERT TABLE 1

A company was taken into consideration only if it has filed for bankruptcy and not if it is merely in financial distress. The German sample totals 116 firms and the U.S. sample 1160 firms. Full balance sheet and market data, which could be used in the multivariate analysis were however available only for approximately 70% of the firms for both samples.

Apart from a comparison of the full samples of bankrupt German and U.S. firms, a matched sample has been further used to minimize the selection bias of having firms going bankrupt under different bankruptcy procedures. The matching technique used is a mixture of matching on the propensity score and caliper matching, a variant of the nearest neighborhood matching (here) without replacement (Rosenbaum and Rubin, 1983; Smith and Todd, 2005; Heckman, Ichimura, and Todd, 1997).[11] In particular, for each bankrupt firm from the German sample it is attempted to find a corresponding firm from the U.S. sample. The matching is done in three dimensions. The first matching criterion is the probability of default. Since this measure is composed of different firm specific data and is bounded between zero and one, a parallel can be drawn to the propensity score. After adjusting for currency differences, Total Assets was taken as the second criterion for finding a match for the German firms.[12] In case there were more firms left as a matching candidate, a third criterion, industry, was applied. Due to the limited number of firms, which satisfy the first two criteria, only the first digit of the SIC-code industry classification is considered. Proceeding in this way, matches were found for 58 of the German companies.

Table 1 gives a descriptive summary of the data for each year between 1999 and 2007. Not surprisingly, one can see that there has been a peak in bankruptcy announcements in 2001 and 2002 both for the U.S. and Germany. This coincides with the U.S. recession from the same period, the bursting of the technology bubble, and the unsecure political situation combined with low consumer sentiment at that time (e.g. Nofsinger, 2005). There is a reduction in the insolvencies in both countries since 2002, which may reflect the relatively stable economic environment in that period. It is important to note that the accumulation of bankruptcies in 2001-2002 may lead to a bias when analyzing the determinants of value destruction in section 4. According to Lang and Stulz (1992) there exists a contamination to a bankruptcy announcement for firms in the same industry. One may therefore expect that 2001 and 2002 will play a significant role in the multivariate analysis later on.

Panel A in Table 1 shows further that 95% of the U.S. firms in the sample filed for creditor protection under Chapter 11. 20% were however eventually liquidated. For 30% there is either no information available, or they are still under Chapter 11 protection, 10%

[11] Caliper matching, a variant of nearest neighborhood matching without replacement, imposes a tolerance on the maximum distance $\|P_i - P_j\| < \varepsilon$ allowed. This is one way to impose a common support condition. Treated firms for which no matches can be found within the caliper are excluded from the analysis.

[12] The exchange rate at the end of the fiscal year is considered, when adjusting for currency differences.

(not seen in the table) have been acquired and the rest 34% have emerged either private or public. Panel B gives similar information about Germany. Notable is that approximately one fourth of the firms filing for insolvency have chosen the new option "imminent insolvency" with it being the second most common reason for bankruptcy protection. Further, the identified German bankrupt companies are ten times fewer than their U.S. counterparts. This low rate is in line with the lower market capitalization in Germany and the finding of Claessens and Klapper (2005) that there are more than three times more filings in the U.S. compared to Germany relative to the firms in the economy. More importantly, it is evidence for the arguments in the previous section that the German code makes insolvency less attractive for debtors than Chapter 11. As expected, there are considerably less recoveries in Germany than in the U.S. in relative terms and the average recovery time is approximately 60% longer.[13] This gives reasons to be careful when comparing the U.S. with Germany, as the conjecture that the German sample is comparable only to the "worse" U.S. firms seems to be confirmed.

In Table A.1 in the appendix there are some additional statistics regarding the distribution of the sample in different industries using the SIC code classification. Not surprisingly, given the technology bubble in the early 2000's, it can be seen many of the bankrupt firms are in a technology related sector. The picture is highly comparable for Germany.

Matched sample

Table 1 and A.1 present also the results for the matched sample. It can be seen that in both cases the distribution of firms across industry and year of default is pretty much comparable to the overall samples both across industries and filing years. However, only 19% of the firms in the matched sample have successfully emerged from bankruptcy, compared to 34% in the full U.S. sample. In contrast, the recoveries in Germany are representative for the overall sample: 10.3% compared to 12%. These findings seem to confirm that U.S. firms entering bankruptcy are more viable than their German counterparts.

Before making such as statement however, one should check the abnormal returns of the bankrupt companies to see whether shareholders are eventually indeed better off. This will only be the case, if lower shareholder losses compensate the more frequent bankruptcies in the U.S.

3.2 Measuring the Abnormal Returns of Illiquid Assets

The time frame for the event study is 250 days prior the event and 10 days after it. Looking at such a broad horizon gives a chance to look beyond the short term shock of the bankruptcy announcement and to try to identify the fundamental sources for the long term value destruction. Furthermore, to get a sense of the market reaction on the bankruptcy date, two short term event windows, +/-3 days and +/-10 trading days around the event are presented. The abnormal returns are calculated using standard event study methodology (MacKinlay, 1997; Brown and Warner, 1985) with market model parameters estimated over the prior one year interval. In order to avoid a bias in the market model estimates caused by the illiquidity of some assets, a correction proposed by Scholes and Williams (1977) is considered. They argue that falsely assuming equal time intervals between the daily returns leads to a bias in the betas and alpha of the market model. The

[13] This table makes an exception by reporting calendar and not trading days.

coefficients they propose are easily computable, and do not depend on the specific assumptions regarding the probability distribution and the sequence of non-trading days. A further advantage is that in the case of equal trading intervals, they coincide with the standard coefficients of an OLS model. The rationale for using the Scholes and Williams method in this case is that around bankruptcy some assets are quite illiquid, and some are more liquid than the average due to speculations and sell offs. To further minimize the biases in the estimation, a rolling window approach is used to estimate the coefficients separately for each day in the event window (e.g. Hillegeist et al.). Finally, the method used to aggregate the abnormal returns is proposed by Ritter (1991). The idea is to aggregate the abnormal returns geometrically. His Buy and Hold Abnormal Returns [BHAR] thus look the following way:

$$BHAR_T = \prod_{t=1}^{T}\left(1 + AR_{i,t}\right) - 1. \tag{2}$$

They have the advantage that they are restricted to -1 and represent the result of a buy and hold strategy.

3.3 BHAR for the U.S. and Germany

The first evidence that shareholders are not better off under the soft U.S. bankruptcy law is given in the event study results. Table 2a) shows the full sample results of the event study for three different time frames. Displayed below the BHAR-values are a number of nonparametric tests such as the one sample and two sample mean comparison tests, checking respectively whether the BHAR's are significantly different from zero and whether the means of the German and U.S. samples for each period are equal. It has been further tested whether the medians of the German and U.S. samples are equal. The results of two sample Wilcoxon rank-sum tests are also presented.

The first insight from the event study is that the median loss in the U.S. of 94% is significantly greater than the 86% loss in Germany at the 1% level. These results are disappointing from the shareholder perspective. They show that the shareholders in the U.S. are not compensated for the more frequent bankruptcies by a smaller loss on their stock. Although the difference in terms of mean is not significant for the full sample, it is robust and significant over all robustness checks that are discussed below. In particular, it is significant both in terms of mean and median for the matched sample. This is a new finding, which contradicts the previous results in the literature. The average value loss of 82% for the U.S. is more than the average 51% found by Clark and Weinstein (1983) for the last year and also larger than the 61% found by Armstrong and Riddick (2000) for the last three years prior to insolvency. This may be due to the considerably larger sample in this case. As it is argued below however, it is not due to the fact that there have been many bankruptcies around the technology bubble in 2001-2002. For Germany there is a mean value reduction of 79.7%, which is larger than the 43% found by Gutiérrez, Olalla, and Olmo (2005) for the three years prior to insolvency and slightly larger than the 77% for the last year prior to the announcement reported by Armstrong and Riddick (2000).[14] Most importantly, by using considerably larger samples this study contradicts the ones

[14] Just as in the U.S. case, both references use significantly smaller samples.

mentioned above by showing that there is larger value destruction in the U.S., a result also true for the matched sample as argued below.

The second new insight is that losses in the U.S. are accumulated much faster than in Germany. One possible explanation is that markets in the U.S. are more efficient. Market participants learn early that a firm is about to go bankrupt and this is reflected in an early discount in stock price. An alternative and complementary explanation is the argument of Brunner and Krahnen (2008) and Kaiser (1996): an out of court reorganization is considered more probable under a creditor friendly procedure. That gives hope to the shareholders and is responsible for the losses in Germany to accumulate at a later period. If this is indeed the case, then a debtor friendly bankruptcy code is bad news for the shareholders, because in the eyes of the market it discourages out of court reorganizations. In that respect the result is complementary to the one by Gilson, John, and Lang (1990) and Jostarndt and Sautner (2007), who show for the U.S. and Germany respectively that workouts are better accepted by the market than bankruptcy announcements.

INSERT TABLE 2a), b)

Together, these two results are the backbone of the argument to use the probability of default as a distinction variable between both countries. As explained above, default risk has a twofold effect on equity returns. The immediate effect punishes the company by an immediate discount from its stock price, thereby leaving less for the company to lose. The long term effect is due to bankruptcy and agency costs. If workouts are less probable in the U.S. and instead bankruptcies are more probable, then the indirect bankruptcy costs connected with the uncertainty regarding a bankruptcy announcement will be higher. The same holds for agency costs such as risk shifting. According to the first hypothesis higher costs can then lead to the probability of default having a negative effect instead of a positive one on the equity returns.

For completeness, looking at the shorter horizons, there is clear evidence that although in many cases anticipated, the bankruptcy announcement brings new information to the market in both countries. German firms lose more on average in the 21 days (48% compared to 35%) as well as in the 7 day event windows (41% compared to 25%). These differences are significantly different at the 1% level, but are in contrast to the values of the medians and cannot be confirmed by the 21 day event window. They show however that bankruptcy is important news in both countries, which leads to significant value correction in the days around the announcement.[15]

Several alternative tests have been performed to test the robustness of the above results. The first one is repeating the tests with bankruptcy announcements only after the year 2002. The results are even stronger. The mean average *BHAR_261* loss for the U.S. sample is 84% compared to 70% in the German case.[16] [17] The median values are -95% and -71% respectively. Both means and medians are significantly different at the 1% level. The development of the *BHAR* also confirms the above arguments. 150 days before the announcement the average loss for the U.S. sample is 34%, whereas there is a gain for

[15] In this respect the analysis confirms the findings of the previous studies (e.g. Clark and Weistein, 1983, Aharony, James, and Swary, 1980; Rimbey, Born and Anderson, 1995) and contradict the finding of Frino, Jones, and Anderson (2007) for their sample of Australian firms.

[16] BHAR_# denotes the #-days event window.

[17] The results of these additional tests are available upon request.

the German sample of 5%. One can therefore conclude that the results are not driven by the technology bubble in the early 2000's.

Matched sample

The second robustness test considers the matched sample. Table 2b) displays the development of the BHAR's for the matched sample. In accordance with the above findings, in the long run event window one observes that U.S. companies lose more value than their matched German counterparts not only in terms of median (-96% vs. -82%), but also on average (-91% vs. -77%). These differences are significant at the 1% level. One should recall that in the non-matched sample German and U.S. samples seemed to lose equally on average in the long run, with the median loss of U.S. companies however being significantly higher. In the 21 and seven days event windows the results are comparable to the full sample. All in all, they confirm that bankruptcy announcement is always bad news and that U.S. shareholders actually fare worse despite the more debtor friendly bankruptcy code.

INSERT TABLE 3

For completeness, Table 3 contains the abnormal returns for the bankrupt U.S. and German samples, reflecting a buy-and-hold strategy starting five, four, three, two, and one year prior to the bankruptcy filing respectively. The table reports the number of bankrupt securities available at the beginning of each buy-and-hold strategy, the number of securities with negative buy-and-hold abnormal returns at the end of each year, as well as the mean and median BHAR at the end of each year. One can see that the results from above are confirmed again. Further, in line with the findings in the literature, firms that are about to go bankrupt start accumulating negative returns in many cases five years prior to the anouncement. One can see however that U.S. firms accumulate more losses and they are accumulated much faster than from their German counterparts.[18]

Finally, robustness checks with the simple and not abnormal returns also yield the same results. Therefore, the results in this section have provided evidence that bankruptcy leads to more and faster destruction of value in the U.S. than in Germany. This gives support to Hypothesis 1 that the value destruction will have different causes. With this in mind, one can turn to the multivariate analysis.

4 Explaining the Abnormal Returns

4.1 Descriptive Statistics

Table 4 gives a descriptive overview with data one year prior to bankruptcy over the German and the U.S. sample comparing them to non bankrupt firms from the S&P500 and CDAX indices respectively.[19] Both the German and the U.S. bankrupt firms are significantly smaller than the typical index firm. The average size of a bankrupt public German firm (€245 mil.) is almost one seventh of its U.S. counterpart ($1.7 bil.) not correcting for the currency differences. It is however only one half of its size, if the medians are

[18] The reason for different numbers under "count" in Panel A is that for some firms trading virtually stops at a certain point in time. This explains why there are only 862 left in the first event window.

[19] Nonparametric tests concerning the differences in mean in median can be provided upon request.

taken ($118 mil. And €56 mil.). These findings are not surprising given the fact that one can find similar ratios comparing the S&P and CDAX non bankrupt firms.

INSERT TABLE 4

A brief look at the market to book ratios [*MTB*] confirms again the observation that one year before bankruptcy it is more difficult to identify a troubled firm in Germany than it is in the U.S. The *MTB* ratios in Germany are not statistically different both in terms of median (1.3 and 1.4) as well as in terms of average (2.2 and 2.8) for bankrupt and non bankrupt firms. In the U.S. the situation is completely different with bankrupt firms having a median *MTB* of 0.3 compared to 2.7 for the median S&P500 firm. However, it is to be noted that the standard deviation of the U.S. sample is very large with many highly negative *MTB*-ratios present.

A similar picture is conveyed by the BSM-probabilities.[20] Both 250 days as well as 10 days before the bankruptcy announcement, the average bankrupt U.S. firm has a significantly higher probability of default than its German counterpart. For both time periods and samples the probability of default is significantly higher than for the S&P500 and CDAX firms, which was to be expected given the results from above.

As the different profitability and liquidity measures and are not central in this study, they will not be discussed in detail. A brief look tells us that they are highly comparable between both countries, both for the bankrupt and non bankrupt samples. The goodness of their predictive power for bankruptcy, i.e. whether the differences between the bankrupt and non bankrupt samples are significant, can be inferred from Table A.5 in the appendix.

More attention will be turned to the different leverage measures. If the ratios of the non bankrupt samples are compared to those presented by Rajan and Zingales (1995) [R&Z], there are no big contradictions to be found.[21] One difference is that, contrary to common belief, non bankrupt companies in both countries seem to be equally leveraged if Total Liabilities to Total Assets [*TL*/*TA*] is taken (ca. 0.6). Looking at Total Debt to Total Assets [*TD*/*TA*] as a leverage indicator tells the same story (0.22-0.24 for GER and U.S.), which is almost the same result as in Rajan and Zingales (1995). The composition of debt seems to be an interesting issue. Both this sample and R&Z, but also a study performed by Gertler and Glichrist (1994), show that German firms have almost twice as much short term debt in relative terms compared to the U.S. Non bankrupt U.S. companies further seem to have more bank debt (measured as Total Debt to Total Liabilities), but the difference is not as big as found by R&Z.

Taking a closer look at the bankrupt samples, *TL*/*TA* once again suggests that is more difficult to tell a troubled firm in Germany. Bankrupt German firms are only slightly more leveraged than typical CDAX firms. Not so in the U.S.; bankrupt companies have a median leverage of 0.9 compared to 0.6 for the median S&P500 firm. *TD*/*TA* supports the latter finding. It further shows that troubled German firms have considerably more total debt on average (0.3) than not troubled companies (0.2), suggesting that this is a better

[20] A thorough motivation for using the BSM-approached is offered in the appendix section A.2.

[21] As noted by Tirole (2006), measures of leverage vary across different studies for several reasons. First, leverage depends on the sample (small/large or private/publicly listed companies). Second, studies that report nonweighted means are likely to report higher leverage than those that compute weighted averages. Another reason is that studies differ in the period they cover.

leverage ratio, when identifying troubled companies.[22] *Short/Total Debt* is another measure, which requires mentioning. It seems support to the theory of Barnea, Haugen, and Senbet (1980) that more short term debt signals a bad company.[23] In Germany and in the U.S. bankrupt firms have significantly more short term debt. Again the contrast is greater in the U.S. The case of *Fraction of Bank Debt* is just the same. In both countries bankrupt firms have more bank debt: 0.6 and 0.4 compared to 0.4 and 0.3 respectively for U.S. and Germany. With these descriptive statistics in mind, the attention can be finally turned to the regression results.

4.3 Regression Results

The method used for the multivariate analysis is simple OLS with robust standard errors. Despite the timeframe from 1999-2007, this is not a panel regression, since each firm is considered only once. The dependent variable are the BHAR. BHAR261 signify a start of the buy and hold period 250 days before the announcements. For the U.S. sample a dummy for 2001 and 2002 each is included in order to take into account the specific effect of these years. For the German sample only 2002 is considered, since 2001 turns out to have no significance.

Panel A of Table 5 displays the results for the U.S. sample. Model 1 is the complete specification and takes into account all hypotheses. Models 2, 3, and 4 are variations thereof isolating Hypothesis 1 and Hypothesis 2, Hypothesis 1 and the control variables, and Hypothesis 1 respectively.

The most interesting result is that in line with expectations, the BSM-probability is significant at the 1% level. It has a negative sign for all long term specifications, suggesting that firms with high probability of default experience a higher value reduction. According to Hypothesis 1(i) this is the case, because the bankruptcy and agency costs are high. Looking at Models 2-4 confirms the result. Even if taken on its own, the BSM-probability significantly explains a good deal of the variation in the equity loss for all time horizons. As Hypothesis 1 is central for this study, it makes sense to make further robustness tests besides different model specifications. Table A.3 and A.4 in the appendix present two such tests. Table A.3 uses the market model to calculate the BHAR instead of the correction of Scholes and Williams (1997). Table A.4 is perhaps even more interesting because it splits the sample into firms which have filed before and during the dot-com bubble and firms which have filed after that. In all cases, the probability of default remains significantly negative. A final robustness check was done using the normal simple returns instead of the abnormal returns. The significance turns out to be even higher in that case.[24]

INSERT TABLE 5

In connection with Hypothesis 2, an interesting finding is that balance sheet data have some explanatory power. *TD/TA* seems to be the most stable significant variable, having a positive sign both for Model 1 and 2. The empirical literature suggests that firms that

[22] Rajan and Zingales (1995) offer a detailed discussion on the advantages and disadvantages of the different leverage ratios.

[23] See also Hart and Moore (1998). They observe that assets tend to be matched with liabilities. Long term loans are often used for fixed assets acquisition and short term loans are used for working capital purposes (payroll, inventories, and seasonal imbalances).

[24] The same holds for all other variables in this regression. The results can be provided upon request.

are more highly leveraged have a higher probability of restructuring (Gilson, John, and Lang, 1990; Jostarndt and Sautner, 2007). This could be an explanation for the positive effect in this case, since the majority of cases have filed under Chapter 11. As discussed earlier, unlike the German code, Chapter 11 allows for strategic default, so that market participants may still hold higher leverage for a positive sign. In contrast, the measure of profitability [*EBITDA/TA*] does not have a persuasive effect. It is significant at the 10% level, but only for Model 2. The estimated effect is positive, confirming intuition that more profitable firms should experience fewer losses. The scaled change of profitability [*d_EBITDA*] is significant at 1%, meaning that firms with less reduction in their operating business perform better. It may be argued that *EBITDA/TA* is not a suitable measure as it might depend on the industry. Running the test with return on equity [*ROE*] instead yields insignificant results, both for ROE as well as for its scaled change.

When explaining the equity loss in the last year prior to insolvency, *Size* (measured as the logarithm of total assets) proves to be an important factor. Larger firms do not lose as much as their smaller bankrupt counterparts. "Too big to fail" may be one reason, but as suggested by Gilson, John, and Lang (1990), for larger firms it is also easier to renegotiate with their creditors. It is therefore interesting to see that the scaled change of total assets $[d\_TA \equiv (TA_t - TA_{t-1})/(|TA_t| + |TA_{t-1}|)]$ has a significant negative impact. There are several explanations for this effect. First, companies that have sold assets in the year prior to the insolvency year can use the proceeds to reduce the leverage. Further, because of such measures, bankruptcy doesn't come as a surprise to shareholders. Second, a high positive change in *d_TA* may indicate that the company has grown inefficiently in the previous years (as during the technology bubble) so that a bigger crash can be expected in the case of bankruptcy (Jensen, 2005).

Further, the *MTB* is significant at the 1% level for all variations and horizons. It seems that firms with higher valuation one year prior to insolvency lose less around bankruptcy. In connection with the negative sign of the default probability, this result suggests that the immediate effect of higher default risk is not the crucial one in the U.S., when comparing the shareholder loss of defaulted companies.

The last hypotheses, Hypothesis 4, also seems to find some confirmation. The minority of firms in this sample that declare bankruptcy under Chapter 7 is valued significantly worse by the market.[25] Finally, looking at the control variables, it is not surprising that the less liquid OTC traded firms perform significantly worse in all cases. The same is true for firms in the high tech industries, *SIC3* and *SIC7*. This was to be expected, because the firms gone bankrupt as a consequence of the burst of the technology bubble were mainly listed under these SIC codes. SIC1 firms however, loose less under all model specifications and horizons. The recession years 2001 and 2002 further explain some of the variations in the long term. Firms, declaring bankruptcy in these years, also destroy more value for their shareholders.

[25] The regression uses the following dummy variables. *penny_stock* is unity if the price of the company was lower than one 250 days before the bankruptcy announcement, *Chapter 7* takes the value of one, if the company has filed under Chapter 7, *OTC* and *NASDAQ* indicate whether the firms were traded OTC or on NASDAQ respectively, *SIC1*, *SIC3*, and *SIC7* are denote the sector the company was operating in. "*Imminent*" takes the value of one, if the company has filed under "imminent insolvency", and *Neuer Markt* indicates whether the company was traded on this market segment. Regretfully, there is no information in Datstream which German firms were traded OTC.

It is not surprising that explaining the abnormal returns in the German sample turns out to be a much tougher business. In accordance with Hypothesis 3, a high fraction of bank debt in firms that declare bankruptcy is a bad signal to the market. However, in 2002 the very same effect is reversed and firms with a higher fraction of bank debt performed relatively better. After checking the descriptive statistics of the firms having filed for bankruptcy in 2002 and those from 2002 that were listed on Neuer Markt, there turns out to be no difference at all from the overall sample regarding the fraction of bank debt (Table A.2). The positive effect in 2002 remains therefore unexplained.

Most importantly however, Hypothesis 1(ii) is confirmed in the German sample. The probability of default has a significant positive effect. Firms with a higher probability of default experience less value reduction. The intuition is that bankruptcy is a rarer event in Germany and it appears to be harder for market participants to foretell it compared to the U.S. A brief reference with Table 4 shows that the average and median levels of the BSM-probability are much higher in the U.S. The very low levels in Germany suggest that the threat of bankruptcy is not as clearly realized by the stakeholders or, as the previous evidence suggests, there is greater hope that it will be avoided. Hence, there is less time for indirect bankruptcy costs and agency costs to accumulate, making the effect of the probability of default positive. As in the U.S. case a number of robustness checks of this result have been performed. Using BHAR calculated with the market model in Table A.3, splitting the sample into pre and post bubble subsamples in Table A.4, and using different model specifications in Table 5 and A.3 all yield the same significant positive result for the probability of default. With reference to the example in section two, it is again important to note that the above results do not mean that there is no immediate effect in the U.S. The low MTB ratio combined with the relatively high probability of default, which was after all extracted from the market prices, suggest that bankrupt firms in the U.S. have already experienced a significant value reduction. In contrast to Germany however, bankruptcy does not seem to be such a big surprise and bankruptcy and agency costs therefore seem to play a bigger role.

Turning to Hypothesis 2, it seems that it has no solid base in Germany. Apart from *Fraction Debt*, only *TD/TA* and *Size* seem to have some significance. The market seems to give more highly leveraged better chances. The same holds for smaller firms. The latter is another difference to the U.S. and repeats the results of Gutiérrez, Olalla, and Olmo (2005) who have performed their tests on Spain, Germany, France, and the UK. It appears that in Europe, smaller firms, possibly with fewer creditors, are able to persuade better that they can emerge from bankruptcy. For completeness sake, it is interesting to see that *Neuer Markt* and *y_2002* both have a highly significant negative effect on the performance of the German sample. There is no evidence for Hypothesis 4 however that firms making use of the new insolvency reason "imminent insolvency" fare better than the rest. This is not surprising, because Table 1 already showed that many of the firms that were able to reorganize did not file using this reason.

INSERT TABLE 6

Matched sample

In the beginning it was argued that it is not possible to compare the coefficients from the two regressions, when the firms have not been matched. A short look at a combined regression for the matched sample case shows the same qualitative results. One can see

that in the 261 days event window in the U.S. the probability of default has a significant negative effect, whereas there is an altogether positive effect in Germany.

Similarly, performing all mentioned tests with the simple returns instead of the abnormal returns yields qualitatively the same results. The probability of default in the U.S. case remains significantly negative at the 1% level, and is significantly positive at the 5% level for the German case. It further turns out that all other variables remain significant at least at the same significance level. Excluding all financial firms from the analysis also yields qualitatively the same results.

As mentioned in section two, one final alternative specification of the above model additionally includes the hypothesis that a high concentration of board ownership has an effect on the equity returns. The hypothesis is derived from the corporate governance literature (e.g. Morck, Schleifer, and Vishny, 1988; Denis, Denis, and Sarin, 1997). It states that the effect of a high concentration of board ownership can be positive or negative depending on whether it reflects a convergence of interests between the managers and the shareholder or rather entrenchment of the management team. The percentage of stock held by key employees available from Datastream was taken as a proxy for board ownership.[26] Unfortunately, data are available only after 2002. There are no qualitative differences, when redoing the tests for this subsample. The proxy for board ownership turns out insignificant with a p-value of 0.9 for the German and 0.2 for the U.S. case. Using the percentage of strategic investments, defined as one minus free float, as an alternative specification yields a similar result. However, as both proxies are far from perfect, it remains for further studies with more precise data on board ownership to check whether the hypothesis is indeed irrelevant.

4.4 Nonparametric robustness tests

A final test for the validity of Hypothesis 1 is performed for robustness reasons. A nonparametric approach suggested by Acharya, Sundaram and John (2008) has been adopted. It relies on pooling the German with the matched U.S. firms according to the value of the probability of default. The pool is divided into five quintiles based on the BSM probability one year before the event [*BSM_Prob*]. Quintile 5 represents the highest value of *BSM_Prob* and Quintile 1 the lowest. As the aim is to measure the influence of the probability of default on the BHAR's, the mean and median values of *BHAR261* are measured for each quintile. Under Hypothesis 1 the probability of default has a positive effect in Germany and a negative in the U.S. Thus, the difference in BHAR's between German and U.S. firms should be growing for higher quintiles. In other words, if one takes the difference in *BHAR261* between Geramny and the U.S. in a given quintile and subtracts from this difference the difference in *BHAR261* from a lower quintile, then this "difference of differences" as Acharya, Sundaram, and John (2008) call it, should be positive.

INSERT TABLE 7

Table 7 presents the results. One can see that as predicted by Hypothesis 1 the difference of differences is positive and growing for higher quintiles. The mean Q2-Q1 is only

[26] The exact definition given by Datastream is "The percentage of total shares in issue held by employees, or by those with a substantial position in a company that provides significant voting power at an AGM". The results of the tests described above are available upon request.

2% and the mean Q5-Q4 reaches 20%. An exception makes Q3-Q2 with a negative difference of differences of -3%. On the whole however, the results are consistent with the prediction of Hypothesis 1. One can therefore conclude that the results from the analysis of the abnormal returns in the previous section are confirmed. A soft bankruptcy procedure such as chapter 11 does not necessarily make shareholders better off. They suffer more frequently from bankruptcy announcements and lose more from agency conflicts and problems resulting from indirect bankruptcy costs than their German counterparts.

5 Conclusion

Using a dataset of 1160 bankrupt U.S. and 116 bankrupt German this study empirically analyzes the abnormal returns of a buy and hold strategy for an event windows starting 250 days before the announcement and ending 10 days after. It has been documented that U.S. firms lose a median of 94%, which is significantly greater than the 86% of German firms. These results are confirmed after taking into account bankruptcies only after 2002 and bankruptcies based on a matched sample of German and U.S. firms. It is further documented that the losses in the U.S. are accumulated much faster, indicating that German shareholders place more hope in the pre-bankruptcy recovery of financially distressed firms. These findings confirm the recent discussion in the literature that shareholders are not better off under a debtor friendly bankruptcy code (Bebchuk, 2002; Krahnen, 2008): not only do they suffer more often from bankruptcy filings, but they are also not compensated by relatively lower losses on their investments.

In order to test the hypothesis that there is more value destruction resulting from indirect agency and bankruptcy costs in the U.S., a multivariate analysis is performed separately for both countries and for a combined matched sample of German and U.S. companies. One of the main hypotheses tested is that the abnormal losses in the U.S. and Germany will be of different nature and that this could be shown by analyzing the probability of default. This is due to the fact that the probability of default is present both in the numerator as well as in the denominator when calculating the returns of bankrupt firms. It has been shown that, depending on the bankruptcy and agency costs, it may have a positive or a negative effect on equity returns. Indeed, the regression results confirm that default risk has a different significant effect in both countries. In particular, its effect in the U.S. is negative, whereas in Germany it is positive. It has been hypothesized that the negative effect is not dominant in the German sample, because the German bankruptcy code predisposes for out of court negotiations and settlements. Bankruptcy is therefore rather unexpected by the market and it is for that matter less likely to trigger high agency and indirect bankruptcy costs. Nonparametric tests on the matched sample also confirm these findings.

It remains for future research to investigate the reasons for different costs associated with bankruptcy. The proposed measure in this study, the probability of default one year prior to bankruptcy, can only give an indication whether these costs are high or low. However, it would be interesting to know whether the presumably more frequent out of court solutions in Germany lead indeed to less inefficiencies. In particular, there are still no comparative studies that investigate in which countries workouts turn out to be more successful in the long run.

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Table 1

Filing types and fate of the bankrupt companies for the full and matched samples of bankrupt U.S. and German firms between 1999 and 2007.

The table presents the filing types and the fate of the bankrupt companies for the full sample of 1160 bankrupt U.S. firms and 116 bankrupt German firms and the matched sample of 58 U.S. and 58 German firms respectively. All firms in the sample have announced bankruptcy between 1999 and 2007. As expected, there is a peak in the bankruptcy announcements in 2001 and 2002. 95% (92%)of the (*mtch*) firms in the U.S. have chosen Chapter 11, 20% (21%) have been subsequently liquidated. 34% (20%) have emerged either private or public. For the remaining there is no information or they are still under Chapter 11. Panel B of the table presents similar statistics for Germany. Again there is a peak in 2001 and 2002. Insolvency seems to be the most common filing in Germany and the recovery rate there is only 12%. Additionally, German firms seem to spend 60% more time in bankruptcy than U.S. firms.

Panel A: US

							liquidated				emerged private				emerged public			
Year	All		Chapter 11		Chapter 7		N		days in Ch.		N		days in Ch.		N		days in Ch.	
	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*
1999	112	*7*	109	*7*	3	*0*	28	*1*	524	*311*	25	*1*	479	*857*	12	*1*	452	*92*
2000	155	*7*	148	*7*	7	*0*	28	*0*	712	-	37	*1*	670	*258*	13	*2*	605	*488*
2001	260	*15*	252	*15*	8	*0*	65	*4*	533	*408*	33	*1*	601	*n.a.*	31	*0*	471	-
2002	204	*11*	189	*10*	15	*1*	41	*0*	416	-	47	*1*	371	*144*	30	*1*	382	*n.a.*
2003	162	*10*	148	*10*	14	*0*	30	*5*	473	*206*	28	*1*	359	*33*	37	*0*	402	-
2004	96	*3*	87	*3*	9	*0*	15	*0*	602	-	13	*0*	319	-	24	*0*	329	-
2005	83	*5*	83	*5*	0	*0*	13	*2*	398	*35*	20	*1*	341	*667*	18	*1*	376	*39*
2006	59	*0*	54	*0*	5	*0*	12	*0*	264	-	5	*0*	211	-	12	*0*	215	-
2007	29	*0*	27	*0*	2	*0*	2	*0*	97	-	2	*0*	108	-	2	*0*	111	-
	1160	*58*	1097	*57*	63	*1*	234	*12*			210	*6*			179	*5*		
			95%	*98%*			20%	*21%*			18%	*10%*			15%	*9%*		

Panel B: GER

Year	All		insolvency		imminent insolvency		overindebted-ness		insolvency and over-indebtedness		im. insolvency and over-indebtedness		Recovered		reason was imminent isolvency		Days until confirmation of plan	
	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*
1999	1	*0*	0	*0*	0	*0*	1	*0*	0	*0*	0	*0*	0	*0*	0	*0*	-	-
2000	4	*2*	2	*0*	2	*2*	0	*0*	0	*0*	0	*0*	1	*1*	1	*1*	317	*317*
2001	23	*8*	12	*2*	5	*2*	2	*2*	3	*1*	1	*1*	2	*0*	0	*0*	1032	-
2002	47	*24*	25	*12*	12	*7*	6	*2*	3	*2*	1	*1*	6	*1*	1	*0*	951	*837*
2003	13	*9*	8	*5*	3	*2*	0	*0*	1	*1*	1	*1*	2	*1*	2	*1*	824	*550*
2004	9	*7*	6	*5*	0	*0*	1	*1*	0	*0*	2	*1*	1	*1*	0	*0*	720	*720*
2005	3	*2*	2	*2*	0	*0*	0	*0*	1	*0*	0	*0*	0	*0*	0	*0*	-	-
2006	10	*3*	4	*3*	1	*0*	2	*0*	1	*0*	1	*0*	2	*2*	0	*0*	192	*167*
2007	6	*3*	2	*1*	3	*2*	2	*1*	0	*0*	0	*0*	0	*0*	0	*0*	-	-
	116	*58*	61	*30*	26	*15*	14	*6*	9	*4*	6	*4*	14	*6*	4	*2*		
													12%	*10%*				

Table 2a)

BHAR's for the full sample of bankrupt U.S. and German firms

The table reports BHAR's for the full sample of 1160 bankrupt U.S. and 116 bankrupt German firms, resulting from a buy and hold strategy for the event windows [-250;10], [-10;10], and [-3;3]. -# denotes the # day before the bankruptcy announcement. +# denotes the # day after the bankruptcy announcement. Apparently U.S. firms accumulate not only significantly higher losses in the year prior to default, but accumulate them at a much faster pace. To check for significance in the differences between the German and the U.S. sample, the p-values of the median, ranksum, 1- and 2-sample mean comparison tests are presented.

MEDIAN							MEAN						
Days to event	US	GER	US	GER	US	GER	Days to event	US	GER	US	GER	US	GER
-249	-0.60%	-0.36%					-249	-0.56%	-0.61%				
-240	-5.94%	-1.19%					-240	-4.08%	1.70%				
-230	-10.48%	-2.42%					-230	-7.01%	0.38%				
-220	-15.08%	-4.10%					-220	-12.32%	-0.65%				
-210	-17.73%	-9.00%					-210	-14.74%	-1.92%				
-200	-22.61%	-13.99%					-200	-19.30%	-2.48%				
-190	-27.06%	-13.24%					-190	-21.68%	-4.44%				
-180	-30.93%	-17.37%					-180	-24.59%	-7.79%				
-170	-35.95%	-15.60%					-170	-28.73%	-12.64%				
-160	-40.11%	-18.95%					-160	-32.00%	-12.09%				
-150	-43.46%	-21.07%					-150	-35.07%	-15.15%				
-140	-45.79%	-27.74%					-140	-36.45%	-19.97%				
-130	-48.03%	-34.80%					-130	-38.29%	-22.99%				
-120	-52.51%	-37.55%					-120	-41.86%	-26.39%				
-110	-56.29%	-40.59%					-110	-44.43%	-28.94%				
-100	-59.86%	-43.76%					-100	-47.50%	-31.62%				
-90	-63.24%	-41.76%					-90	-50.88%	-34.58%				
-80	-66.43%	-47.86%					-80	-53.36%	-38.93%				
-70	-70.06%	-48.58%					-70	-56.16%	-42.48%				
-60	-72.96%	-52.05%					-60	-58.66%	-43.62%				
-50	-75.22%	-51.32%					-50	-60.47%	-45.00%				
-40	-78.25%	-57.77%					-40	-62.74%	-49.45%				
-30	-79.28%	-59.82%					-30	-65.50%	-52.08%				
-20	-84.27%	-64.93%					-20	-68.28%	-56.26%				
-10	-87.00%	-74.18%	-4.94%	-0.58%			-10	-72.24%	-61.76%	-2.30%	-2.35%		
-5	-88.71%	-77.46%	-17.43%	-13.23%			-5	-74.39%	-64.24%	-9.85%	-8.70%		
-4	-88.67%	-78.09%	-17.14%	-15.63%			-4	-74.82%	-65.76%	-11.37%	-12.56%		
-3	-89.16%	-78.28%	-20.71%	-16.38%	-3.97%	-3.63%	-3	-75.30%	-67.29%	-13.05%	-16.48%	-3.55%	-6.10%
-2	-89.39%	-78.44%	-22.37%	-17.01%	-5.98%	-4.35%	-2	-75.84%	-67.66%	-14.96%	-17.42%	-5.67%	-7.16%
-1	-89.92%	-80.48%	-26.25%	-24.84%	-10.68%	-13.37%	-1	-76.28%	-68.54%	-16.50%	-19.66%	-7.39%	-9.67%
0	-91.64%	-83.51%	-38.85%	-36.51%	-25.95%	-26.82%	0	-78.74%	-76.18%	-25.16%	-39.19%	-16.99%	-31.63%
1	-92.80%	-85.90%	-47.38%	-45.73%	-36.27%	-37.46%	1	-80.44%	-79.74%	-31.14%	-48.26%	-23.62%	-41.83%
2	-93.21%	-85.53%	-50.32%	-44.31%	-39.83%	-35.81%	2	-80.73%	-79.56%	-32.16%	-47.80%	-24.75%	-41.31%
3	-93.74%	-86.35%	-54.22%	-47.43%	-44.56%	-39.42%	3	-80.80%	-79.36%	-32.40%	-47.29%	-25.02%	-40.74%
4	-93.85%	-86.26%	-55.02%	-47.12%			4	-81.07%	-79.19%	-33.35%	-46.85%		
5	-93.61%	-86.70%	-53.25%	-48.78%			5	-81.06%	-79.39%	-33.34%	-47.37%		
10	-94.19%	-86.44%	-57.49%	-47.81%			10	-81.63%	-79.66%	-35.32%	-48.08%		
p-value			p-value		p-value		p-value		p-value	p-value	p-value	p-value	p-value
median (H0: same median)							1-sample-mean comp. (H0: BHAR=0)						
0.000			0.111		0.001		0.000		0.000	0.000	0.000	0.000	0.000
ranksum (H0: same distribution)							2-sample-mean comp. (H0: BHAR_US=BHAR_GER)						
0.000			0.625		0.009		0.387			0.176		0.001	

Table 2b)

BHAR's for the matched sample of bankrupt U.S. and German firms

The table reports BHAR's for the matched sample of 58 bankrupt U.S. and 58 bankrupt German firms, resulting from a buy and hold strategy for the event windows [-250;10], [-10;10], and [-3;3]. -# denotes the # day before the bankruptcy announcement. +# denotes the # day after the bankruptcy announcement. The matching is done along three dimensions: BSM-default probability, total assets, and industry classification. Apparently U.S. firms accumulate not only significantly higher losses in the year prior to default, but accumulate them at a much faster pace. To check for significance in the differences between the German and the U.S. sample, the p-values of the median, ranksum, 1- and 2-sample mean comparison tests are presented.

MEDIAN							MEAN						
Days to event	US	GER	US	GER	US	GER	Days to event	US	GER	US	GER	US	GER
-249	-1.09%	-1.12%					-249	0.20%	-2.01%				
-240	-8.51%	-2.23%					-240	-8.77%	1.71%				
-230	-14.98%	-2.80%					-230	-8.14%	-1.14%				
-220	-20.84%	-1.93%					-220	-15.23%	0.76%				
-210	-25.30%	-6.95%					-210	-17.54%	2.36%				
-200	-27.48%	-7.95%					-200	-21.42%	3.78%				
-190	-29.69%	-6.08%					-190	-26.69%	4.90%				
-180	-36.37%	-2.77%					-180	-29.58%	5.25%				
-170	-36.43%	-2.04%					-170	-33.41%	0.73%				
-160	-41.51%	-4.60%					-160	-34.89%	3.06%				
-150	-50.02%	-8.11%					-150	-39.37%	-2.04%				
-140	-50.32%	-21.83%					-140	-42.31%	-8.21%				
-130	-54.76%	-24.93%					-130	-44.98%	-11.55%				
-120	-54.65%	-23.28%					-120	-47.52%	-15.60%				
-110	-63.31%	-31.78%					-110	-52.94%	-18.09%				
-100	-65.95%	-31.58%					-100	-57.25%	-18.62%				
-90	-71.75%	-35.73%					-90	-60.53%	-21.98%				
-80	-75.48%	-39.06%					-80	-64.60%	-28.40%				
-70	-76.08%	-40.26%					-70	-65.00%	-33.09%				
-60	-71.92%	-44.75%					-60	-68.19%	-35.44%				
-50	-74.98%	-47.02%					-50	-70.43%	-35.87%				
-40	-78.05%	-47.84%					-40	-71.80%	-39.65%				
-30	-83.45%	-46.84%					-30	-75.64%	-41.17%				
-20	-86.33%	-53.41%					-20	-78.93%	-45.48%				
-10	-89.29%	-67.86%	-1.48%	3.50%			-10	-82.89%	-53.31%	-5.89%	-0.66%		
-5	-90.47%	-71.06%	-22.94%	-6.81%			-5	-85.47%	-55.34%	-21.86%	-4.97%		
-4	-91.20%	-72.71%	-20.68%	-12.14%	2.93%	-5.72%	-4	-85.67%	-57.68%	-23.99%	-9.94%	-1.69%	-1.69%
-3	-93.06%	-74.84%	-16.79%	-18.99%	7.97%	-13.07%	-3	-86.48%	-59.62%	-25.33%	-14.07%	-3.42%	-6.20%
-2	-93.97%	-74.61%	-22.74%	-18.25%	0.25%	-12.28%	-2	-88.44%	-60.08%	-26.16%	-15.06%	-4.49%	-7.27%
-1	-95.04%	-75.24%	-38.20%	-20.27%	-19.81%	-14.44%	-1	-89.68%	-60.28%	-30.74%	-15.47%	-10.42%	-7.73%
0	-95.08%	-80.55%	-46.94%	-37.38%	-31.15%	-32.81%	0	-89.72%	-71.90%	-42.23%	-40.21%	-25.28%	-34.73%
1	-95.27%	-82.89%	-56.94%	-44.89%	-44.12%	-40.87%	1	-89.49%	-76.94%	-44.59%	-50.93%	-28.33%	-46.43%
2	-96.39%	-82.93%	-63.13%	-45.04%	-52.16%	-41.03%	2	-90.53%	-76.28%	-45.53%	-49.54%	-29.54%	-44.91%
3	-95.85%	-85.51%	-60.61%	-53.34%	-48.89%	-49.94%	3	-90.66%	-76.34%	-44.74%	-49.66%	-28.53%	-45.05%
4	-95.91%	-86.14%	-68.06%	-55.38%			4	-90.90%	-76.83%	-50.11%	-50.69%		
5	-96.16%	-85.44%	-65.48%	-53.11%			5	-90.85%	-76.88%	-51.34%	-50.81%		
10	-96.25%	-82.94%	-66.51%	-45.07%			10	-91.16%	-77.21%	-51.81%	-51.50%		
p-value			p-value		p-value		p-value		p-value	p-value	p-value	p-value	p-value
median (H0: same median)							1-sample-mean comp. (H0: BHAR=0)						
0.000			0.853		0.577		0.000		0.000	0.000	0.000	0.000	0.000
signrank (H0: same distribution)							2-sample-mean comp. (H0: BHAR_US=BHAR_GER)						
0.000			0.370		0.355		0.000			0.966		0.014	

Table 3
Long term abnormal returns for the bankrupt U.S. and GER samples
The table reports abnormal returns for the bankrupt U.S. and GER samples, reflecting a buy-and-hold strategy starting five, four, three, two, and one year prior to the bankruptcy filing respectively. Reported is the number of bankrupt securities available at the beginning of each buy-and-hold strategy, the number of securities with negative buy-and-hold abnormal returns at the end of each year, as well as the mean and median BHAR at the end of each year.

Panel A: USA								Panel B: GER					
			Year -1	Year -2	Year -3	Year -4	Year -5	Year -1	Year -2	Year -3	Year -4	Year -5	
1 year prior to bankruptcy		count	862					98					
		<0	97.56%					100%					
		Mean	-81.60%					-79.66%					
		Median	-94.19%					-86.44%					
2 years prior to bankruptcy		count	753	802				74					
		<0	99.20%	90.97%				100%	100%				
		Mean	-90.34%	-46.86%				-85.09%	-33.87%				
		Median	-97.77%	-61.61%				-91.63%	-43.18%				
3 years prior to bankruptcy		count	640	679	701			53					
		<0	96.56%	90.43%	75.46%			100%	88.68%	62.26%			
		Mean	-91.73%	-61.53%	-29.21%			-86.28%	-43.94%	-15.87%			
		Median	-98.70%	-76.46%	-40.77%			-92.00%	-51.60%	-28.68%			
4 years prior to bankruptcy		count	562	597	614	636		44					
		<0	96.09%	88.61%	77.36%	66.35%		100%	97.73%	79.55%	63.64%		
		Mean	-92.14%	-64.43%	-39.41%	-14.49%		-86.10%	-49.36%	-29.72%	-2.29%		
		Median	-99.03%	-82.02%	-58.01%	-26.32%		-92.00%	-51.84%	-27.80%	-9.06%		
5 years prior to bankruptcy		count	489	520	536	556	564	38					
		<0	95.91%	85.00%	75.37%	67.81%	60.11%	100%	92.11%	84.21%	71.05%	73.68%	
		Mean	-91.54%	-60.26%	-36.20%	-19.10%	-10.93%	-87.48%	-54.59%	-38.84%	-24.53%	-16.63%	
		Median	-99.12%	-76.74%	-50.81%	-23.05%	-24.24%	-92.68%	-61.35%	-38.49%	-24.99%	-19.39%	

Table 4
Descriptive statistics: full sample and matched sample
The table reports key balance sheet and market based coefficients for the full sample of bankrupt U.S. and German companies compared to the ones of the S&P500 and CDAX firms for the period 1999-2007. The weighted average is taken in accumulating the observations over the years. The mean, median, and the standard deviation are presented for each variable.

			USA 1999-2007	GER 1999-2007				USA 1999-2007	GER 1999-2007
Total Assets	bankrupt firms	mean	1,668,567	245,055	EBITDA/ TA	bankrupt firms	mean	-0.5899	-0.1966
		median	117,703	55,715			median	-0.0771	-0.0460
		stdev	15,800,000	827,794			stdev	2.2027	0.5309
	matched sample	*mean*	174,411	170,214		*matched sample*	*mean*	-0.2315	-0.1816
		median	73,126	70,742			*median*	-0.0490	-0.0395
		stdev	253,745	268,058			*stdev*	0.4833	0.5638
	S&P 500/ CDAX firms	mean	37,161,785	9,713,391		S&P 500/ CDAX firms	mean	0.1383	0.0752
		median	8,378,774	157,151			median	0.1337	0.1013
		stdev	111,677,982	59,386,739			stdev	0.1339	0.4608
MTB	bankrupt firms	mean	0.1372	2.1793	TD/TA	bankrupt firms	mean	0.6893	0.3095
		median	0.2984	1.3283			median	0.5362	0.2551
		stdev	27.8633	18.3932			stdev	0.8240	0.4220
	matched sample	*mean*	1.8725	2.0506		*matched sample*	*mean*	0.6097	0.4406
		median	0.5097	1.0790			*median*	0.5336	0.3236
		stdev	6.5361	3.2414			*stdev*	0.6399	0.5033
	S&P 500/ CDAX firms	mean	4.1809	2.7609		S&P 500/ CDAX firms	mean	0.2490	0.2146
		median	2.7093	1.4318			median	0.2322	0.1545
		stdev	15.0329	39.0732			stdev	0.1839	0.2673
S/TA	bankrupt firms	mean	1.2462	1.2100	Fraction of Bank Debt	bankrupt firms	mean	0.5504	0.3862
		median	0.9342	0.7539			median	0.6133	0.3801
		stdev	1.4793	1.9823			stdev	0.2814	0.2845
	matched sample	*mean*	0.6053	0.5032		*matched sample*	*mean*	0.6053	0.5032
		median	0.6903	0.4800			*median*	0.6903	0.4800
		stdev	0.2911	0.2519			*stdev*	0.2911	0.2519
	S&P 500/ CDAX firms	mean	0.8763	1.1549		S&P 500/ CDAX firms	mean	0.3904	0.3377
		median	0.7201	1.0446			median	0.4039	0.2973
		stdev	0.7392	1.2227			stdev	0.2731	0.7468
BSM_Prob_250	bankrupt firms	mean	19.9541%	5.0147%	Short/Tota l Debt	bankrupt firms	mean	0.4162	0.6180
		median	2.5283%	0.0031%			median	0.3074	0.6842
		stdev	0.2935	0.1147			stdev	0.3733	0.3237
	matched sample	*mean*	8.7130%	8.9565%		*matched sample*	*mean*	0.4729	0.6233
		median	0.9909%	0.9831%			*median*	0.3807	0.6934
		stdev	0.1337	0.1431			*stdev*	0.3820	0.3405
	S&P 500/ CDAX firms	mean	0.0760%	0.7909%		S&P 500/ CDAX firms	mean	0.2442	0.5128
		median	0.0000%	0.0000%			median	0.1512	0.4783
		stdev	0.0058	0.0432			stdev	0.2594	0.3966
BSM_Prob_10	bankrupt firms	mean	52.5287%	22.1606%	TL/TA	bankrupt firms	mean	1.1086	0.6580
		median	58.5155%	14.3071%			median	0.8651	0.6562
		stdev	0.3698	0.2211			stdev	1.0199	0.4604
	matched sample	*mean*	53.5780%	28.5428%		*matched sample*	*mean*	0.6097	0.8087
		median	53.4567%	23.5965%			*median*	0.7882	0.7505
		stdev	0.3117	0.2255			*stdev*	0.6399	0.4893
	S&P 500/ CDAX firms	mean	0.0763%	1.4964%		S&P 500/ CDAX firms	mean	0.6035	0.6043
		median	0.0000%	0.0000%			median	0.6070	0.6199
		stdev	0.0054	0.0655			stdev	0.2248	0.3528

Table 5

Regression results for the U.S. and German samples with correction of Scholes and Williams (1977)

The dependent variable is the buy and hold abnormal return [BHAR]. *TD/TA* denotes total debt to total assets, *E/TL* is common equity to total liabilities, *d_EBITDA* is the scaled change of EBITDA to total assets [*EBITDA/TA*]. *Long/Total Debt* is the fraction of long to total debt, *Fraction Debt* is the fraction of total debt to total liabilities, *FD_02* is an interaction term of the same fraction and y_2002. Size is the natural log of total assets, *d_TA* is the scaled change of total assets, MTB is the market to book ratio, *BSM_Prob* is the default probability determined by the Black and Scholes Merton 250 days before the announcement, *y_2001* and *y_2002* are dummies for 2001 and 2002 respectively, *penny_stock* is a dummy variable that is unity if the price of the company was lower than one 250 days before the bankruptcy announcement, *Chapter 7* is a dummy taking the value of one, if the company has filed under Chapter 7, *OTC* and *NASDAQ* are also dummies whether the firms were traded OTC or on NASDAQ respectively, *SIC1*, *SIC3*, and *SIC7* are dummies denoting the sector the company was operating in. "*Imminent*" is a dummy taking the value of one, if the company has filed under "imminent insolvency", and *Neuer Markt* is a dummy indicating whether the company was traded on this market segment. ***,** and * indicates significance level at 1%, 5% and 10%.

Panel A: USA	Model 1 BHAR261	Model 2 BHAR261	Model 3 BHAR261	Model 4 BHAR261
TD/TA	0.0014	0.0042 ***		
EBITDA/TA	0.0019	0.0051 *		
d_EBITDA	0.0021 ***	0.0021 ***		
d_TA	-0.0943 ***	-0.0863 ***		
Size	0.0115 ***	0.0174 ***		
MTB	0.0001 ***	0.0001 ***		
BSM_Prob	-0.1700 ***	-0.1678 ***	-0.1634 ***	-0.1783 ***
y_2001	-0.0576 ***		-0.0604 ***	
y_2002	-0.1042 ***		-0.0892 ***	
penny_stock	0.0427 **		0.0256	
Chapter 7	-0.0499 *		-0.0858 **	
OTC	-0.2563 ***		-0.2644 ***	
NASDAQ	-0.0923		-0.0800	
SIC1	0.1314 **		0.1055 *	
SIC3	-0.0174		-0.0177	
SIC7	-0.0562 ***		-0.0639 ***	
Const.	-0.6864 ***	-1.0212 ***	-0.5332 ***	-0.8094 ***
N	675	675	706	706
R^2	0.2699	0.1317	0.1777	0.0411
F	14.50 ***	22.54 ***	12.28 ***	72.94 ***
mean VIF	1.35	1.30	1.24	1.00
Panel B: GER	Model 1 BHAR261	Model 2 BHAR261	Model 3 BHAR261	Model 4 BHAR261
Long/Total Debt	0.0884		0.0872	
Fraction Debt	-0.2256 *		-0.2347 *	
FD_02	0.2735 *		0.2730 *	
TD/TA	0.0925 **		0.1029 **	
Size	-0.0138			
MTB	-0.0005			
BSM_Prob	0.3284 *	0.3007 *	0.3851 *	0.4971 **
y_2002	-0.1872 ***	-0.0879 **	-0.1919 ***	
Imminent	-0.0216	-0.0082	0.0609	
Neuer Markt	-0.1432 ***	-0.1219 ***	-0.1308 ***	
Const	-0.5235 ***	-0.7126 ***	-0.7116 ***	-0.8232 ***
N	80	90	80	90
R^2	0.3760	0.2747	0.3858	0.1012
F	5.35 ***	7.04 ***	7.50 ***	4.29 **
mean VIF	2.49	1.10	2.69	1.00

Table 6
Regression results for the matched sample
The table presents the regression results, explaining the BHAR's for the event window [-250;10] using the correction proposed by Scholes and Williams (1977). The matched sample consists of 58 bankrupt U.S. and 58 bankrupt German firms. The matching has been done along three dimensions: the BSM-probability of default, total assets, and industry classification. The dependent variable is the buy and hold abnormal return [*BHAR*] for the respective time frame. *GER* is a dummy variable taking the value of one if the firm is German. *BSM_Prob* is the default probability determined by the Black and Scholes Merton model 250 days before the announcement and *BSM_GER* is an interaction term for Germany and *BSM_Prob*, *y_2002* is a dummy for 2002 and *y_2002_GER* is the respective interaction term for Germany. *Neuer Markt* is a dummy indicating if the company was traded on this market segment in the German case and *OTC* indicates if the company was traded OTC in the U.S. case. ***,** and * indicates coefficients significant at 1%, 5% and 10% levels, respectively.

	BHAR261
BSM_Prob	-0.1501642 ***
BSM_GER	0.4147774 **
y_2002	-0.0247811
y_2002_GER	-0.0787858
OTC	-0.3158037 ***
Neuer Markt	-0.1318633 ***
GER	-0.1036417
Const.	-0.594562 ***
N	103
R^2	0.4125
F	8.87 ***

Table 7
Nonparametric Inter-Quintile- Difference of Differences Tests
The table reports the results of the Inter-Quintile- Difference of Differences Tests: A matched sample for the German firms has been constructed using caliper matching based on BSM_Prob_250, Total Assets and Industry. Then the resulting 58 firms per country are pooled in quintiles based on the probability of default with quintile 5 denoting the highest value and quintile 4, 3, 2, and 1 the progressive lower values. In panel A the differences in the means of BHAR261 are then computed between German and matched U.S. firms for each quintile. In panel B the difference of differences is calculated by computing the difference between mean BHAR_261 differences of high BSM_Prob_250 firms (Quintile n) and that of low BSM_Prob_250 firms (Quintile n-1) using the German sample and the matched U.S. sample.

Panel A: Differences in mean and median BHAR261

	Q5	Q4	Q3	Q2	Q1
Median	35.55%	15.59%	0.27%	3.64%	1.38%
Mean	34.47%	13.82%	-1.30%	7.62%	2.63%

Panel B: Differneces of Differences

	Q5-Q1	Q5-Q4	Q4-Q3	Q3-Q2	Q2-Q1
Median	34.17%	19.96%	15.32%	-3.37%	2.26%
Mean	31.85%	20.65%	15.12%	-8.92%	4.99%

Appendix

A.1 Proof of Corollary 1.

Corollary 1. *(i) The probability of default can have a positive or a negative effect on the return in the last year to bankruptcy.*
(ii) High direct and indirect bankruptcy costs as well as high agency costs make the negative effect more likely.

Proof. (i) For simplicity assume that the high cash flows in the two states are the same. As there is a different default probability in both states, this assumption can be made without loss of generality. Note that the return at the bankruptcy date can be represented as

$$return = \frac{price_{t=1}}{price_{t=0}} = \frac{CF2(1-\beta_2) - X - K}{CF1(1-\beta_1) + CF2(1-\beta_2) - X - \beta_1 K}. \tag{4}$$

Denote the numerator with N and the denominator with D.

$$\frac{\partial return}{\partial \beta_1} = \frac{N_{\beta_1} D - N D_{\beta_1}}{D^2} \tag{5}$$

Note that $N_{\beta_1} D - N D_{\beta_1}$ can be rewritten as

$$N_{\beta_1} D - N D_{\beta_1} = CF^2 \left((1-\beta_2) - \frac{\partial \beta_2}{\partial \beta_1}(1-\beta_1) \right) - \beta_2 XK - K^2 - X(CF + K). \tag{6}$$

It is immediate that the higher the bankruptcy costs, the higher the likelihood that the above expression will be negative. ■

A.2 Approximation of the Probability of Default

Measuring the Probability of Default

The default risk model used in this study is the Black-Scholes-Merton model [BSM]. The probability of bankruptcy is measured one year prior to the bankruptcy announcement, at the beginning of the event window. Unlike score models, such as the ones by Altman (1968) and Ohlson (1980), BSM has a theoretical ground to stand on and uses not only the market value of equity, but also the market value and the volatility of the assets. BSM dates back to Merton (1974) and the idea that equity can be compared to a European call option.[27] The underlying are the assets V_A of the firm and the maturity T is the maturity of the debt of the firm. The strike price is the face value of debt X. The equity holders will exercise their option and repay X to the debt holders in T if $V_A > X$. Otherwise, due to their limited liability, they will step back from the firm and leave it to the debt

[27] How to use Merton's model to obtain the probability of default and why this is the best measure of default risk, is described in detail in e.g. Crosbie and Bohn (2003) and Hillegeist et al. (2004).

holders. If one assumes away direct bankruptcy costs, then this is a plausible model of what happens in bankruptcy, and one can use an option pricing model to reverse engineer V_A and its volatility σ_A. Including bankruptcy costs does not change the prediction of a structural model such as this one (Reisz and Reisz, 2004). As the name of the model suggest, the option pricing model used to recover V_A and σ_A is that of Black-Scholes-Merton. The central assumption is that the assets of the firm follow a geometric Brownian motion with drift μ and volatility σ_A; dz is a as usual the Wiener process. Leaving out the details, the BSM probability of default obtains the following simple form:

$$p_t = N\left[-\frac{ln\frac{V_A}{X} + \left(\mu - \frac{\sigma_A}{2}T\right)}{\sigma_A\sqrt{T}}\right] \tag{3}$$

There are a couple important advantages of this formula. On the one hand, it uses market data to determine the market value of the assets and their volatility. These variables are important, since the company goes bankrupt if the value of debt is higher than the value of the assets. In contrast to the score models it gives, on the other hand, a theoretical based measure of the probability of default. It is not only easy to interpret, but it is also more plausible than a score, based on indicators of the viability of the firm, and it is more difficult to manipulate compared to a model using entirely past balance sheet data. Further, the BSM model is independent of a specific bankruptcy law, so that it can be used in a comparison between Germany and the U.S.

As in any other model, there are, however, some caveats that one should be aware of. The model does not take into account the possibility of private renegotiations for example. The assumptions of log normally distributed assets and of a constant debt, *X*, should be also critically observed. It is further questionable, how to calculate *X* itself. The KMV approach described by Crosbie and Bohn (2003) is to take the short term liabilities plus one half of the long term liabilities. This study follows the approach of Hillegeist et al. (2004) and takes the total liabilities.[28] Indeed, empirical tests, which are presented in the appendix prove that this is a good way to measure the probability of default for the gathered U.S. and German samples. For further empirical evidence on the advantage of the BSM model the reader is referred to Crosbie and Bohn (2003), Hillegeist et al. (2004), Chan-Lau, Jobert, and Kong (2004) and Gropp, Vesala, and Vulpe (2002). The appendix further extends the sample of bankrupt firms with non bankrupt firms and shows that BSM is a highly significant predictor of bankruptcy for the U.S. and German sample.

The Explanative Power of the BSM-probability

Even though it is not an explicit purpose of this study to determine the best measure for the probability of default, this issue can hardly be omitted. Extending the sample of U.S. and German bankrupt firms with the non-bankrupt companies included in the CDAX and S&P 500 Composite index respectively, a logit regression model with robust standard errors is used to determine the best method for predicting bankruptcy between 1999 and 2007 as discussed in Section 2. The rolling window approach proposed by Hillegeist et al. (2004) has been used. Source for the market and balance sheet data is again Thomson's Financial Datastream and Worldscope. The dependent variable in the logit

[28] The assumption that all liabilities mature in one year is clearly violated in practice. Hillegeist et al. (2004) find, however, that this specification is better suited to measure the probability of default. As is reported later in the paper, the same finding was made for these samples of bankrupt firms.

Table A.5

Logit regression results for determining the default prediction ability of Altman's (1968), Oholson's (1980) and the BSM model.

The table presents Logit regression results for determining the default prediction ability of Altman's (1968), Oholson's (1980) and the BSM model. The coefficients of the regression are compared to the original ones and the ones of Hillegeist et al. (2004). The dependent variable is Bankruptcy, taking the value of one if a company has gone bankrupt. Both samples of 1160 bankrupt U.S. and 116 bankrupt German firms are extended by the firms present in the S&P500 and CDAX indices respectively. *WC/TA* denotes working capital to total assets, *RE/TA*: retained earnings to total assets, *VE/TL*: market cap to total liabilities, *S/TA*: sales to total assets, *BSM_Prob* is the probability of default based on the Black and Scholes Merton model, Size is the natural logarithm of total assets, *TL/TA*: total liabilities to total assets, *CL/CA*: current liabilities to current assets, *NI/TA*: net income to total assets, *FU/TL* is pre-tax income plus depreciation and amortization divided by total liabilities; *INTWO* is a dummy variable equal to one if the cumulative net income over the previous two years is negative, and zero otherwise; *OENEG* is an dummy variable equal to one if owners' equity is negative, and zero otherwise; $CHIN = (NI_t - NI_{t-1})/(|NI_t| + |NI_{t-1}|)$ is the scaled change in net income. The results show that the BSM probability of default one year before bankruptcy is always a highly significant measure when explaining default. It is to be noted that unlike in Hillegeist et al. (2004), the BSM probability is not measured in percent. The score models perform well, however the significance, sign, and magnitude of their coefficients is not as stable as those of the BSM-model.

Altman (1968)	N	Pseudo R²	WC/TA	RE/TA	EBIT/TA	VE/TL	S/TA	BSM_Prob	Const
Original Coefficients	66	NA	-1.20	-1.40	-3.30	-0.60	-1.00		
Hillegeist et al.	89,826	0.06	-0.08	0.04	-0.10 **	-0.22 ***	0.06		-4.34 ***
USA (1999-2007)	4,279	0.49	-2.70 ***	-7.32 ***	-2.29	-0.02	0.56 ***		-2.21 ***
	4,262	0.59	-2.26 ***	-3.99	-4.32 *	-0.02 **	0.58 ***	24.97 ***	-2.61 ***
GERMANY (1999-2007)	3,963	0.04	-0.68	0.96	-1.70	-0.01 ***	-0.04		-4.04 ***
	3,921	0.07	-0.39	1.17	-1.93	-0.01 ***	-0.02	5.67 ***	-4.24 ***

Ohlson (1980)	N	Pseudo R²	Size	TL/TA	WC/TA	CL/CA	NI/TA	FU/TL	INTWO	OENEG	CHIN	BSM_Prob	Const
Original Coefficients	2,163	0.84	-0.41 ***	6.03 ***	-1.43 **	0.08	-2.37 **	-1.83 ***	0.29	-1.72 ***	-0.52 ***		-1.32
Hillegeist et al.	89,643	0.10	0.04 ***	0.08 ***	0.01 ***	-0.01	1.20 **	0.18 ***	0.01 ***	1.59 ***	-1.10 ***		-5.91 ***
USA (1999-2007)	4,345	0.80	-1.50 ***	1.86 ***	-2.89 ***	0.21 *	0.35	-0.11	2.76 ***	-0.06	-0.94 ***		17.38 ***
	4,236	0.83	-1.56 ***	1.30 ***	-2.83 ***	0.24 **	0.40	-0.14	2.41 ***	0.15	-1.06 ***	17.38 **	18.32 ***
GERMANY (1999-2007)	3,721	0.11	-0.09	0.25	-0.96	-0.28	-0.15	-0.06 **	1.96 ***	0.05	0.05		-4.29 ***
	3,631	0.13	-0.12	0.20	-1.01	-0.36	-0.13	-0.12 **	1.82 ***	-0.12	-0.03	4.82 ***	-3.83 ***

BSM	N	Pseudo R²	BSM_Prob	Annual Rate	Const
Hillegeist et al.	78,100	0.12	0.27 ***	0.54 ***	-3.77 ***
USA (1999-2007)	5,142	0.33	47.41 ***		-2.24 ***
GERMANY (1999-2007)	5,453	0.03	4.59 ***		-4.02 ***

regression is Bankruptcy. It takes the value of one, if the firm has gone bankrupt in the respective year and is zero otherwise. Firms with missing balance sheet data are omitted in both extended samples. As the approach used is very similar to the one of Hillegeist et al. (2004), the results are not discussed in detail, since they only confirm their findings. The main purpose of the analysis is mainly to show that the BSM model performs well in ex- plaining bankruptcy for the given sample. It is also interesting to see that this fact holds not only for the U.S., but also for the German sample, which has not been documented before.

Table A.5 shows the outcome of the regression, comparing it to the original coefficients of Altman (1968) and Ohlson (1980) and also to the ones of Hillegeist et al. (2004).[29] It can be seen that the balance sheet models still do a relatively good job in explaining the probability of default. It makes an impression however that not only the significance of the coefficients varies in time, but also that there is sometimes a change in the sign of the effect as in the case of *NI/TA*, *FFO/TL*, *OENEG*, *S/TA,* and *Size*. This finding is not surprising given the arguments above that the balance sheet models lack a theoretical background and gives further support to the intention not to use a score model as a predictor of bankruptcy. As mentioned, balance sheet data will be included in the analysis, but only because they are easily available and it can intuitively be assumed that they have explanatory power.

More interesting to see is how the BSM performs.[30] It turns out that, if added to the score models as an explanatory variable, it is significant at the 1% level for the U.S. sample and significant at least at the 5% level for the German sample. It further notably increases the Pseudo R^2 in all cases for the score models. If tested on its own, the BSM-probability is always significant at the 1% level and exhibits the predicted positive sign.[31]

An interesting finding is that all model specifications seem to perform better for the U.S. sample. This supports the conjecture from the previous section that it is more difficult to predict bankruptcy in Germany than in the U.S. one year ahead and give further intuition for Hypothesis 1. Still, all significant coefficients have the same sign both for Germany and the U.S.

[29] The original Z-Score model has been estimated using MDA analysis. For better comparison with the logit model, the signs of the Altman's coefficients have been switched. Note also that unlike Hillegeist et al. (2004), the BSM_Prob values are not taken in percent.

[30] Annual rate is the annual bankruptcy rate in the preceding year. It has not been taken into account in this study, as the aim is to isolate the predictive power of the BSM-probability. Further analyses for each separate year between 1999 and 2007 have also been performed. The results are highly comparable.

[31] Further tests were performed using short term liabilities plus one half of the long term liabilities instead of total liabilities for the "strike price" *X*. Although the results are highly comparable, the mean and median values of the probability of default are lower than in the case of total liabilities. The same finding was made using total debt for *X*. It further turns out that it does not play a big difference for the multivariate analysis, which measure is used for *X*. All these results are available upon request.

Table A.1
Sector distribution of the bankrupt companies for the full and matched samples of bankrupt U.S. and German companies.
The table reports the number of firms in the sample by broad industry group. The full sample consists of 1160 bankrupt U.S. firms and 116 bankrupt German firms. The matched (*mtch*) sample consists of 58 bankrupt U.S. firms and 58 bankrupt German firms. All firms in the sample have announced bankruptcy between 1999 and 2007. SIC# denotes all companies having a SIC code starting with the respective digit. Apparently there is a peak in the bankruptcy filings in 2001-2002. This coincides with the burst of the technology bubble, which is also mirrored in the fact that 43% of the filings are in the Hi-tech dominated SIC3 and SIC7 sectors.

Panel A: US

	SIC 1		SIC 2		SIC 3		SIC 4		SIC 5		SIC 6		SIC 7		SIC 8	
Year	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*
1999	7	*1*	14	*1*	25	*2*	14	*1*	22	*1*	9	*0*	11	*0*	9	*1*
2000	5	*0*	16	*0*	29	*1*	20	*1*	37	*2*	10	*2*	21	*0*	17	*1*
2001	7	*0*	27	*2*	53	*3*	47	*3*	38	*1*	10	*0*	65	*5*	13	*1*
2002	10	*0*	22	*0*	48	*4*	42	*2*	13	*2*	8	*1*	43	*2*	17	*0*
2003	8	*0*	20	*0*	37	*5*	19	*0*	21	*2*	8	*1*	38	*2*	9	*0*
2004	5	*0*	14	*0*	30	*1*	12	*1*	16	*1*	3	*0*	14	*0*	1	*0*
2005	2	*0*	10	*1*	27	*0*	15	*2*	7	*0*	4	*0*	14	*2*	3	*0*
2006	2	*0*	13	*0*	18	*0*	6	*0*	7	*0*	2	*0*	7	*0*	3	*0*
2007	3	*0*	2	*0*	11	*0*	3	*0*	5	*0*	1	*0*	1	*0*	2	*0*
	49	*1*	138	*4*	278	*16*	178	*10*	166	*9*	55	*4*	214	*11*	74	*3*
US sample	4%	*2%*	12%	*7%*	24%	*28%*	15%	*17%*	14%	*16%*	5%	*7%*	19%	*19%*	6%	*5%*
S&P500	6%	*6%*	18%	*18%*	24%	*24%*	12%	*12%*	10%	*10%*	19%	*19%*	9%	*9%*	1%	*1%*

Panel B: GER

	SIC 1		SIC 2		SIC 3		SIC 4		SIC 5		SIC 6		SIC 7		SIC 8	
Year	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*	Full	*mtch*
1999	1	*0*	1	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*
2000	1	*0*	1	*0*	0	*0*	1	*1*	0	*0*	1	*1*	0	*0*	1	*0*
2001	1	*0*	1	*0*	2	*1*	1	*1*	4	*2*	2	*0*	12	*4*	1	*0*
2002	1	*0*	1	*0*	8	*4*	2	*0*	7	*4*	8	*6*	20	*10*	0	*0*
2003	2	*0*	2	*1*	3	*2*	0	*0*	2	*2*	4	*4*	2	*0*	0	*0*
2004	0	*0*	0	*0*	3	*3*	1	*1*	0	*0*	2	*1*	2	*1*	1	*1*
2005	0	*0*	0	*0*	2	*2*	0	*0*	0	*0*	0	*0*	1	*0*	0	*0*
2006	4	*0*	4	*1*	0	*0*	1	*1*	0	*0*	3	*1*	1	*0*	1	*0*
2007	0	*0*	0	*0*	2	*1*	1	*1*	1	*0*	2	*1*	0	*0*	0	*0*
	10	*0*	10	*2*	20	*13*	7	*5*	14	*8*	22	*14*	38	*15*	4	*1*
GER sample	1%	*0%*	9%	*3%*	17%	*22%*	6%	*9%*	12%	*14%*	19%	*24%*	33%	*26%*	3%	*2%*
CDAX	2%	*2%*	13%	*13%*	27%	*27%*	6%	*6%*	11%	*11%*	16%	*16%*	21%	*21%*	4%	*4%*

Table A.2
Descriptive statistics for Fraction of bank debt
The table reports the median, mean, and standard deviation for Fraction of Bank Debt for the whole German sample and for two subsamples of 2002 and 2002 with the companies being traded on Neuer Markt.

		Fraction of bank debt of GER sample		
Sample	N	Median	Mean	Std. Dev.
2002 and Neuer Markt	23	0.4012	0.3779	0.2539
2002 only	45	0.4012	0.3961	0.2773
Whole	104	0.3801	0.3862	0.2845

Table A.3

Regression results for the U.S. and Germany without correction of Scholes and Williams (1997)

The table shows the regression results, explaining the BHAR's using the market model. The dependent variable is the buy and hold abnormal return [BHAR]. *TD/TA* denotes total debt to total assets, *E/TL* is common equity to total liabilities, *d_EBITDA* is the scaled change of EBITDA to total assets [*EBITDA/TA*]. *Long/Total Debt* is the fraction of long to total debt, *Fraction Debt* is the fraction of total debt to total liabilities, *FD_02* is an interaction term of the same fraction and y_2002. Size is the natural log of total assets, *d_TA* is the scaled change of total assets, MTB is the market to book ratio, *BSM_Prob* is the default probability determined by the Black and Scholes Merton 250 days before the announcement, *y_2001* and *y_2002* are dummies for 2001 and 2002 respectively, *penny_stock* is a dummy variable that is unity if the price of the company was lower than one 250 days before the bankruptcy announcement, *Chapter 7* is a dummy taking the value of one, if the company has filed under Chapter 7, *OTC* and *NASDAQ* are also dummies if the firms was traded OTC or on NASDAQ respectively, *SIC1*, *SIC3*, and *SIC7* are dummies denoting the sector the company was operating in. "*Imminent*" is a dummy taking the value of one, if the company has filed under "imminent insolvency", and *Neuer Markt* is a dummy indicating if the company was traded on this market segment. ***,** and * indicates coefficients significant at 1%, 5% and 10% levels.

Panel A: USA	Model 1	Model 2	Model 3	Model 4
	BHAR261	BHAR261	BHAR261	BHAR261
TD/TA	0.0021	0.0046 ***		
EBITDA/TA	0.0032	0.0061 **		
d_EBITDA	0.0022 ***	0.0022 ***		
d_TA	-0.1073 ***	-0.1011 ***		
Size	0.0144 ***	0.0191 ***		
MTB	0.0001 ***	0.0001 ***		
BSM_Prob	-0.2083 ***	-0.1800 ***	-0.1883 ***	-0.1875 ***
y_2001	-0.0663 ***		-0.0708 ***	
y_2002	-0.1107 ***		-0.0939 ***	
penny_stock	0.0613 **		0.0376	
Chapter 7	-0.0738 **		-0.0994 ***	
OTC	-0.2695 ***		-0.2783 ***	
NASDAQ	-0.1133		-0.0992	
SIC1	0.0889 *		0.0813 *	
SIC3	-0.0044		-0.0050	
SIC7	-0.0528 ***		-0.0632 ***	
Const.	-0.6986 ***	-1.0338 ***	-0.5113 ***	-0.8014 ***
N	678	678	706	710
R^2	0.2600	0.1329	0.0337	0.0409
F	14.69 ***	21.03 ***	7.64 **	68.81 ***
mean VIF	1.33	1.26	1.24	1.00

Panel B: GER	Model 1	Model 2	Model 3	Model 4
	BHAR261	BHAR261	BHAR261	BHAR261
Long/Total Debt	0.0778		0.0785	
Fraction Debt	-0.2706 **		-0.2747 **	
FD_02	0.2392		0.2524 *	
TD/TA	0.1308 ***		0.1389 ***	
Size	-0.0093			
MTB	-0.0003			
BSM_Prob	0.4159 **	0.3821 **	0.4286 **	0.5180 **
y_2002	-0.1486 **	-0.0702 **	-0.1589 **	
Imminent	0.0439	0.0378	0.0496	
Neuer Markt	-0.1153 ***	-0.1105 ***	-0.1189 ***	
Const	-0.6026 ***	-0.7364 ***	-0.7148 ***	-0.8176 ***
N	80	90	80	90
R^2	0.3755	0.2446	0.3687	0.1090
F	9.20 ***	5.60 ***	10.95 ***	4.92 **
mean VIF	2.38	1.10	2.69	1.00

Table A.4

Regression results for the U.S. and Germany before and after the dot-com bubble

The table shows the regression results, explaining the BHAR's using the market model. The dependent variable is the buy and hold abnormal return [BHAR]. "Before" means before 12/31/2002, "after" means after 1/1/2003. *TD/TA* denotes total debt to total assets, *E/TL* is common equity to total liabilities, *d_EBITDA* is the scaled change of EBITDA to total assets [*EBITDA/TA*]. *Long/Total Debt* is the fraction of long to total debt, *Fraction Debt* is the fraction of total debt to total liabilities, *FD_02* is an interaction term of the same fraction and y_2002. Size is the natural log of total assets, *d_TA* is the scaled change of total assets, MTB is the market to book ratio, *BSM_Prob* is the default probability determined by the Black and Scholes Merton 250 days before the announcement, *y*, *penny_stock* is a dummy variable that is unity if the price of the company was lower than one 250 days before the bankruptcy announcement, *Chapter 7* is a dummy taking the value of one, if the company has filed under Chapter 7, *OTC* and *NASDAQ* are also dummies if the firms was traded OTC or on NASDAQ respectively, *SIC1*, *SIC3*, and *SIC7* are dummies denoting the sector the company was operating in. "*Imminent*" is a dummy taking the value of one, if the company has filed under "imminent insolvency", and *Neuer Markt* is a dummy indicating if the company was traded on this market segment. ***,** and * indicates coefficients significant at 1%, 5% and 10%.

Panel A: USA	BEFORE 12/31/2002	AFTER 1/1/2003
	BHAR261	BHAR261
TD/TA	-0.0063	-0.0014
E/TL	-0.0001 *	-0.0088
EBITDA/TA	0.0063 *	-0.0056
d_EBITDA	-0.0001	0.0022 ***
d_TA	-0.1153 ***	-0.0480
Size	0.0066	0.0162 ***
MTB	0.0001 ***	0.0044
BSM_Prob	-0.1571 ***	-0.1862 ***
penny_stock	0.0432	0.0301
Chapter 7	-0.1108 ***	-0.0147
OTC	-0.2498 ***	-0.3433 **
NASDAQ	-0.1575 *	-0.0813
SIC1	0.1761 **	0.0555
SIC3	-0.0027	-0.0459
SIC7	-0.0756 ***	-0.0505
Const.	-0.6758 ***	-0.6473 ***
N	445	230
R^2	0.2207	0.3457
F	8.57 ***	15.76 ***
mean VIF	1.24	2.12

Panel B: GER	BEFORE 12/31/2002	AFTER 1/1/2003
	BHAR261	BHAR261
Long/Total Debt	0.0450	0.2392
Fraction Debt	-0.2842 **	-0.6155 **
TD/TA	0.4968 ***	0.1358 **
Size	-0.0245 *	0.0396
MTB	-0.0002	0.0180 **
BSM_Prob	0.0822	0.8276 *
Imminent	-0.0374	0.0103
Neuer Markt	-0.1007 ***	-0.0632
Const	-0.5448 ***	-1.1204 ***
N	53	26
R^2	0.4815	0.3724
F	3.93 ***	2.71 **
mean VIF	1.86	2.02