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Abhandlungen

Costs of Financial Distress: The German Evidence

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I. Introduction

The trade off theory of capital structure states that firms choose their capital structure by comparing benefits against costs of using debt. Benefits of debt usually comprise tax savings and the avoidance of agency costs of equity. Financial researchers agree that a major part of the costs or disadvantages of using debt comes in the form of *"bankruptcy costs"* or *"costs of financial distress"* (cfd).[1] However, there is disagreement about whether ex ante (expected) cfd are big enough to account for empirically observable capital structures. *Almeida/Philippon* (2007) argue that the systematic risk of cfd requires it to be discounted with a discount rate that is lower than the riskless rate. The resulting increase in ex ante cfd would explain empirical capital structure choices solely by cfd.[2]

In this paper we aim to measure these costs empirically for a sample of German industrial firms. We concentrate on the ex post indirect cfd that materialize when bankruptcy or a financial crisis occurs. The notion *"direct"* costs refers to all bankruptcy related payments to lawyers, courts etc., whereas all other losses in value (e. g. due to customers', suppliers' and competitors' reactions) are labelled as *"indirect"* cfd.

Evidence on indirect cfd in Germany is not existent: to our knowledge there is no study that tries to estimate ex post indirect cfd. Nevertheless

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[1] See e. g. *Kraus/Litzenberger* (1973); *zur Linden* (1975); *Kim* (1978); *Chen* (1979); *Flath/Knoeber* (1980); *Morris* (1982); *Bradley/Jarrell/Kim* (1984).

[2] *Almeida/Philippon* (2007).

a specific reference to Germany seems particularly worthwhile for two reasons: first, concerning book values; on average German firms seem to have higher debt/equity ratios than US firms.[3] Estimates on German cfd might help to answer the question whether this difference is due to lower cfd of German firms. Second, German firms have different governance structures than US firms. The German financial system is usually characterised as bank-based with close firm house-bank relationships.[4] One of the constitutive elements of a close house-bank relationship is the willingness of the bank to support its client in a financial crisis.[5] This *"liquidity insurance"* is argued to decrease cfd: *"An important component of the conventional wisdom concerning the merits of the bank-based system in Germany is based on the view that German banks are able to reduce the costs of bankruptcy and financial distress."*[6] According to this hypothesis we would expect German firms to have lower cfd than US firms.

The analysis focuses on a particular empirical approach to measure cfd: *Opler/Titman* (1994) (henceforth referred to as OT) verify the existence of *ex post, indirect costs* of financial distress as sales losses and other declines in operating performance of (ex-ante) highly levered firms in industry-wide economic downturns. We chose this model because empirical evidence suggests that indirect cfd exceed direct cfd and thus appear to be more important for the capital structure choice.[7]

The main results of our study are as follows: applying the OT approach on the German CDAX data, we do *not* find that ex-ante highly levered

[3] See e.g. *Rajan/Zingales* (1995), p. 1427 Table II. The authors point out that the results are sensitive to accounting adjustments, especially the treatment of pension liabilities. See *Rajan/Zingales* (1995), p. 1433. *Fan/Titman/Twite* (2008) also find mean leverage of German firms to be higher than for US firms (Figure 1 on p. 33). As they exclude pension reserves of German firms, the moderate positive difference between the two countries is also a conservative estimate.

[4] See e.g. *OECD* (1995); *Allen/Gale* (1995); *Elsas/Krahnen* (1998).

[5] See e.g. *Fischer* (1990); *Boot* (2000) or *Schäfer* (2003). The informational advantage stemming from the close relationship allows the bank to extract rents from the client during the reorganization. *Santos/Winton* (2008) provide evidence that banks raise credit rates during recessions higher than justified purely by the increase in default risk alone. Loan spreads of firms without bond market access increase by 28 bp more than those of comparable firms with access to bond markets (p. 1316). *Memmel/Schmieder/Stein* (2007) provide mixed evidence for German data.

For an analysis of the general impact of close bank relationships on firm performance in Germany see e.g. *Gorton/Schmid* (2000).

[6] *Edwards/Fischer* (1994), p. 158.

[7] See e.g. *Altman* (1984); *Opler/Titman* (1994); *Andrade/Kaplan* (1998).

firms in distressed industries have lower sales growth than more conservatively financed counterparts. Thus there does not seem to be a significant interaction between leverage and costs in distress. This is in sharp contrast to the results of OT. Additionally, we do not observe a negative impact of leverage upon sales growth.

The rest of the paper is organised as follows: section II discusses some theoretical aspects surrounding cfd and provides a review of the existing empirical evidence. In section III, we introduce the OT model and describe the data. Section IV presents the results of the study and section V concludes.

II. Costs of Financial Distress

1. Theory and Terminology

In financial economics the prominence of cfd stems from prior work on the capital structure choice of firms, more precisely on the trade-off theory. Important early contributions are due to *Kraus/Litzenberger* (1973), *zur Linden* (1975), *Kim* (1978), *Chen* (1979), *Flath/Knoeber* (1980), *Morris* (1982) and *Bradley/Jarrell/Kim* (1984) among others. More recent contributions to cfd are *Kahl* (2002), *Titman/Tsyplakov* (2007) and *Almeida/Philippon* (2007). As the purpose of this study is not to contribute to this theory but to empirically estimate cfd it shall suffice to clarify some terminological issues surrounding the empirical literature[8] on cfd here:[9] the term *ex post* cfd refers to costs realized if the financial crisis occurs, whereas *ex-ante* cfd are expected costs estimated under uncertainty. *Direct* cfd are all immediate insolvency costs, such as fees for legal advice and court proceedings. Information on these costs is publicly available and obtaining estimates of *direct* cfd is therefore mainly an issue of the researcher's industriousness. *Indirect* cfd on the other hand are all declines in value associated with distress. Such value losses can occur before or after a firm actually files for bankruptcy and they can appear under various guises: e. g. debt holders' priority rights might lead to inefficient reorganization,[10] cus-

[8] See section II.2 below.

[9] These issues are well documented in the literature, see e. g. *Andrade/Kaplan* (1998) or *Branch* (2002) for a review.

[10] Part of this cost depends on the legal environment, especially on differences in the bankruptcy codes. See e. g. *Davydenko/Franks* (2008). *Kahl* (2002) has given an alternative explanation for losses in value while the firm is in bankruptcy, which is independent of bankruptcy regulations: creditors postpone the liquida-

tomers might be reluctant to purchase long lived assets from a distressed firm,[11] distress endangered firms might have to sell assets of high specificity at "fire-sales prices",[12] and healthy competitors might aggressively seek to increase their market share and drive financially vulnerable firms out of the market.[13] For obvious reasons, it is difficult to measure *indirect* cfd. We review the existing empirical literature on both, *direct* and *indirect* cfd in section II.2.

Finally we shall make a short reference to the issue of *financial distress* vs. *economic distress*: costs of financial distress can be viewed as comprising only those costs that are directly associated with renegotiating financial contracts, independent of operating business issues, while declines in a firm's operating performance can be viewed as *costs of economic distress*. But since high leverage acts as an amplifier of operating business problems (such as performance declines),[14] economic distress and financial distress are intertwined. Empiricists therefore face a "*reverse causality problem*"[15] (economic distress may be the cause for, as well as the result of financial distress) and are mostly not able to distinguish *(costs of) economic* and *financial distress*.[16]

2. Empirical Evidence

Estimates of *direct* cfd have been derived by *Warner* (1977), *Altmann* (1984), *Ang/Chua/McConnell* (1984), *Weiss* (1990), *Campbell* (1997), *Betker* (1997) and *Bris/Welch/Zhu* (2006) among others. Their analyses focus on bankrupt firms or firms undergoing private debt reorganization. The estimates for *direct* cfd as a percentage of the respective firm value proxy range from 1% to 11.1%.[17] The authors also find evidence for the fixed cost nature of cfd by showing cfd to be a concave function of firm size.

tion/reorganization decision in order to gather information and learn more about the true state of the firm.

[11] *Opler/Titman* (1994) refer to these costs as "customer driven". See *Opler/Titman* (1994), p. 1016.

[12] See e.g. *Shleifer/Vishny* (1992); *Pulvino* (1998).

[13] See e.g. *Fudenberg/Tirole* (1986); *Bolton/Scharfstein* (1990).

[14] See e.g. *Andrade/Kaplan* (1998).

[15] *Opler/Titman* (1994), p. 1016.

[16] A rare exception is the study of *Andrade/Kaplan* (1998) who rely on a database of troubled firms from highly leveraged transactions that have positive operating income and thus are not subject to economic distress.

[17] See *White* (1989); *Weiss* (1990); *Ang/Chua/McConnell* (1984); *Campbell* (1997); *Betker* (1997). Concentrating on differences in US bankruptcy between Ch. 7

Several attempts have been made to estimate *indirect* cfd: *Cutler/Summers* (1988) analyze the Pennzoil/Texaco trial and find a net loss in value of 1.1 billion USD for both companies. Following this idea *Bhagat/Brickley/Coles* (1994) analyze 355 court proceedings and find median cfd for the defendant of 1.5 million USD.[18] OT focus on *indirect* cfd and explore whether firms with high ex-ante leverage experience stronger performance declines during a subsequent industry distress than low-levered firms in the same situation. They provide evidence that ex-ante highly levered firms face lower sales growth in distressed industries than firms with lower ex-ante leverage.[19] *Campello* (2003) has shown that industry-adjusted sales growth is lower for stronger levered firms, especially when rival firms in the same industry use less leverage.[20] *Altman* (1984) computes *indirect* cfd as the difference between profit projections and realized profits during distress. The former are derived by multiplying a regression based sales forecast with an average profit margin. He finds *indirect* cfd of 8.1% of firm value three years before distress occurred.[21] *Chen/Merville* (1999) use Altman's Z-score model to divide their sample into three risk classes and show that the deviation between realized earnings in distress and a distress free earnings projection is significantly different for each of the three risk classes. The class with the continuously increasing insolvency risk experiences the highest average deviation.[22] *Andrade/Kaplan* (1998) analyse firms that underwent a highly leveraged transaction (HLT) and then became financially distressed but could still maintain positive operating earnings.[23] The mean cfd – adjusted for industry/market effects – are found to be roughly 10% of firm value where cfd are computed as the mean decline in market values due to financial distress. However, this result is statistically not different from zero, a finding that might be attributed to the fact that HLTs are primarily undertaken in mature industries where indirect cfd are argued to be of less importance.[24] *Bris/Welch/Zhu* (2006) report median cfd of 62% in Chap-

liquidations and Ch. 11 reorganizations *Bris/Welch/Zhu* (2006) report median direct cfd (measured as court-declared expenses) of 2.5% (Ch. 7) and 1.9% (Ch. 11); (pp. 1260).

[18] See *Bhagat/Brickley/Coles* (1994), p. 221. The variability of this result seems to be substantial across the authors' equations.

[19] See *Opler/Titman* (1994), p. 1025. We will refer to this study in detail later.

[20] See *Campello* (2003), pp. 372.

[21] See *Altman* (1984), pp. 1074.

[22] See *Chen/Merville* (1999), pp. 277.

[23] See *Andrade/Kaplan* (1998), pp. 1447.

[24] See *Andrade/Kaplan* (1998), p. 1466 and table 7. Median values are 20.7% and 24.3% and thus substantially higher.

ter 7 liquidations and 13% in Chapter 11 reorganizations by measuring indirect cfd by losses in asset values during bankruptcy.[25] *Korteweg* (2007) estimates cfd of 5% of firm value for observed leverages and up to 31% of firm value for bankrupt firms.

Despite the abundance of research on distress indicators and on the estimation of distress probabilities in Germany,[26] German work on the magnitude of cfd remains limited. Several authors report estimates of direct costs of bankruptcy between 4% and 5% of asset value.[27] To our knowledge there are no studies that estimate indirect cfd with German data.

III. Opler/Titman Approach

1. The Model

OT propose and estimate a pooled regression model to investigate the influence of financial distress on firm performance (proxied for by sales growth, stock returns and growth in operating income) for a sample of 46.799 firm years in the period between 1972 and 1991. They focus on indirect cfd and analyze whether firms in distressed industries with high ex-ante leverage under-perform peer firms with lower ex-ante leverage. This means that according to OT's method, firms in distressed industries with *high ex-ante leverage* proxy for *financially distressed* firms. If their performance was significantly lower than that of firms in the same industry but with low ex-ante leverage then this could be considered evidence for the existence of significant costs of financial distress.

Similar to OT, we specify a pooled cross section time series OLS model reported in table 1.

In this model, firm performance is proxied for by three alternative measures: industry adjusted sales growth (*SGA*), stock returns (*SRA*) and

[25] See *Bris/Welch/Zhu* (2006), pp. 1264. The authors also point to some problems measuring indirect cfd in Ch. 11 reorganizations: as there are incentives for some parties to overstate asset values at the end of the bankruptcy procedure, asset values may be biased upwards and cfd downwards. Indeed, the authors report an increase of average value (and thus negative cfd) in this case.

[26] See e.g. *Gebhardt* (1980); *Baetge* (1980); *Feidicker* (1992); *Albrecht/Baetge/Jerschensky/Roeder* (1999) or *Baetge* (2002). For the impact of financial distress on ownership structure and management turnover in German firms see a study of *Jostarndt/Sautner* (2008).

[27] *Drukarczyk* (1994), p. 121, and *Bigus/Eger* (2002), p. 25, refer to an analysis of *Gessner/Rhode/Strate/Ziegert* (1978). While this study compiles extensive information about corporate bankruptcy in Germany it does not contain an explicit calculation of direct cfd.

Table 1

The Regression Specification

Alternative Dependent Variables	Independent Variables
$SGA_{i,t}$ $EGA_{i,t} = \alpha$ $SRA_{i,t}$	$\beta_1 \cdot LSL_{i,t-2}$ $\beta_2 \cdot EAA_{i,t-2}$ $\beta_3 \cdot IAA_{i,t-2}$ $\beta_4 \cdot ASA_{i,t-2}$ $+ \; \beta_5 \cdot DD^{I-III}_{j,t}$ $\beta_6 \cdot LD^{I-II}_{i,t-3}$ $\beta_7 \cdot \left(DD^{I-III}_{j,t} \cdot LD^{I-II}_{i,t-3}\right)$ $\sum_t \Delta_t \, YD_t$ $\varepsilon_{i,t}$

change in earnings before interest and taxes (*EGA*). More specifically, in the model, $SGA_{i,t}$ is the industry adjusted (*A* stands for industry adjusted) sales growth of firm *i* over the two year period preceding a particular base year *t*. Similarly $EGA_{i,t}$ denotes earnings growth and $SRA_{i,t}$ stock return, both for firm *i* over the same period and both industry adjusted.

The independent variables are defined as follows: $LSL_{i,t-2}$ is the natural logarithm of firm *i*'s sales two years prior to the base year *t* (i.e. at the outset of the two year observation period). $EAA_{i,t-2}$ is the ratio EBIT/Assets, $IAA_{i,t-2}$ the ratio of investments/assets and $ASA_{i,t-2}$ the ratio of asset sales to assets, all three are static variables of firm *i* two years prior to the base year *t* and all are industry adjusted. $LSL_{i,t-2}$, $IAA_{i,t-2}$ and $ASA_{i,t-2}$ control for a size related performance impact, the influence of investment behaviour on performance and for performance effects originating from asset sales, respectively. YD_t denotes the dummy variable for the respective year.

As in OT's analysis, the main focus of the above model is on two dummy variables and the interaction term between these dummy variables. One dummy, $DD^{I-III}_{j,t}$, indicates a distressed industry *j* and another dummy, $LD^{I-II}_{i,t-3}$ indicates whether a firm is in the high leverage group. The interaction term of these two dummies measures the combined effect of industry distress *and* high leverage and thus proxies for financial distress.

We work with three different distress definitions: $DD^{I}_{j,t}$ is the distressed industry dummy in year *t*, set equal to one if median[28] sales

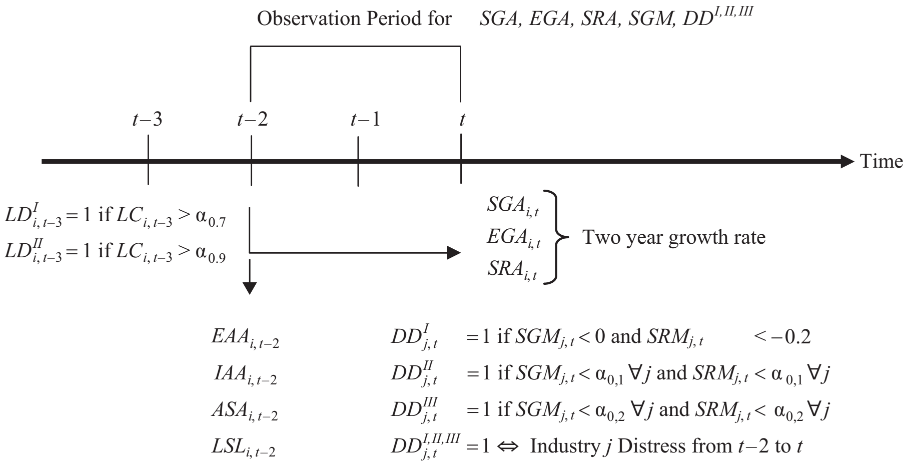

Figure 1: Time Lag Design of Regression Model

growth in industry j was negative *and* median stock return was below –20% over the two years preceding t. $DD^{II}_{j,t}$ and $DD^{III}_{j,t}$ define an industry j as distressed, if median sales growth and stock price change are in the lowest 10% and 20% percentile, respectively, over all industries.

For the leverage dummies we employ several definitions: $LD^{I}_{i,t-3}$ and $LD^{II}_{i,t-3}$ are set equal to one if firm i's leverage in year $t-3$ exceeds the 70% and 90% leverage percentile, respectively, over all firms *and* all years. Additionally, leverage dummies $LD^{III}_{i,t-3}$ and $LD^{IV}_{i,t-3}$ are defined by applying the same percentiles over all firms and years in the same industry. By combining three different distress measures with two basic high leverage definitions we obtain six models for each of the three dependent variables.

Table 2 gives an overview over the variables used.

Following OT, we adjust for industry effects by calculating the absolute difference between realizations of a certain variable and the industry median/mean across all firms in the industry in that year.

Figure 1 illustrates the time lag design of the model. In order to avoid the reverse causality problem mentioned earlier, leverage leads the begin-

[28] It is not quite clear which definition OT use for their distressed industry dummy: on page 1024 an industry is distressed if it exhibits negative *median* sales growth and stock returns below –0.3, whereas on page 1026 distressed industries have negative *mean* sales growth and stock returns below –0.3. See *Opler/Titman* (1994), pp. 1024 and 1026.

Table 2

Variables

Variables	Calculation/Description
$SGA_{i,t}$	$\frac{\text{Sales}_{i,t} - \text{Sales}_{i,t-2}}{\text{Sales}_{i,t-2}}$ – SG Industry Average
$EGA_{i,t}$	$\frac{\text{EBIT}_{i,t} - \text{EBIT}_{i,t-2}}{\text{EBIT}_{i,t-2}}$ – EG Industry Average
$SRA_{i,t}$	$\frac{\text{Share Price}_{i,t} - \text{Share Price}_{i,t-2} + \sum_{j=t-2}^{t} Dividends_{i,j}}{\text{Share Price}_{i,t-2}}$ – SR Industry Average
$LSL_{i,t-2}$	$\ln\left(\text{Sales}_{i,t-2}\right)$
$EAA_{i,t-2}$	$\frac{\text{EBIT}_{i,t-2}}{\text{Total Assets}_{i,t-2}}$ – EA Industry Average
$IAA_{i,t-2}$	$\frac{\text{Inv. Fixed Assets}_{i,t-2} + \text{Inv. Other Assets}_{i,t-2}}{\text{Total Assets}_{i,t-2}}$ – IA Industry Average
$ASA_{i,t-2}$	$\frac{\text{Disposal of Fixed Assets}_{i,t-2}}{\text{Total Assets}_{i,t-2}}$ – ASA Industry Average
DD_t^{I}	one if median sales growth is negative *and* median stock return is below –20 %, otherwise zero
DD_t^{II}	one if median sales growth and stock return is in the lowest 10 % percentile over all industries, otherwise zero
DD_t^{III}	one if median sales growth and stock return is in the lowest 20 % percentile over all industries, otherwise zero
$LD_{i,t-3}^{I}$	one if firm i's leverage in that year exceeds the 70 % leverage percentile over all firms *and* all years, otherwise zero
$LD_{i,t-3}^{II}$	one if firm i's leverage in that year exceeds the 90 % leverage percentile over all firms *and* all years, otherwise zero
$LD_{i,t-3}^{III}$	one if firm i's leverage in that year exceeds the 70 % leverage percentile over all firms and all years *in the same industry,* otherwise zero
$LD_{i,t-3}^{IV}$	one if firm i's leverage in that year exceeds the 90 % leverage percentile over all firms and all years *in the same industry,* otherwise zero

ning of a two year performance-observation-period by one year. The time lag design is similar to OT's fundamental relations (two year observation period and ex ante leverage). The only difference is the position of the base year: OT's base year 0 is always the middle of the two year observation period, whereas here the base year *t* always marks the end of a two year period.[29]

2. Data and Descriptive Statistics

We use data from DATASTREAM. The sample consists of companies included in the Composite DAX (CDAX) index over the time period 1990–2005. CDAX is a broad index including all companies listed in the General Standard and Prime Standard segments of Frankfurt Stock Exchange. Each firm that was in the index between 1990 and 2005 is included into the initial sample. To avoid survivorship biases, we reconstruct the composition of the CDAX in every year (and conduct a dynamic index adjustment). This results in a sample of 1,003 companies.

Since firms sometimes change their field of operation, we also trace industry affiliations for each company based on the data from Deutsche Börse AG. For company years without industry information, we apply the latest known industry group. Firms not remaining in the same industry group for at least three successive years are removed from the sample. We can thus ensure that there is no change in the industry affiliation over the time horizon of the model.

In order to align accounting data with capital market information we combine asset and liability data with share prices at April 1st in the following year and remove firms where the fiscal year does not correspond to the calendar year. We exclude all banks and insurance companies and remove all firm years from the sample which belong to an industry displaying less than three firms in a year.[30] Following *Fama/French* (1998) we trim the sample to control for outliers in the database by removing the upper and lower 1% tail of observations for the dependent and the control variables. This procedure results in a final sample (firms with va-

[29] This facilitates the maneuvering of the data.

[30] In order for an industry to be accepted in the final sample, OT require that it should have a minimum of four firms, see *Opler/Titman* (1994), p. 1022. OT also require that their industries have "at least one firm in the top three sample leverage deciles and one firm not in the top three deciles per year". *Opler/Titman* (1994), p. 1022.

lid observations only) of 2,264 firm years and valid data sets for the base regression (*SGA* as dependent variable).

Table 10 in the appendix shows the industries that are distressed during a specific two-year observation period for the median-based models. In brackets we show the number of firms for each industry that suffer from distress depending on the different distress dummies. Depending on the distress definition we obtain eight, seven and thirteen distressed industry years[31] for the sample; this amounts to 5.6 %, 3.1 %, and 8.3 % of the total sample, respectively. In OT's study it is ca. 3 %.[32]

Tables 3, 4 and *5* exhibit descriptive statistics for the entire trimmed sample. They distinguish observations in distressed industries from those in normal industries and employ the three different distress definitions DD^I, DD^{II} and DD^{III} defined above.

With respect to differences in leverage between distressed and non-distressed industries three years prior to distress, a clear picture does not emerge: under distress definition DD^I, we observe lower leverages for distressed firms than for non-distressed firms, under distress definitions DD^{II} and DD^{III}, the opposite holds. From $t-3$ to t, mean and median leverage generally increase in distressed industries, independent of the distress definition. In period t finally, distressed firms generally exhibit higher leverage ratios than their non-distressed counterparts.

OT also report increasing leverage ratios in distressed industries. Their tentative explanation is that firms in distressed industries are forced to build up leverage during the distress period since other financial resources dry up.[33]

Firms in non-distressed industries are larger in size (proxied for by sales) than those in distressed industries.[34] In distressed industries mean and median sales decline as the industry moves into distress.

It is not surprising that sales growth and stock returns are substantially lower for distressed firms than for non-distressed firms, as these variables account for the distress definitions. Mean and median of all three dependent variables are negative for distressed firms according to the three distress definitions.

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[31] The non-linear increase of distressed industries when moving from the 10 % to the 20 % decile reflects the fact that both conditions for the distress definition have to be fulfilled simultaneously.

[32] See *Opler/Titman* (1994), p. 1022.

[33] See *Opler/Titman* (1994), p. 1024.

[34] See *Opler/Titman* (1994), p. 1023 and 1024.

Table 3: **Descriptive Statistics for Distress Dummy I (DD^I)**

Panel A: Distressed Firm Years

Variable Time	Leverage in $t-3$	Leverage in t	Sales in $t-1$	Sales in t	Sales growth in t	Stock return in t	EBIT growth in t
Mean	0.62323	0.67554	1731248	1726061	–0.05182	–0.33197	–1.24271
Median	0.66000	0.67600	213271	163380	–0.10204	–0.49206	–0.26469
Std.Dev.	0.23337	0.38393	5768204	6189450	0.45941	0.58305	7.33365
Observations	129	128	129	129	129	126	127

Panel B: Non-Distressed Firm Years

Variable Time	Leverage in $t-3$	Leverage in t	Sales in $t-1$	Sales in t	Sales growth in t	Stock return in t	EBIT growth in t
Mean	0.63189	0.62656	3723276	3891655	0.38636	0.28784	0.34108
Median	0.66151	0.65520	421291	429802	0.08545	0.08192	0.20428
Std.Dev.	0.22567	0.20961	12111526	12468279	4.49192	1.20646	12.89337
Observations	2142	2127	2142	2139	2135	2023	2119

This table shows descriptive statistics for variables in distressed and non-distressed industries with distress definition according to DD^I. DD^I is indicating a distressed industry if two year change in median stock price is less than –20% and two year median sales growth is negative. Leverage is total liabilities divided by total assets. The table shows total sales, two-year sales growth, two-year stock return, and two-year EBIT growth.

Table 4: **Descriptive Statistics for Distress Dummy II (DD^{II})**

Panel A: Distressed Firm Years

Variable Time	Leverage in $t-3$	Leverage in t	Sales in $t-1$	Sales in t	Sales growth in t	Stock return in t	EBIT growth in t
Mean	0.66851	0.68762	607023	609591	–0.11802	–0.10575	–0.26317
Median	0.68485	0.69490	234649	194538	–0.09133	–0.15352	–0.09785
Std.Dev.	0.19998	0.27197	891318	998803	0.37795	0.47851	2.01353
Observations	71	71	71	71	71	70	70

Panel B: Non-Distressed Firm Years

Variable Time	Leverage in $t-3$	Leverage in t	Sales in $t-1$	Sales in t	Sales growth in t	Stock return in t	EBIT growth in t
Mean	0.63020	0.62744	3707040	3870565	0.37692	0.26353	0.26809
Median	0.66042	0.65526	413340	418810	0.08230	0.06216	0.19364
Std.Dev.	0.22680	0.22138	12027071	12388705	4.43330	1.20277	12.84519
Observations	2200	2184	2200	2197	2193	2079	2176

This table shows descriptive statistics for variables in distressed and non-distressed industries with distress definition according to DD^{II}. DD^{II} is indicating a distressed industry if two year change in median stock price and change in sales is in the lowest 10% percentile over all industries. Leverage is total liabilities divided by total assets. The table shows total sales, two-year sales growth, two-year stock return, and two-year EBIT growth.

Table 5: **Descriptive Statistics for Distress Dummy III (DD^{III})**

Panel A: Distressed Firm Years

Variable Time	Leverage in $t-3$	Leverage in t	Sales in $t-1$	Sales in t	Sales growth in t	Stock return in t	EBIT growth in t
Mean	0.65056	0.67136	1101737	1072294	–0.02876	–0.12593	–0.59918
Median	0.66001	0.67745	258838	223494	–0.05001	–0.21236	–0.05079
Std.Dev.	0.32638	0.33894	3351824	3426309	0.44667	0.59557	6.04734
Observations	188	188	188	188	188	184	187

Panel B: Non-Distressed Firm Years

Variable Time	Leverage in $t-3$	Leverage in t	Sales in $t-1$	Sales in t	Sales growth in t	Stock return in t	EBIT growth in t
Mean	0.62967	0.62552	3836515	4012174	0.39673	0.28685	0.32879
Median	0.66144	0.65446	418810	428479	0.08686	0.08134	0.20498
Std.Dev.	0.21475	0.20938	12308326	12677937	4.55437	1.22300	13.08234
Observations	2083	2067	2083	2080	2076	1965	2059

This table shows descriptive statistics for variables in distressed and non-distressed industries with distress definition according to DD^{III}. DD^{III} is indicating a distressed industry if both change in stock price and change in sales are in the lowest 20% percentile over all industries. Leverage is total liabilities divided by total assets. The table shows total sales, two-year sales growth, two-year stock return, and two-year EBIT growth.

Considering EBIT growth of distressed firms, we find strongly negative means under the DD^{I} and DD^{III} definitions, whereas the corresponding median values are significantly higher. Thus, EBIT growth figures are skewed. Notice that EBIT growth was not used to distinguish distressed from non-distressed industries. There are several reasons to treat the EBIT growth variable with great care: first, negative EBITs and changes of sign make a meaningful interpretation of the growth rate difficult.[35] There is a significant number of observations with negative EBIT figures and changes in sign in our sample. Removing these cases from the sample reduces the number of observations by more than 25 % to 1498. Second, at low levels, even small absolute EBIT changes may produce large growth rates. Finally, firms tend to manipulate earnings figures as they move into a financial crisis.[36] Sales figures on the other hand, do not suffer from these shortcomings. We thus focus on sales growth as the primary performance measure henceforth.

IV. Costs of Financial Distress for German Firms

Before we present the results, we shall briefly review OT's findings: the authors report a significantly negative coefficient for the interaction dummy as their most prominent finding. Their interpretation is that highly levered firms have lower sales growth in industry downturns than their less levered competitors.[37] Some additional analyses on stock returns and operating income let the authors conclude that the sales growth reductions are "*customer-*" or "*competitor-driven*" and hence indeed represent costs of financial distress.[38] OT also report a negative and significant leverage dummy coefficient, which is interpreted as follows: "*leveraged firms lose market share to their more conservatively financed counterparts even in good times*".[39]

[35] For example a decrease in EBIT from –10 in t to –12 in $t+1$ yields an EBIT growth rate between t and $t+1$ of $\frac{(-12)-(-10)}{(-10)} = +20\,\%$.

[36] *Opler/Titman* (1994), p. 1019.

[37] See *Opler/Titman* (1994), p. 1025.

[38] See *Opler/Titman* (1994), p. 1033.

[39] *Opler/Titman* (1994), p. 1025. For the results see p. 1026, Table IV.

1. Baseline Results

Tables 6 to *8* present baseline results. Consider first the sales growth equations in table 6, where industry adjusted sales growth (*SGA)* is the dependent variable.

We first note that all control variables are signed as expected: investment (IAA) and earnings (EAA) affect sales growth significantly positively, whereas size (LSL) and asset sales (ASA) have a significant negative impact. *The main result is that we do not find any statistically significant negative interaction between high leverage and distress*. On the contrary, the coefficient of the distressed industry and leverage dummy interaction term is predominantly positively signed, in model one even significantly.

Additionally, we find evidence for a positive impact of leverage upon sales growth: in all models, highly levered firms display significantly higher sales growth than their lower-levered counterparts. These results are in clear contrast to the results of OT

Finally, we establish that industry distress affects sales growth negatively, partly significantly.[40]

Consider now the results in tables 7 and 8 where industry adjusted EBIT growth (EGA) and stock returns (SRA) are the dependent variables.

Contrary to the sales growth models, the EBIT growth and stock return models are not able to document conclusive evidence: most coefficient estimates are insignificant, control variables display coefficients with unreasonable signs[41], the models achieve a low explanatory power and the signs of the dummy variable coefficients partially differ from those obtained with the sales growth models and are even erratic across the six EBIT growth models.

We attribute these findings primarily to two issues associated with the dependent variables in these models: first, as discussed in section III.2

[40] This coefficient is difficult to interpret however: as the dependent variable is adjusted for industry effects, it has to be zero on average in distressed industries as well as in non-distressed industries. In OT's study the estimate for the distress dummy is significantly *positive* at 1% in four of their six models. See *Opler/Titman* (1994); table IV on p. 1026. This suggests that industry-adjusted sales growth is 11.1% higher for firms in distressed than for those in non-distressed industries. OT do not devote any additional attention to this result.

[41] In all EGA-based models, industry adjusted operating earnings (*EAA)* have a negative impact on the dependent variable.

Table 6: **Regression Results for Sales Growth (SGA) as Dependent Variable**

Model No.	1	2	3	4	5	6
Intercept	0.410628***	0.38885***	0.412315***	0.391237***	0.414154***	0.391767***
LSL	-0.030867***	–0.028716***	–0.031131***	–0.028912***	–0.031186***	–0.028984***
EAA	0.208389**	0.209398**	0.217658***	0.211928***	0.217119***	0.214902***
IAA	0.749102***	0.739257***	0.724529***	0.728862***	0.738402***	0.732312***
ASA	–1.240627***	–1.212765***	–1.249978***	–1.201482***	–1.266865***	–1.195163***
DD^{I}	–0.118706**	–0.075146*				
DD^{II}			–0.090313	–0.076243		
DD^{III}					–0.07369*	–0.046489
LD^{I}	0.047638**		0.056408***		0.05173**	
LD^{II}		0.078664**		0.083907***		0.090823***
*DD * LD*	0.195773**	0.122766	0.088375	0.092	0.088648	–0.006553
N	2097	2097	2097	2097	2097	2097
Adj. R^2	4.46 %	4.22 %	4.18 %	4.15 %	4.26 %	4.15 %

SGA as dependent variable is industry-adjusted two-year sales growth. DD^{I} to DD^{III} are industry distress dummies. DD^{I} is indicating a distressed industry if two year change in median stock price is less than –20 % and two year median sales growth is negative. DD^{II} (DD^{III}) is equal to one if both change in stock price and change in sales are in the lowest 10 % (20 %) percentile over all industries. LD^{I} and LD^{II} are different dummies indicating whether a firm is highly levered or not. LD^{I} (LD^{II}) is indicating whether a firm is in the 70 % (90 %) percentile of the distribution of total liabilities to total assets over all firms. *LSL* is the natural logarithm of total sales. *EAA*, *IAA*, and *ASA* are industry-adjusted earnings-to-assets, industry-adjusted investment-to-assets, and industry-adjusted asset sales-to-assets ratios. Regression equations contain dummy variables for different years.

*** (**,*) denotes that estimated coefficients are different from zero at 1 % (5 %, 10 %) confidence level.

Table 7: **Regression Results for EBIT Growth (EGA) as Dependent Variable**

Model No.	1	2	3	4	5	6
Intercept	–0.656755	–0.636227	–0.65121	–0.653035	–0.648854	–0.660025
LSL	0.061669**	0.05926**	0.060474**	0.060158**	0.061364**	0.060846**
EAA	–1.976031***	–1.959661***	–1.97419***	–1.938746***	–1.979874***	–1.970929***
IAA	–1.344198	–1.434272	–1.396046	–1.443039	–1.313547	–1.454448
ASA	1.712969	1.713499	1.797102	1.855949	1.616344	1.800759
DD^{I}	0.072341	0.244309				
DD^{II}			0.132843	0.19719		
DD^{III}					–0.092372	0.119409
LD^{I}	–0.071341		–0.027586		–0.085974	
LD^{II}		–0.084038		–0.010815		–0.044452
*DD * LD*	0.05632	–0.966054	–0.979275*	–2.395053**	0.223095	–0.97857*
n	2076	2076	2076	2076	2076	2076
Adj. R^2	0.65 %	0.79 %	0.81 %	1.22 %	0.65 %	0.83 %

EGA as dependent variable is industry-adjusted two-year EBIT growth. DD^{I} to DD^{III} are industry distress dummies. DD^{I} is indicating a distressed industry if two year change in median stock price is less than –20 % and two year median sales growth is negative. DD^{II} (DD^{III}) is equal to one if both change in stock price and change in sales are in the lowest 10 % (20 %) percentile over all industries. LD^{I} and LD^{II} are different dummies indicating whether a firm is highly levered or not. LD^{I} (LD^{II}) is indicating whether a firm is in the 70 % (90 %) percentile of the distribution of total liabilities to total assets over all firms. *LSL* is the natural logarithm of total sales. *EAA, IAA,* and *ASA* are industry-adjusted earnings-to-assets, industry-adjusted investment-to-assets, and industry-adjusted asset sales-to-assets ratios. Regression equations contain dummy variables for different years.

*** (**,*) denotes that estimated coefficients are different from zero at 1 % (5 %, 10 %) confidence level.

Table 8: **Regression Results for Stock Return (SRA) as Dependent Variable**

Model No.	1	2	3	4	5	6
Intercept	–0.15283	–0.159161	–0.154808	–0.163032	–0.155314	–0.169343
LSL	0.012577*	0.013407**	0.012474*	0.013595**	0.012733*	0.014028**
EAA	0.246403*	0.219779*	0.251596**	0.225634*	0.25032**	0.225555*
IAA	–0.172092	–0.241192	–0.191965	–0.246523	–0.179054	–0.264217
ASA	–0.202439	–0.12954	–0.19755	–0.115557	–0.235576	–0.109143
DD^{I}	0.000325	0.041252				
DD^{II}			0.061768	0.057284		
DD^{III}					0.015073	0.067002
LD^{I}	–0.006101		0.007531		–0.003627	
LD^{II}		–0.105196**		–0.083027*		–0.072319
*DD * LD*	0.103611	–0.003229	–0.181363	–0.324829*	0.042557	–0.251376*
N	1996	1996	1996	1996	1996	1996
Adj. R^2	0.06 %	0.27 %	0.08 %	0.41 %	0.03 %	0.45 %

SRA as dependent variable is industry-adjusted two-year stock returns. DD^{I} to DD^{III} are industry distress dummies. DD^{I} is indicating a distressed industry if two year change in median stock price is less than –20 % and two year median sales growth is negative. DD^{II} (DD^{III}) is equal to one if both change in stock price and change in sales are in the lowest 10 % (20 %) percentile over all industries. LD^{I} and LD^{II} are different dummies indicating whether a firm is highly levered or not. LD^{I} (LD^{II}) is indicating whether a firm is in the 70 % (90 %) percentile of the distribution of total liabilities to total assets over all firms. *LSL* is the natural logarithm of total sales. *EAA*, *IAA*, and *ASA* are industry-adjusted earnings-to-assets, industry-adjusted investment-to-assets, and industry-adjusted asset sales-to-assets ratios. Regression equations contain dummy variables for different years.

*** (**,*) denotes that estimated coefficients are different from zero at 1 % (5 %, 10 %) confidence level.

above, negative EBIT growth rates and changing EBIT signs may cause general problems in the type of analysis we conduct.[42] Second, stock returns reflect the impact of changing expectations, while operating performance measures do not: changing expectations about future earnings should be reflected in stock returns but not in current operating performance, represented, e.g., by earnings and sales figures. Moreover, the statistically significant negative distressed industry and leverage interaction term in two of the stock return models may be attributed to the fact that stock returns reflect financial leverage which acts as an amplifier of operating performance whereas sales growth and EBIT growth as measures of operating performance do not.

As we are interested in the indirect costs of financial distress, the rest of the analysis focuses primarily on sales growth as a measure of operating performance.[43]

2. *Robustness Analyses*

To verify the robustness of the previous results, we perform a number of additional analyses: first, we explore the role of firm specific effects. Second, we alter the definitions of the leverage dummies. Third, we analyse the impact of the change in the German bankruptcy code in 1999 on the results. Fourth, we adjust all variables for industry effects by subtracting the industry mean instead of the median and repeat the entire analysis.

a) Unobserved Heterogeneity

The regression model proposed by OT is estimated from cross sections pooled over time. In order to obtain results that are directly comparable to those of OT, we used the same estimation strategy. However, results might be affected by unobserved firm heterogeneity. Such heterogeneity could be particularly important in distress as some firms may be more dependent on their suppliers or have less loyal employees or customers and thus potentially costs of financial distress, than others.

[42] We ran the EBIT growth regressions on a reduced sample (1498 observations) where negative EBITs and cases of changing signs were removed, but this did not improve the conclusiveness of the results.

[43] OT also focus on the sales growth models and use the EBIT growth and stock return models only to distinguish customer- and competitor-driven sales losses from management-driven sales losses. See *Opler/Titman* (1994), p. 1019.

We thus include an unobserved, time invariant, firm specific effect into the model proposed by OT and first conduct a standard Hausman specification test. The test rejects the random effects assumption in both the sales and EBIT growth models, independent of the leverage and distress definitions used.

We now estimate all models using a standard fixed effects estimator. Results are reported in table 9. The signs and significance levels of the resulting coefficient estimates correspond closely to the baseline results, with one exception: the impact of the distressed industry dummies on sales growth is no longer uniformly negative, but exhibits changing signs. The main findings from the baseline model are re-inforced by the fixed effects estimations: a significantly negative effect of financial distress on sales growth cannot be established and leverage appears to impact sales growth positively.

b) Effects of Intra-Industry Leverage Heterogeneity

Campello (2003) finds that differences in leverage within an industry have explanatory power for costs of financial distress. We thus run the previous sales growth regressions again employing two alternative definitions for the high leverage dummy: $LD^{III}_{i,t-3}$ and $LD^{IV}_{i,t-3}$ are set equal to one if firm i's leverage in that year exceeds the 70 % and 90 % leverage percentile over all firms and all years *in the same industry*.

This analysis clearly confirms the previous findings in table 6.[44]

c) Implications of the 1999 Change of the German Bankruptcy Code

A new bankruptcy code was introduced in Germany on January 1st 1999. The major goal of the new code was to increase the chances of a firm to successfully reorganize during bankruptcy. Therefore, the change might have affected average indirect cfd.

We thus split the sample in two subsamples. The first subsample covers the years under the old code before 1999 (756 valid firm years for the *SGA* variable), whereas the second subsample covers the years under the new code starting in 1999 (1341 valid firm years for the *SGA* variable).

[44] Results are available upon request.

Table 9: **Regression Results for Sales Growth (SGA) as Dependent Variable – Fixed Effects**

Model No.	1	2	3	4	5	6
Intercept	5.333943***	5.280105***	5.390608***	5.317978***	5.44178***	5.37974***
LSL	–0.40279***	–0.398748***	–0.407292***	–0.401796***	–0.411531***	–0.406898***
EAA	0.351299***	0.357457***	0.357498***	0.357547***	0.360132***	0.364563***
IAA	0.475229***	0.475174***	0.477896***	0.479366***	0.476408***	0.473215***
ASA	–1.083379***	–1.083023***	–1.101568***	–1.087754***	–1.108528***	–1.080074***
DD^{I}	–0.011818	–6.02E-07				
DD^{II}			0.039472	0.05149		
DD^{III}					0.060507*	0.078669**
LD^{I}	0.022375		0.025149		0.024322	
LD^{II}		0.083826**		0.085063**		0.089509**
*DD * LD*	0.074347	0.062599	0.08295	0.121433	0.068687	0.042911
n	2097	2097	2097	2097	2097	2097
Adj. R^2	46.45 %	46.6 %	46.5 %	46.7 %	46.7 %	46.8 %

SGA as dependent variable is industry-adjusted two-year sales growth. DD^{I} to DD^{III} are industry distress dummies. DD^{I} is indicating a distressed industry if two year change in median stock price is less than –20 % and two year median sales growth is negative. DD^{II} (DD^{III}) is equal to one if both change in stock price and change in sales are in the lowest 10 % (20 %) percentile over all industries. LD^{I} and LD^{II} are different dummies indicating whether a firm is highly levered or not. LD^{I} (LD^{II}) is indicating whether a firm is in the 70 % (90 %) percentile of the distribution of total liabilities to total assets over all firms in the same industry. *LSL* is the natural logarithm of total sales. *EAA, IAA,* and *ASA* are industry-adjusted earnings-to-assets, industry-adjusted investment-to-assets, and industry-adjusted asset sales-to-assets ratios.

*** (**,*) denotes that estimated coefficients are different from zero at 1 % (5 %, 10 %) confidence level.

We re-run the sales growth regressions for all twelve combinations of the distressed industry and leverage dummy variables in both subsamples.

The results are supportive of the above finding that highly levered firms do not face significantly lower sales growth than their less levered counterparts when the industry moves into distress. The results further reveal that the positive impact of leverage on sales growth in the combined sample (baseline model) is primarily driven by observations under the new bankruptcy code: significantly positive coefficients of the leverage dummy are primarily observed in the subsample after 1999.[45]

d) Alternative Industry Adjustment Using Means Instead of Medians

We also estimate all 36 models (four high leverage definitions times three distress definitions times three dependent variables) using *means* instead of *medians* for both the distressed industry definition and the industry adjustment.[46]

Again, the results support our main finding: the coefficient of the distressed industry and high leverage interaction term is significantly positively estimated in five of the twelve sales growth models. Also, the explanatory power of the models increases as compared to the baseline estimation.[47]

V. Interpretation and Conclusions

Our results are in contrast to those of OT: in Germany, ex ante highly levered firms do *not* seem to face significant additional sales losses in economic downturns as compared to their less highly levered competitors. This result points to systematic differences in indirect cfd between the German data of this study and OT's US data.

Our results with the EBIT growth (*EGA*) and stock return (*SRA*) models are less conclusive, but contrary to OT: we are not able to document a significantly negative effect of financial distress on either EBIT growth or stock returns.

[45] Results are available upon request.
[46] The sample is again trimmed at the 1% tails.
[47] Results are available upon request.

There are several possible interpretations of this result which shall be discussed in turn:

First, the non-negative coefficients could reflect particular benefits of leverage in distress. *Wruck* (1990) argues that *"forced"* reorganization may enhance operational efficiency in distress situations. Some other authors, such as *Jensen* (1989), *Bronars/Dear* (1991), and *Dasgupta/Sengupta* (1993) argue that a threat of bankruptcy could increase the bargaining power of management against other (rent earning) stakeholders, such as employees and suppliers.[48] However, the fact that enhanced efficiency should result in lower costs while performance in this study is proxied for by sales and not by a profit measure reduces the applicability of this argument to account for our results.[49]

Second, the different results might be explained by differences in the bankruptcy codes between the two countries. However, we do not consider this as an important explanation: the German bankruptcy code was changed in 1999 and we did not find convincing evidence that this had any impact upon the main result. Further, as we try to measure indirect cfd, we concentrate on firms that are not subject to legal bankruptcy when facing a financial crisis. Moreover, the most important results are derived using sales growth as a measure for corporate performance. Thus attributing the disagreement of results between Germany and the US to differences in the bankruptcy code would imply that customers would take specific bankruptcy regulations into account when making their decision to buy a product of the company. While this may be true for extremely long-lived and valuable assets we do not believe that this is the major explanation for our main result.

Third, German governance peculiarities – specifically the bank-based financial system with strong firm-bank relationships – may be the reason behind the different results. As liquidity provision in financial distress is one of the key elements of a close firm-bank relation, it might account for this result in a direct and in an indirect way: the direct impact is that the house-bank offers new funding as well as its own financial expertise in reorganizing the troubled firm. *Schäfer* (2003) showed in a theoretical

[48] *Berk/Stanton/Zechner* (2007) argue that bankruptcy allows for renegotiation of labor contracts and thus might be beneficial for the shareholders (p. 4).

[49] If enhanced efficiency and improved bargaining power would lead to higher sales and not only to reduced costs, then our results could be consistent with these hypotheses. Nevertheless the question still remains why there should be differences in this bargaining power improvement or efficiency enhancement between Germany and the US.

framework that it is beneficial for a bank to invest in (re-)organizational capabilities in order to avoid hold-up situations when renegotiating credit terms. So the bank's support may directly increase the efficiency of the firm's operations; as the bank's funding also allows the firm to invest in improved product quality or maintenance, revenues might additionally increase and expenses decrease. The indirect effect of the firm-bank relation is due to the *"liquidity insurance"* (*Fischer* (1990) and *Elsas/Krahnen* (1998)) that the bank provides in distress: the presence of the house-bank is a credible signal to other market participants that the troubled firm is able to maintain funding as well as operations and to continue providing services despite the crisis. Consequently, customers can continue to purchase the firm's products and competitors might be more reluctant to fight for a higher market share. Customer- and competitor-related cfd thus should be lower. Using a German database, *Elsas/Krahnen* (1998) find that contrary to *"normal"* banks, "*house-banks"* increase their loan volume when their client faces a moderate rating downgrade, thus providing a kind of liquidity insurance. Based on US-data, *Rosenfeld (2006)* provides empirical evidence that banking relationships have a positive impact on the future success of a distressed firm: the probability of a firm returning to industry median coverage ratios is significantly higher when it is borrowing from a prior lender.

Unfortunately, the data sample of this study does not allow for a further differentiation between firms with *"normal"* and firms with *"close"* bank relations.[50] (Notice that it is the relation to the bank and not the amount of debt outstanding that should cause lower cfd.) Yet, we believe the house-bank relation to be the most prominent candidate to explain our findings. Several studies support the importance of close bank relationships for small and medium sized German firms.[51]

In this sense the results resemble the findings of *Hoshi/Kashyap/Scharfstein* (1990) for the Japanese market: the authors find that dis-

[50] Usually the quality of the relationship is proxied by the variables "duration and number of bank relations". *Elsas/Krahnen* (1998) provide evidence that these two measures fail to fully capture the house bank property when compared to bank manager's assessments. See *Elsas/Krahnen* (1998), p. 1295. These results are confirmed by *Elsas* (2005).

[51] *Harhoff/Körting* (1998) provide evidence for a high degree of concentration in borrowing of German *SME*s; about 50% of the firms in their sample received external financing from only one institution. The largest firms still receive two thirds of the total credit from one bank. See *Harhoff/Körting* (1998), p. 1319. *Hommel/Schneider* (2004) confirm this finding in their study: German SMEs have on average between one and two close "house-bank" relationships.

tressed firms that are *keiretsu*-members perform better (i.e. sell and invest more) than distressed firms outside *keiretsus*. More important, *Hoshi/Kashyap/Scharfstein* (1990) show that distressed non *keiretsu*-members who have close ties to a main bank still sell more than distressed firms without such ties. These findings also imply that close bank relationships reduce customer- and competitor-related cfd in Japan.[52]

The major goal of this paper was to verify the existence of cfd for German firms using an ex post methodology originally suggested by *Opler/Titman* (1994). Contrary to *Opler/Titman* (1994), we were not able to document that firms with high ex-ante leverage in distressed industries perform worse than firms with low ex ante-leverage in distressed industries. Because data on the specific nature ("closeness") of the sample firms' bank relations were not available, we could not further analyze the *"house-bank effect"* in this context, as suggested in the theoretic and empirical literature. Further research could attempt to obtain data on the specific nature of the sample firms' bank relations and examine their explanatory power for our results.

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[52] Recently *Baek/Kang/Park* provided evidence for some benefits of close bank relations in Korean Chaebols. Their major finding is a reverse effect: if the bank gets into financial trouble, too, there is an additional adverse effect on the distressed client firm. See *Baek/Kang/Park* (2004), p. 296.

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Appendix

Table 10

Distressed Industries (Median-Based Model)

year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
DD^{I}								Food & Bev. (11)	Telecomm. (6)	Construction (24)	Technology (32) Telecomm. (7) Construction (21)	Technology (18) Media (10)		
DD^{II}					Food & Bev. (6)	Construction (20)	Food & Bev. (9)	Food & Bev. (11)	Telecomm. (6)			Technology (18)		Food & Bev. (7)
DD^{III}					Construction (16) Food & Bev. (6)	Construction (20) Food & Bev. (10) Retail (17)	Construction (26) Food & Bev. (9)	Food & Bev. (11)	Telecomm. (6)		Technology (32)	Technology (18) Media (10)		Food & Bev. (7)

DD^{I} to DD^{III} are industry distress dummies. DD^{I} is indicating a distressed industry, if two year change in median stock price is less than –20 % and two year median sales growth is negative.

DD^{II} (DD^{III}) is equal to one if both change in stock price and change in sales are in the lowest 10 % (20 %) percentile over all industries. The figure in brackets is the number of firms for each industry.

Summary

Costs of Financial Distress: The German Evidence

In this paper we aim to verify the existence of costs of financial distress (cfd) for a sample of German CDAX firms using an ex-post approach originally due to Opler/Titman (1994). In contrast to this US-based study we do not find a significant interaction between high leverage and distress for German firms: firms in distressed industries with high ex ante leverage do not display lower sales growth than their ex-ante lower levered counterparts. (JEL G32, G33)

Zusammenfassung

Indirekte Konkurskosten in der Bundesrepublik Deutschland

Bislang existieren keine Studien, welche die Nachteile und Wertverluste von Unternehmen ausgelöst durch indirekte Konkurskosten (Cost of Financial Distress) für deutsche Unternehmen untersuchen. Der vorliegende Beitrag schließt diese Lücke: Basierend auf einem Modell von Opler/Titman wird die Interaktion von Krisen in einer Branche und unternehmensindividuellem Verschuldungsgrad analysiert. Im Gegensatz zu den Ergebnissen für US-Daten findet sich keine negative Interaktion zwischen den beiden Faktoren: Das Umsatzwachstum von Unternehmen in Krisenbranchen, die vor der Krise eine höhere Verschuldung aufweisen, ist nicht signifikant niedriger als dasjenige von Unternehmen mit niedrigerer Verschuldung in der gleichen Branche.