Financial distress costs of highly levered German firms during industry downturns

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Abstract

This study tests the hypotheses that businesses in financial distress see a more significant decline in revenue, invest less and cut their workforce to a greater extent compared to more conservatively financed competitors during an industry downturn. An OLS regression on multiple subsamples is utilized to evaluate the relationship between leverage and firm performance as well as corporate decision making. The results show that highly levered firms in distressed industries do not suffer from financial distress costs as they do not show significantly less sales growth. Nevertheless, financial distress decreases companies' investment in industry distress phases while the effect on employment is ambivalent. While the findings of this study regarding the sales effect do not support the theory that financial distress is costly, it is consistent with the view that highly levered firms invest comparatively less.

Keywords: Financial distress costs, high leverage, firm performance, customer driven, competitor driven, manager driven.

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Sumário

Este estudo testa a hipótese de que as empresas em dificuldades financeiras vêem um declínio mais significativo nas receitas, investem menos e cortam a sua força de trabalho em maior medida em comparação com os concorrentes financiados de forma mais conservadora durante uma recessão da indústria. Uma regressão OLS em múltiplas subamostras é utilizada para avaliar a relação entre a alavancagem e o desempenho da empresa, bem como a tomada de decisões empresariais. Os resultados mostram que as empresas altamente alavancadas em indústrias em dificuldades não sofrem de custos de angústia financeira, uma vez que não mostram um crescimento significativamente menor das vendas. No entanto, a crise financeira diminui o investimento das empresas nas fases de crise da indústria, enquanto o efeito sobre o emprego é ambivalente. Embora as conclusões deste estudo sobre o efeito das vendas não apoiem a teoria de que a crise financeira é dispendiosa, é consistente com a opinião de que as empresas altamente alavancadas investem comparativamente menos.

Palavras-chave: Custos da angústia financeira, elevado efeito de alavanca, desempenho da empresa, orientada para o cliente, orientada para a concorrência, orientada para o gestor.

Título: Custos de dificuldades financeiras de empresas alemãs altamente alavancadas durante a recessão da indústria

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List of Abbreviations

EBIT	Earnings before interest and taxes
LTM	Last twelve months
OLS	Ordinary least squared
Q	Quarter
ROA	Return on Assets

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1 Introduction

The COVID-19 pandemic and containment efforts resulted in a sharp and unprecedented slowing of the world economy, including a record decline in Germany's real GDP in Q22020 of -11.3 percent (Destatis, 2022). Cash flows were severely negatively affected in several industries (Demmou, Franco, Calligaris, & Dlugosch, 2021). Nonetheless, financial obligations to suppliers, employees, lenders, and investors persist, reducing organizations' liquidity buffers and posing a threat to business solvency (S&P Global Market Intelligence, 2020). Even if these financially distressed companies stay solvent, they may incur costs due to a misalignment of interest between them and their stakeholders, which may translate into decreases in sales and losses of firm value even if the firms do not file for bankruptcy (Opler & Titman, 1994).

These financial distress costs have been researched in-depth from the 1980s' to the 2000s'. Perhaps the best-known empirical contribution to assess indirect financial distress costs comes from Altman (1984). He evaluated a sample of 19 industrial companies which went bankrupt between 1970 and 1978 and a sample of seven recent (around 1984) bankruptcies. His results show that, on average, companies suffered between 11 percent and 17 percent of their firm value three years prior to bankruptcy in financial distress costs. Opler and Titman (1994) later continued Altman's research. They were able to show that, in a sample of 46,799 companies in the years 1972 to 1991, financial distress had a significantly negative effect on sales development, stock performance, and investment growth. Ashgarian (2003), following Opler and Titman's (1994) methodology in part, confirmed these results when analyzing how highly levered companies in Sweden faired against more moderately financed counterparts in the recession period of 1990 to 1992.

Nevertheless, not all studies point toward the idea that financial distress negatively affects firm performance. Using financially challenged enterprises in Sweden, Bergstrom and Sundgren (2002) conclude that the association between leverage and corporate performance is negligible. Jandik and Makhija (2005) were able to show that over the five years following the takeover cancellation date, leverage-reducing companies were outperforming leverage-increasing firms by 60 percent.

However, the COVID-19 pandemic is no ordinary economic crisis since it brought forward an unprecedented package of fiscal stimulus and financial support measures in Europe and particularly Germany. Amongst others, Germany granted tax advantages to companies urgently in need of cash, distributed €100 billion of direct recapitalization to ensure strong solvency, and introduced a suspension of the obligation to file for insolvency (KPMG, 2022).

On top of direct measures affecting the solvency and liquidity of companies, the German government reduced the VAT by 16.0 percent to stimulate customer spending and, conversely, help the company's topline growth (Bundesregierung, 2022).

Thus, it is necessary to investigate whether the results of previous studies hold under the specific conditions of the pandemic and initiated countermeasures. As a result, this paper will address this literature gap by analyzing the following research question:

"Did stock market listed highly levered German firms suffer from financial distress costs during the observation period between Q12019 and Q22021?"

This paper follows the subsequent structure: The literature review will give an overview of the current state of financial distress research, including the determinants for debt decisions [2.1], financial distress costs [2.2], and implications of financial distress [2.3], where the last two paragraphs will be concluded with the formulation of hypotheses. Following, the data and methodology section will state the research question [3.1], describe the data retrieving and sampling process [3.2], and will finalize by presenting the estimation model used and outline utilized variables of interest [3.3]. Afterward, the main characteristics of the data sample are described [4]. Building upon that, the empirical findings for answering the stated hypothesis are presented [5.1] and tested for robustness [5.2]. Then, the critical results of the paper are highlighted [6.1], interpreted [6.2], and on this basis, theoretical [6.3] and practical [6.4] implications are derived. The study will end by outlining the limitations and will make a proposition for future studies [7] on concluding the findings [8].

2 Literature Review

The literature review section provides a comprehensive overview of the prevailing theories and studies on debt decisions, financial distress costs, and leverage implications. The following will discuss the findings obtained from previous studies on the subject, based on which the hypotheses for the study will be established.

2.1 Determinants for Debt Decisions

Modigliani and Miller's (1958) groundbreaking work sparked a lengthy debate among financial economists over the importance of a corporation's financing decision as a source of increasing firm value. The propositions brought forward in the study argue that a corporation's financing decisions do not affect its firm value. Instead, the degree of indebtedness is arbitrary in the absence of taxes. As proven by other scholars, a proportional corporate income tax provides a sufficient economic incentive for businesses to optimize, i.e., maximize their use of debt financing to increase firm value (Modigliani & Miller, 1963). Kim (1978) and other authors argued that other determinants besides the corporate income tax determine companies' optimal debt level since the general debt level from 1966 to 1970 for US non-financial companies was two-thirds equity and one-third debt. Since then, various experts have conducted studies and formulated theoretical models whose findings suggest the existence of other costs and benefits associated with debt financing (Bradley, Jarell, & Kim, 1984).

2.2 Financial Distress Costs

Andrade and Kaplan (1998) conclude that extensive leverage is the primary cause of financial distress when investigating 31 highly levered transactions that became financially distressed in the US between 1980 and 1989. The literature distinguishes financial distress costs between direct and indirect costs (Kim, 1978).

2.2.1 Direct Financial Distress Costs

Direct financial distress costs include fees paid to lawyers, accountants, and other professionals to administer the bankruptcy process and time invested by corporate management (Betker, 1997). Scholars have essentially reached a consensus that direct financial distress costs make up a relatively small component of total firm value lost in bankruptcy (see Warner (1977), Gilson et al. (1990), Betker (1997), Gilson (1997)). Warner (1977) estimated the administrative costs of the bankruptcy process of a small sample of bankrupt railroad companies in the years

1933 to 1955 to be around four percent of their pre-bankruptcy market value. For a sample of companies that filed for Chapter 11 bankruptcy protection between 1980 and 1986, Weiss (1990) estimated these direct financial distress costs to be roughly three percent of pre-bankruptcy market value, close to what Warner had estimated a decade before.

2.2.2 Indirect Financial Distress Costs and Hypothesis

Indirect financial distress can come up much earlier than a bankruptcy filing due to misalignment of interest between financially distressed companies and their stakeholders. This translates into decreases in sales and losses of firm value for the company. The triggers for this development are customers, competitors, and managers. (Opler & Titman, 1994)

Declines in company sales and firm value can be attributed to customer behavior if they are reluctant to buy from or do business with a financially distressed firm (Asgharian, 2003). These costs are *customer-driven* losse*s* (Opler & Titman, 1994). Maksimovic and Titman (1991) demonstrated that increased leverage limits a company's ability to legitimately offer high-quality goods, even if the customer does not bear any costs in a liquidation scenario or reduces the incentive for the company to uphold product quality. Baxter (1967) and Titman (1984) both demonstrate that customers would choose to buy a product elsewhere or only at a discounted price to account for the suffered liquidation costs which arise due to increased future maintenance costs if the producer goes out of business. R&D-intensive industries were identified as most prone to suffer from these customer-induced sales losses since they tend to produce more unique products (Titman & Wessels, 1988).

A financially distressed firm's sales slumps and market value loss can also be caused by competitor behavior, referred to as *competitor-driven* losses (Opler & Titman, 1994). The emergence of a company being financially restrained could incentivize competitors to introduce a predatory pricing scheme to lower the distressed company’s cash flows and induce market exit desires ((Fudenberg & Tirole, 1986), (Poitevin, 1989), and (Bolton & Scharfstein, 1990)). Additionally, rivals may make hostile tender offers to buy up the company in distress, thereby increasing their market position (Hendel, 1996). Competitor-driven losses should be more heightened in concentrated industries since companies in these industries tend to interact more closely, as stated by Opler and Titman (1994).

Manager-driven losses primarily arise due to the disciplinary effect of leverage on managers to take value-maximizing measures to avoid bankruptcy (Opler & Titman, 1994). Compared to customer or competitor-driven sales losses, manager-driven ones benefit shareholders (Asgharian, 2003). Jensen (1989) and Wruck (1990) discuss how debt and

financial distress are tremendous transformative agents by facilitating the needed crisis atmosphere to change management & governance as well as organizational strategy and structure, which is faster than less-levered peers. Scholars in multiple studies have analyzed this behavior: Operating income grows by approximately 40 percent in the two to three years after a levered buyout, according to Kaplan (1989) and Smith (1990). Ofek (1993) analyzed a sample of 358 US firms between 1983 and 1987, which experienced a year of average or superior to average performance followed by a low-performance year. His empirical findings reveal that a firm's leverage in the base year has a positive and significant impact on the likelihood of a distress year operational action. Opler and Titman (1994) argue that manager-driven losses are most likely observed when larger firms become financially distressed since they generally have multiple business units that might underperform. Larger organizations may be more susceptible to the incentive difficulties outlined by Jensen (1989) and more prone to have underperforming areas of operation that require elimination. On the other hand, Novaes and Zingales (1993) suggest that managing large enterprises during financial collapse may be exceptionally costly. Their more intricate internal organizational structures need implicit contracts that may be difficult to enforce during financial distress.

Table I

Possible Causes of Decreased Performance of Highly Levered Companies During Economic Downturn

Trigger	Motive	Motive translates to Sales decrease?	Motive translates to Firm Value loss?	Amplifying Firm Characteristics
Customer	Customers stop doing business with the company	Yes	Yes	Highly specialized product firms suffer more
Competitor	Competitors use predatory pricing to increase market share	Yes	Yes	Firms in highly concentrated industries suffer more
Management	Managers restructure operations by divesting underperforming assets	Yes	No	Large firms may benefit more from efficient downsizing

Therefore, the hypothesis about the implication of financial distress on firm performance is as follows:

H_1: Enterprises in financial distress suffer from a greater sales decrease compared to their less levered industry peers.

2.3 Other Implications of Financial Distress and Hypotheses

A firm's financial condition has an impact on corporate decision-making. Numerous past publications have investigated financially challenged organizations' proclivity to reduce investment and employment. It must be mentioned that these studies link the actions taken by management to some extent to the firm's financial conditions. However, it cannot be precluded that fundamental changes in the business do not drive the driving factor behind these measures. It is generally difficult to attribute the actions of financially distressed firms solely to their financial circumstances, as most financially distressed firms also experience some fundamental decline in their businesses. (Opler & Titman, 1994)

Misalignment of interests between the borrowing company and lenders can produce either an overinvestment problem, as discussed by Jensen and Meckling (1976), or an underinvestment problem, as brought forward by Myers (1977), if borrowers are highly levered. White (1996) makes the theoretical argument that the problems of excessive or insufficient investment can be worsened in enterprises in financial distress even before they file for bankruptcy. López-Gutiérrez, Sanfilippo-Azofra, and Torre-Olmo (2014) analyzed financially distressed companies from North America and Europe for this behavior and were able to show that financial distress has a negative influence on investments, but only if less attractive investment opportunities prevail. Garcia-Appendini (2018) proved that the mere existence of a financially distressed firm in an industry heightens borrowing costs for competitors and negatively affects their investment growth. However, this does not seem to be the case for strong balance sheet companies or highly concentrated industries, suggesting predatory investment behavior to strengthen market positions in these instances (Garcia-Appendini, 2018). Additionally, Bhagat, Moyen, and Suh (2005) observed a link between operating profits and investment behavior, decreasing when profits are negative for a distressed firm.

Following these arguments, the hypothesis regarding investment behavior is as follows:

H_2: Companies in financial distress underinvest, i.e., invest less than their less levered industry counterparts.

John, Lang, and Netter (1992) were able to show that companies cut their workforce in advance of entering a distressing period, yet manager turnover remained low. Sharpe (1994) retrieved similar results showing that highly indebted companies are less likely to hoard labor and adjust the labor force more sensitively to economic developments. He attributes this behavior to a leverage-induced reduction of management-related agency costs that force the executives to cut employment during recessions even if it is against their self-interest. Bronars and Deere (1991), Perotti and Spier (1993), and Dasgupta and Sengupta (1993) found strong empirical evidence that leverage is an effective shield to successfully lower the impact of a unionization effort of workers by reducing the overall funds available to meet workers' demands. Ofek (1993) and Opler and Titman (1994) were all able to show that a combination of financial distress and high leverage pre-distress amplifies the possibility of operational actions, particularly workforce reductions.

Table II

Implications of Financial Distress on Corporate Decisions During Economic Distress

Decision on	Possible Implication
Investment	Financially distressed companies may underinvest in times of industry downturn
Workforce	Highly levered companies may cut workforce pre-distress to lower costs and increase efficiency

Taking the study results into account, the hypothesis is as follows:

H_3: Firms in financial distress decrease their workforce to a greater extent than their more conservatively financed industry peers.

3 Data and Methodology

This section discusses the study's research design. It includes the questions that the study tries to answer, the data collection process, and the final sample selection process. Finally, the variables and their operationalization are illustrated as well as the analysis approach. The sample selection process and methodology utilized in this paper follow to a great extent the research design of Opler and Titman (1994).

3.1 Research Question

The research design described in this paragraph is predicated on the study's primary purpose, as stated in the research question:

"Did stock market listed highly levered German firms suffer from financial distress costs during the observation period between Q12019 and Q22021?"

3.2 Data and Sample Selection

The data collection process and following building of a final data sample follow a multi-stage process to retrieve a collection of companies on which the effect of high leverage on firm performance is observable.

3.2.1 Timespan

This study focuses on enterprises in declining industries during the Q12019-Q32021 period. Studying the effect of financial distress in the period has several advantages. First, the prevailing belief is that the costs and benefits of financial hardship are more apparent during recession times (Asgharian, 2003). Germany has seen negative real gross domestic product changes compared with the prior-year quarter in five out of eleven quarters (Statistisches Bundesamt, 2022). Additionally, the start of the COVID-19 (Q42019) pandemic falls into this period, and multiple lockdowns and curfew measures in Q12020 and Q42020 (Bundesregierung Deutschland, 2022). Second, the timespan enables the use of the most recent data and gain the most up-to-date insights.

3.2.2 Data Retrieving Process

The DATASTREAM WORLD SCOPE LIST was utilized to retrieve the WORLD SCOPE codes for Germany, which were plugged into Thomson Reuters Eikon DATASTREAM to obtain ISIN-Codes of publicly listed companies in Germany. Quarterly firm-level data was extracted using the Standard & Poor's COMPUSTAT database. Due to data unavailability on

employment and stock returns, the former was retrieved directly from the company's quarterly statements, while the latter was retrieved using Thomson Reuters Eikon. This approach resulted in an initial sample of 244 companies that report complete quarterly data during the period of interest.

3.2.3 Final Sample Selection

Industries are identified by their first three-digit SIC-Code. Several additional selection criteria were introduced to make industry classification as precise as possible and reliably test for within-industry effects (Asgharian, 2003). The *Computer and Data Processing Services* industry was separated on a four-digit SIC-Code basis. Firms that list more than one industry on their 2019 annual report cannot be assigned to one SIC-Code and were therefore excluded from the sample (Asgharian, 2003). Furthermore, the criteria below led to the further reduction of the sample size:

(1) Due to the unique financial structure and accounting treatment of financial services firms, banks and insurance companies were excluded from the sample.
(2) Financial holding businesses were excluded due to their non-operating nature.
(3) Businesses operating in industries that are not large enough to serve as a reasonable barometer for industry adjustment (industries must include four or more companies).
(4) Firms for which it was not possible to gather the necessary data for the analysis (i.e., ex-ante leverage, sales growth, operating income).
(5) Companies operating in industries with too slight cross-sectional variation in ex-ante leverage. In each quarter, industries must have at least one company in the sample's three highest deciles and one firm not in them.

After applying the selection criteria, 59 companies in 10 industries remain for Q12019. Some companies were either temporarily excluded due to a lack of cross-sectional variability or permanently excluded after being the takeover target and delisted.

3.3 Included Variables and Model

This section will introduce dependent and independent variables and their definition, followed by a description of the estimation model used.

3.3.1 Core Dependent Variables

This paper studies the linkage between financial distress and firm performance by determining whether high-levered companies are more likely than other firms to suffer performance declines during a phase of industry downturn. Following Opler and Titman (1994) and Ashgarian (2003), the following variables have been chosen as a proxy for firm performance:

(1) **Sales growth**: the percentage change in firms' last twelve-month (LTM) revenue between time *t* and *t*-1, where *t* represents the quarters ranging from Q12019 to Q32021.
(2) **Profitability growth**: the change in the company's profitability between time *t* and *t*-1, where profitability represents LTM operating income as a percentage of the average LTM total assets at time *t***,** also known as return on assets (ROA). To account for possible negative profits between *t* and *t*-1, the absolute difference in profitability is used rather than the percentage change (Asgharian, 2003). Earnings before interest and taxes (EBIT) is used to bypass the direct effect of leverage on a firm's financing costs (Asgharian, 2003).
(3) **Stock returns**: The percentage change in a company's stock market pricing from *t* and *t*-1. For occurrences such as new issues or splits, prices are modified.

Based on the existence of three variables to measure firm performance, three regressions will be run in this model, one for each dependent variable. All variables are industry adjusted by subtracting the 3-digit SIC industry average[1] from the individual companies' firm performance metrics to test within-industry effects.

Sales growth has been chosen as a proxy for firm performance since it is the most direct metric to measure sales loss driven by customers or competitors. Additionally, to evaluate how a sales slump affects a companies' earnings and firm value, the regressions are run on operating income and stock performance. This approach allows the evaluation of the results in the aggregate, therefore concluding whether sales decreases can be linked to changes in customers' or rivals' behavior or from efficient downsizing of operations by managers.

One drawback of testing the effect of leverage on stock performance is that the stock price of a highly indebted company generally reacts more sensitively to economic downturns due to the pure leverage effect. This study's timeframe is restricted to a recession period and a greater extent, to a time of heightened uncertainty where most stocks, if part of a distressed

[1] Respectively the 4-digit DIC industry average for companies in the Computer and Data Processing Services industry

industry or not, experience market value losses. Therefore, even under the null hypothesis that financial distress does not affect stock performance, a negative relationship between leverage and stock returns during downturns is expected. (Opler & Titman, 1994)

Since we look at EBIT, this property is not shared by operating income. Nevertheless, it is necessary to mention that EBIT comes with a different disadvantage to sales growth and stock returns. By altering accounting rules or adapting operating policies, a financially distressed (i.e., heavily indebted) enterprise may boost operating profit to avoid technical defaults. Therefore, operating income for distressed companies would be skewed upwards, making it less likely to reflect the actual financial distress costs. (Asgharian, 2003)

3.3.2 Additional Dependent Variables

This studies' research methodology focuses on how financial distress affects various measures of a firm's performance. Additionally, it can also be used to examine the effect of a firm financial situation on various corporate decisions during times of economic downturn. For this reason, two additional dependent variables are introduced:

(4) Investment growth: The percentage change in firms' LTM capital expenditures divided by the LTM total sales between time *t* and *t*-1**.**

(5) Employment growth: The percentage change in the average LTM total employment divided by the LTM total sales between time *t* and *t*-1.

Both variables are related to total sales to evaluate how efficiently increases or decreases were used. All variables are industry adjusted by subtracting the 3-digit SIC industry average from the individual observation. Since it is impossible to clearly distinguish whether investment and employee decisions are fundamentally driven by financial distress, as stated in 2.3, the regressions results should only be considered suggestively.

3.3.3 Independent Variables

Since the focus of this study is the impact of financial distress on a firm's performance during an industry downturn phase, leverage, as a proxy for financial distress, is of primary interest in the regression. Going forward, leverage is defined as the book value of debt to the book value of equity (Asgharian, 2003). To avoid an endogeneity problem, the book value of equity is preferred over the market value since the latter may be influenced by investor anticipation of future company performance (Opler & Titman, 1994). Several earlier studies have found a negative correlation between leverage and profitability if the market value of debt is used. This

bias is bypassed by measuring leverage at its book value rather than at its market value, as the relation to profitability is significantly weaker (Titman & Wessels, 1988). Ex-ante leverage is measured with a lag of one year prior to the base year (*t*-1), while the firm performance proxy is measured at the current *t.* Figure III illustrates this method:

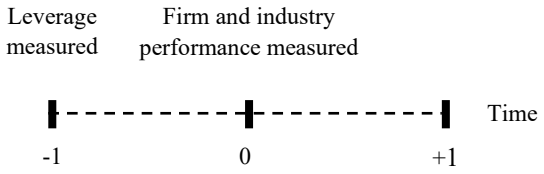

Figure III: Illustration adapted from Opler and Titman (1994)

The one-year lag between financial vulnerability and economic distress is used to avoid any endogeneity issues that can arise from the effect of economic distress on a firm's access to capital. To be more precise, if the firm's current leverage ratio at time *t* is used to assess financial susceptibility, we could establish an erroneous negative correlation between leverage and performance, as underperforming firms may be forced to increase borrowing to cover their losses. The lagged leverage approach avoids a possible reverse causality issue between leverage and firm performance. (Opler & Titman, 1993)

Companies are considered highly levered if their average LTM total debt to average LTM total equity ratio at *t*-1 is part of the eighth quartile of the whole sample. This variable is included in the regression as a dummy variable taking the value of 1 if a company is highly levered and 0 otherwise. A dummy variable indicates high leverage rather than a continuous variable since the relationship between leverage and firm performance will be challenging to characterize beforehand and may be non-linear. (Opler & Titman, 1994)

This study aims to analyze the effect of financial distress on firm performance by determining whether high-leverage firms are more likely than other companies to suffer performance losses during industry downturns. This assumes that financial hardship is more evident in declining or underperforming industries (Asgharian, 2003). To evaluate underperforming industries, an industry is considered distressed if it showcases a one-year negative median LTM sales growth and year-on-year negative stock performance at the time *t* (Asgharian, 2003). Median sales growth is seen as a reliable proxy for industry health, according to Asgharian (2003), while the negative industry stock performance criteria indicate that downturns are also considered substantial for market participants (Opler & Titman, 1994).

A combined criterion also avoids classifying an otherwise prosperous industry as distressed due to overly optimistic market anticipations. This variable is included in the regression as a dummy variable taking the value of 1 if a company is operating in a distressed industry and 0 otherwise.

Following Opler and Titman's (1994) approach, the OLS regression includes a *distressed industry* dummy and a *high leverage* × *distressed industry* dummy. The coefficients of the three other explanatory variables are restricted to be identical across subsamples. The dummy variable *high leverage* × *distressed industry* is of particular interest since the overarching aim of this paper is to evaluate the effect of being highly levered and belonging to a distressed industry during economic slowdowns on firm performance.

3.3.4 Control Variables

Further, the following three control variables are added to the model:

(1) **Size:** the natural logarithm of the average LTM total assets at time *t*.
(2) **Lagged investment ratio:** the ratio of the LTM net investment to the average LTM total assets at time *t*. Net investments are calculated by subtracting LTM depreciation & amortization by LTM investments and dividing it by the average LTM total assets (CFI (Corporate Finance Institute), 2022).[2]
(3) **Lagged profitability**: the ratio of the LTM EBIT and other incomes to the average LTM total assets at time *t*-1.

The three additional variables were included to ensure no bias in the coefficient of lagged leverage caused by the omission of vital explanatory variables linked with lagged leverage. The *size* variable was included as a control variable as it is expected that large businesses should be more indebted and less susceptible to economic downturns (Hannan & Freeman, 1989). Following Ashgarian (2003), the variable *size* is calculated by using total assets instead of total sales, which was utilized in the study of Opler and Titman (1994) since the number of sales might misjudge the size of the company. Historical investment rates and profitability are added to the regression because these variables might be related to leverage and may be significant determinants of sales growth (Asgharian, 2003).

Generally, all regressions include industry and quarter dummies to control for industry and quarter effects.

[2] The calculation of the investment ratio variable differs from Opler and Titman (1994) and Ashgarian (2003) due to the unavailability of data on asset sales.

3.3.5 OLS-Model

This section looks at the OLS regression that forecasts firm-level sales growth, stock returns, and profit growth as size, profit, investment controls, industry condition, and ex-ante leverage ratios. By subtracting the 3-digit SIC industry mean change in performance, changes in firm performance are industry adjusted. The regression equations are written as follows:

$$\begin{aligned} Firm\ performance_i &= \beta_0 + \beta_1\, Log\ of\ assets_i + \beta_2\, Industry\ adjusted\ profitability_i \\ &+ \beta_3\, Industry\ adjusted\ investment\ ratio_i \\ &+ \beta_4\, Distressed\ industry\ dummy_i + \beta_5\, High\ leverage\ dummy_i \\ &+ \beta_6 Distressed\ industry\ dummy \times High\ leverage\ dummy_i + u_i \end{aligned}$$

Due to the industry adjustment of the variables, panel data analysis cannot be undertaken, which would take firm-specific effects into account (Asgharian, 2003). Therefore, no individual effects are assumed in this study as denoted by the notation *i* instead of *it*.

3.3.6 Nonparametric Test

The residuals of the regressions could not be normally distributed, thereby jeopardizing the regression results' interpretability. A nonparametric test of the hypothesis that leverage affects performance in depressed industries is provided to address this issue. The percentage observed in the sample of distressed sectors is then compared to the percentage seen in non-distressed industries using a simple binomial test (Opler & Titman, 1994). Additionally, the regressions are tested for groupwise heteroskedasticity of residuals using the Breusch-Pagan-Godfrey test (Breusch & Pagan, 1979) and for multicollinearity utilizing the variance inflation factor (VIF) test. Heteroskedasticity and multicollinearity do not affect the estimates for the coefficients, yet the OLS standard errors are biased and inconsistent. If groupwise heteroskedasticity of residuals and/or multicollinearity are observed, robust standard errors are highlighted in parentheses in regression tables to cure it (White H., 1980).

3.3.7 Sample Split

The OLS regression mentioned before will not change during this paper. Merely the whole sample (referred to as *Sample 1)* will be split into different subsamples to gain a deeper insight into the driver behind financial distress costs.

First, the sample is split according to different definitions of when a company is considered highly levered. An enterprise is considered highly levered if its total debt to total

equity ratio at *t*-1 is higher than the tenth decile. Additionally, the sample only considers companies if they are either part of the tenth leverage decile or part of the first decile (*Sample 2)*. This split will give increased insight into the effect of leverage on firm performance compared to most vs. least levered firms (Opler & Titman, 1994).

Second, the sample is split into three subsamples by industry or firm characteristics that mitigate or increase financial distress costs. The potential causes behind sales decreases and market values losses of highly levered companies can be grouped into three major categories: *customer-driven*, *competitor-driven*, or *manager-driven.*

Customer-driven losses are most likely to be observed by companies that offer highly specialized services or products with a high need for after-sales service and maintenance. According to Opler and Titman (1993) and Titman and Wessels (1988), research and development expenses (R&D) is a proxy for the specialization of firms' products. Due to incomplete quarterly data on R&D expenditures, allocation to the highly specialized sample has been done on an industry level.[3] Companies with the SIC-Codes 283, 367, 481, 7370, and 7372 have been classified as highly specialized during the observation period, as the other SIC-Code companies have been identified as normal industries (*Sample 3)* (Kile & Phillips, 2009) (Galindo-Rueda & Verger, 2016).

Revenue slumps can be classified as *competitor-driven* if the reason for those lies in the aggressive behavior of competitors, which can mainly be observed in concentrated industries. In this study, industries with a Herfindahl-Hirschman Index of higher than 1,800 are classified as highly concentrated and normal otherwise. Following the highly representative data from the German Monopolies Commission on industry concentration in Germany in 2017, companies with the SIC-Codes 280, 371, and 481 were identified as highly concentrated (*Sample 4) (Heidorn & Welche, 2021).*[4]

Research suggests that large, highly levered enterprises are more efficient at downsizing their operations in response to an industry slump (Opler & Titman, 1994). These reductions in sales are referred to as *manager-driven losses*. Firms are classified as large if their natural log of average LTM total assets at time *t* is higher than the eighth percentile of the overall sample and small otherwise (*Sample 5)*.

[3] This allocation methodology varies from Opler and Titman (1994), who allocate companies based on firm-specific data R&D expenditure, which is time-variant.
[4] Due to the comparatively small sample size, this allocation methodology varies from Opler and Titman (1994), who allocate companies based on their industry four-firm concentration ratio.

4 Descriptive Statistics

Approximately 18 percent of all observations in the sample were found in industries that were classified as distressed. The number of enterprises in troubled industries and the number of troublesome industries by year are shown in Table III. A steady increase in the number of businesses in distressed industries is observed from Q12019 onwards, reaching its peak in Q22020. Between Q22020 and Q12021, 42 percent of industries showed a negative median LTM sales growth and negative year-on-year stock return. The beginning of this period matches the development of the COVID-19 pandemic in Germany, with the first lockdown initiated on March 22, 2020 (Bundesregierung Deutschland, 2022).

Table III

Distribution of Firms by Year

The sample consists of 611 publicly traded firm-quarters from 2019 to 2021. Of these firm quarters, 107 (18 percent) observations were in industries with poor performance that exhibited negative median LTM sales growth and negative year-over-year median stock performance.

Base year		No. of Firms in Industries with Normal Performance	No. of Firms in Industries with Poor Performance	No. of Poorly Performing Industries
2019	Q1	55	0	0
	Q2	50	5	1
	Q3	40	9	3
	Q4	53	0	0
2020	Q1	37	16	4
	Q2	29	30	6
	Q3	30	23	5
	Q4	35	24	5
2021	Q1	59	0	0
	Q2	58	0	0
	Q3	58	0	0

Table IV highlights the median LTM sales growth for each industry between Q12019 and Q32021. The *General Industrial Machinery* industry experienced median LTM sales losses during eight out of eleven quarters in which they, on average, decreased revenue by 4.1 percent each quarter. The *Chemicals and Allied Products* and *Special Industry Machinery* industry witnessed seven out of eleven median LTM sales slumps of, on average, 2.5 percent and 5.5 each quarter, respectively. The *Drugs, Computer and Data Processing Services*, and *Prepackaged Software* have not seen a median LTM sales decline during the observation period and were able to increase revenue, on average, by 28.4 percent, 3.1 percent, and 8.5 percent each quarter, respectively. It is worth mentioning that the latter mentioned industries are

invariably classified as high-technology/high-specialization, following the methodology mentioned above, while the former is not.

Table IV

Median LTM Sales Growth in percent by Industry and LTM Quarter

The sample contains 611 observations for individual LTM sales growth data between Q1 2019 and Q3 2021. An industry is considered as distressed if the median LTM sales growth is negative and negative year-over-year median stock performance. Figures are in percent.

	2019				2020				2021		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Chemicals and Allied Products	5.7	1.4	-0.7	-3.6	-4.6	-7.2	-7.8	-2.8	-0.5	12.6	28.0
Drugs	23.0	22.0	6.3	8.2	16.4	15.1	14.7	10.5	3.8	7.9	8.4
Construction and Related Machinery	9.3	11.7	10.8	7.5	0.3	-9.1	-12.2	-11.8	-11.4	0.4	11.6
Special Industry Machinery	5.5	2.1	1.8	-0.1	-5.9	-7.3	-14.7	-9.9	-5.8	-2.6	2.4
General Industrial Machinery	4.1	-2.6	-2.2	-0.8	-4.3	-4.6	-13.4	-15.3	-13.4	3.6	1.1
Electronic Components and Accessories	10.5	8.2	4.5	-3.2	-5.6	-11.8	-16.5	-11.2	-6.9	4.4	20.5
Motor Vehicles and Equipment	2.0	1.6	2.6	2.6	1.1	-6.5	-7.0	-7.8	-5.9	9.4	8.3
Telephone Communications	1.2	0.4	-0.9	0.9	0.8	-0.2	-2.6	-5.4	-5.3	5.3	8.2
Computer and Data Processing Services	8.4	3.2	4.0	11.6	11.3	12.8	4.9	3.2	3.5	4.2	6.0
Prepackaged Software	9.1	9.4	11.0	8.8	9.5	7.3	9.0	2.8	3.9	4.8	6.1
Chemicals and Allied Products	5.7	1.4	-0.7	-3.6	-4.6	-7.2	-7.8	-2.8	-0.5	12.6	28.0
Entire Sample	**7.2**	**6.3**	**4.0**	**2.3**	**0.5**	**-1.7**	**-4.5**	**-3.1**	**-3.1**	**4.0**	**7.4**

Table V highlights the number of firms within each industry and the inclusion in the regressions as a distressed, highlighted in red, or non-distressed industry in each quarter between Q12019 and Q32021. The *Computer and Data Processing Services* (SIC 737) related industries, *Drugs*, and *Electronic Components and Accessories* industries make up around 50 percent of all companies in the sample. This poses the danger of biased results combined with the fact that these industries are not distressed in the observed period. Generally, the industries make up between seven percent (four companies) and 15 percent (nine companies) of the overall sample. The *Chemicals and Allied Products* and *Electronic Components and Accessories* industries are not included in the sample between Q12019 and Q42019, Q32019, and Q32020, respectively, due to their lack of leverage cross-sectional variability. One firm undertook a merger with another company in the *Prepackaged Software* industry and was therefore excluded from the sample from Q22021 onwards.

Table V

Distribution of Firms by Industry Affiliation and Inclusion in Regressions

A total of 59 companies within 10 industries are represented in the sample. Regressions are run each quarter during the observation period on a minimum of 49 companies and a maximum of 59 companies.

		# of Companies included in Regression each quarter										
		2019				**2020**				**2021**		
	Total # of Companies	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Chemicals and Allied Products	4	0*	0*	0*	4	4	4	4	4	4	4	4
Drugs	5	5	5	5	5	5	5	5	5	5	5	5
Construction and Related Machinery	4	4	4	4	4	4	4	4	4	4	4	4
Special Industry Machinery	7	7	7	7	7	7	7	7	7	7	7	7
General Industrial Machinery	5	5	5	5	5	5	5	5	5	5	5	5
Electronic Components and Accessories	6	6	6	0*	0*	0*	6	0*	6	6	6	6
Motor Vehicles and Equipment	6	6	6	6	6	6	6	6	6	6	6	6
Telephone Communications	4	4	4	4	4	4	4	4	4	4	4	4
Computer and Data Processing Services	9	9	9	9	9	9	9	9	9	9	9	9
Prepackaged Software	9	9	9	9	9	9	9	9	9	9	8**	8**
Chemicals and Allied Products	4	0*	0*	0*	4	4	4	4	4	4	4	4
Entire Sample	**59**	**55**	**55**	**49**	**53**	**53**	**59**	**53**	**59**	**59**	**58**	**58**

Note: *not included due to lack of leverage cross-sectional variability.
**one company has been acquired and therefore excluded from the sample.

Table VI provides descriptive information on the study's primary variables. Panel A depicts businesses in underperforming, i.e., distressed industries. Firms in all other industries are described in Panel B. The leverage ratios of both groups of companies show significant cross-sectional variation. The interquartile range of the one-year lagged debt/equity ratio in distressed businesses, for example, is 107.6 percent, and for companies in industries experiencing normal performance, 76.6 percent. The average ex-ante debt/equity ratio one year before the base year for both panels is similar, with 79.9 percent for distressed companies and normal companies only 8.9 percentage points higher. The average one-year LTM sales growth rate for enterprises in depressed industries is -7.0 percent, lower than other industries (+6.7 percent).

Additionally, the paper observes a significant difference in year-over-year stock returns. Companies in distressed industries showed a mean one-year stock return of -12.1 percent compared to +23.3 percent for other companies. Stock returns for companies in normal industries have an interquartile range of around four times that of sales growth, and for firms in distressed industries, about three times.

Interestingly, firms in distressed industries increased their workforce and assets to a greater extent than other firms having an eight percentage points higher average employment growth and invested, on average, five times more than companies in normal industries. Nevertheless, this behavior could be driven by industry characteristics such as company size. Firms in low-performing industries were, on average, substantially more significant than their counterparts in other industries in terms of total sales, total assets, and total employees. Firms in depressed industries had average base-year revenues of €15.5 billion, which was 48 percent higher than in normal industries, with an average base-year total assets value of €29.3 billion, about €10 billion bigger than companies experiencing average performance, and employed 33 percent more employees. This indicates that sales in distressed industries are driven by size.

Table VI

Description of Sample Firms in Industries with Poor Performance and Normal Performance

The sample consists of 611 publicly traded firm-quarters in the 2019 to 2021 period. Of these firm years, 107 (18 percent) were in industries with poor performance that exhibited negative median LTM sales growth and negative year-on-year median stock performance. Equity and Assets are measured at book value. Ex-ante leverage is measured one year before the base year. Sales growth, operating income change, stock returns, investment growth, and employment growth are measured over a one-year period.

Variable	Mean	Quartile One	Median	Quartile Three	Interquartile Range
Panel A: Firms in Industries Experiencing Poor Performance *(N = 107)*					
Lagged debt/equity (%)	76.9	19.5	52.5	127.0	107.6
Base-year debt/equity (%)	86.8	21.5	58.5	135.6	114.1
Lagged debt/assets (%)	21.0	9.6	18.7	31.8	22.3
Lagged debt (€ millions)	10,688	89	425	3,260	3,170
Base-year debt (€ millions)	12,218	110	559	2,904	2,793
Base-year total equity (€ millions)	7,876	267	1,015	3,749	3,482
Base-year total assets (€ millions)	29,364	637	3,368	12,611	11,974
Base-year employees	38,310	2,973	11,403	32,558	29,585
Base-year sales (€ millions)	15,449	622	2,827	8,283	7,661
Base-year operating income (€ millions)	574.1	-2.8	52.9	413.7	416.5
1-year LTM sales growth (%)	-7.0	-12.6	-5.5	-1.4	11.3
1-year LTM stock return (%)	-12.1	-31.7	-13.2	-0.1	31.6
1-year LTM operating income change (%)	-3.3	-4.6	-2.4	-1.0	3.6
1-year LTM investment growth (%)	15.5	-22.9	-4.2	11.7	34.6
1-year LTM employment growth (%)	8.9	1.0	5.6	14.1	13.1
Herfindahl-Hirschman index	1,801	518	518	3,147	2,629
Panel B: Firms in Industries Experiencing Normal Performance *(N = 504)*					
Lagged debt/equity (%)	68.0	19.8	48.0	96.4	76.6
Base-year debt/equity (%)	72.3	21.6	51.4	97.0	75.4
Lagged debt/assets (%)	20.4	10.5	18.7	28.4	17.9
Lagged debt (€ millions)	7,058	24	172	769	745
Base-year debt (€ millions)	7,770	27	222	813	785
Base-year total equity (€ millions)	5,369	105	408	1,966	1,861
Base-year total assets (€ millions)	18,669	233	950	5,218	4,985
Base-year employees	28,779	1,105	3,997	16,564	15,459
Base-year sales (€ millions)	10,431	167	712	4,952	4,786
Base-year operating income (€ millions)	889	7	54	284	277
1-year LTM sales growth (%)	6.7	-1.5	4.6	12.0	13.5
1-year LTM stock return (%)	23.3	-13.3	16.5	43.6	56.9
1-year LTM operating income change (%)	-0.1	-2.2	-0.5	1.9	4.1
1-year LTM investment growth (%)	4.2	-28.5	-6.4	17.9	46.4
1-year LTM employment growth (%)	0.6	-5.1	-0.4	4.7	9.8
Herfindahl-Hirschman index	1,067	231	446	1,332	1,100

5 Findings

This section will present the empirical results of the OLS regression on the five different samples and test them for robustness.

5.1 Empirical Results

This section describes the empirical results retrieved from running the OLS regression on different subsamples. The coefficient estimates of the average effect of high leverage on firm performance (H_1) and corporate decisions (H_2 and H_3) across industries during distressed and non-distressed times are of particular interest.

5.1.1 Effect of Financial Distress on Firm Performance

The first hypothesis (H_1) argues that financial distress negatively impacts company sales and decreases market value compared to less levered peers. The results of the OLS regression on *Sample 1* and *Sample 2* are shown in Table VII, with the outcome of the nonparametric test highlighted in the last two rows.

Table VII

OLS Regression Predicting Mean Industry-Adjusted Sales Growth, Stock Returns, and Operating Income Growth from Q12019 to Q32021

Industry adjustment is carried out by subtracting the 3-digit SIC industry mean from the firm's performance. Ex-ante leverage is measured one year prior to the base year and is defined as the average LTM book value of long-term and short-term debt divided by the average LTM total equity. Stock returns, operating income growth, and sales growth are measured over a one-year period from one year before the base year to the base year. Operating income is defined as earnings before interest and taxes. Distressed industries had negative median sales growth and negative median year-over-year stock performance in the base year. A binominal sign test is used to measure the significance of the proportion of levered firms in distressed industries with above-median industry performance compared to the same proportion for levered firms in non-distressed industries. Robust standard errors are shown in parenthesis.

Dependent Variable	**Industry-Adjusted Sales Growth**		**Industry-Adjusted Stock Returns**		**Industry-Adjusted Operating Income**	
Sample	Whole Sample	Decile 1 & 10	Whole Sample	Decile 1 & 10	Whole Sample	Decile 1 & 10
Intercept	0.031 (0.176)	0.448 (0.075)*	-0.079 (0.215)	-0.464 (0.006)***	0.021 (0.118)	-0.026 (0.571)
Natural Log of Total Assets	0.022 (0.001)***	0.090 (0.008)***	-0.019 (0.007)***	-0.011 (0.747)	0.004 (0.000)***	0.001 (0.900)
Industry-adjusted investment ratio	0.044 (0.867)	1.271 (0.235)	-2.712 (0.000)***	5.545 (0.001)***	-0.095 (0.169)	0.693 (0.064)*
Industry-adjusted profitability	-0.945 (0.039)**	-3.028 (0.024)**	0.707 (0.008)**	-1.081 (0.081)*	-0.441 (0.000)***	-0.465 (0.001)***
Distressed industry dummy	-0.002 (0.943)	-0.084 (0.383)	0.057 (0.295)	0.338 (0.021)**	-0.001 (0.944)	0.012 (0.619)
High leverage dummy 8-10	-0.034 (0.176)	-	0.200 (0.000)***	-	0.003 (0.504)	-
Distressed industry times x high leverage dummy 8-10	0.007 (0.824)	-	-0.149 (0.025)**	-	-0.011 (0.326)	-
High leverage dummy 10	-	-0.223 (0.145)	-	0.636 (0.000)***	-	0.025 (0.459)
Distressed industry times x high leverage dummy 10	-	-0.022 (0.833)	-	-0.490 (0.000)***	-	-0.038 (0.107)
Proportion of levered firms above median industry performance in non-distressed industries (%)	50.00	51.06	55.55	68.08**	64.19***	53.19
Proportion of levered firms above median industry performance in distressed industries (%)	47.22	50.00	55.55	61.11	63.88	83.33**
No. of observations	611	126	611	126	611	126
R^2	0.06	0.43	0.08	0.43	0.24	0.34

Note: Robust standard errors are in parentheses. Industry and quarter dummies included.
*** p<0.01, ** p<0.05, * p<0.10

The regression results of *Sample 1* and *Sample 2* show that financial distress harms sales development during non-distressed times, yet not at a significant level. The effect during distressed times is positive in *Sample 1* and turns negative in *Sample 2* but is insignificant. High leverage positively influences a firm's market value during normal times and negatively impacts industries in a state of distress, both significant at $p < 0.01$ for both samples. Additionally, industry-adjusted operating income change reacts negatively, but not significantly, when financial distress and industry distress are combined in both samples.

The binomial test indicates that the regression's residuals are normally distributed in nine out of eleven cases over both samples. For stock returns, the distribution is significantly skewed for highly levered companies towards outperformance in non-distressed industries in *Sample 2* at the five percent significance level. For operating income, about 64 percent of companies in *Sample 1* outperform the median operating income growth in non-distressed times, but *Sample 2* companies underperform during distressing times. Both observations are statistically significant ($p < 0.01$ and $p < 0.05$, respectively).

The Breusch-Pagan-Godfrey test indicates significant ($p < 0.01$) groupwise heteroskedasticity of residuals in the sample. Therefore, robust standard errors are shown in all tables. In addition, no VIF-score approaches the widely acknowledged criterion of 10, and all of them are less than 2.5, except for the distressed industry dummy (2.64) (Belsley, 1991).

Table VIII shows the regression results of running the OLS regression on *Sample 3, Sample 4,* and *Sample 5* to test if firm and industry characteristics outlined in section 2.2.2 mitigate financial distress effects on firm performance metrics.

Panel A (sample split 3) shows that financial distress hurts sales growth during distressed and non-distressed times for companies in the highly specialized industry. Firms in normal industries show a positive coefficient, benefiting from high leverage during both industry states, yet the mentioned effects are insignificant. Additionally, high leverage has a strong, $p < 0.001$, positive effect on stock returns in non-distressed times for highly specialized industries compared to other industries.

Panel B (sample split 4) demonstrates no significant variation of effects between companies in concentrated vs. non-concentrated markets. In both cases, financial distress does not significantly affect sales growth during any industry condition stage. Nevertheless, market values of low concentration companies are more sensitive to financial distress, showing a

significant ($p < 0.01$) positive impact in normal times and significant ($p < 0.05$) negative impact in distressed times on stock performance.

Results for *Sample 5* (Panel C) show that high leverage during normal times has a significant negative ($p < 0.05$) influence on sales growth and a significant positive ($p < 0.01$) influence on the stock return of a small company. When entering a period of distress, the former fades, and the latter turns significantly negative ($p < 0.01$). No significant effect is observed for large companies.

Table VII

OLS Regression Predicting Mean Industry-Adjusted Sales Growth and Stock Returns as a Function of Industry Performance, Firm Leverage, and Controls from Q1 2019 to Q3 2021; Period Stratified by Key Firm and Industry Characteristics

Industry adjustment is carried out by subtracting the 3-digit SIC industry mean from the firm's performance. Ex-ante leverage is measured one year prior to the base year and is defined as the average LTM book value of long-term and short-term debt divided by the average LTM total equity. Stock returns and sales growth are measured over one year at the base year. Distressed industries had negative median sales growth and negative median year-over-year stock performance in the base year. R&D intensive firms are the industries with the SIC-Codes 283, 367, 481, 7370, and 7372. High concentration industries are those with a Herfindahl-Hirschman-Index above 1800. Firm size (natural log of Total Assets) is measured at the base year.

Panel A: Split by R&D Intensity

Dependent Variable	**Industry-Adjusted Sales Growth**		**Industry-Adjusted Stock Returns**
Sample	Highly Specialized Industry	Normal Specialized Industry	Highly Specialized Industry
Intercept	0.091 (0.100)	-0.008 (0.029)	-0.115 (0.067)*
Natural Log of Total Assets	0.041 (0.012)***	-0.001 (0.005)	-0.016 (0.009)*
Industry-adjusted investment ratio	0.266 (0.333)	-1.358 (0.395)***	-2.879 (0.438)***
Industry-adjusted profitability	-1.516 (0.590)***	0.500 (0.265)*	0.970 (0.307)***
Distressed industry dummy	0.086 (0.131)	-0.004 (0.028)	0.075 (0.145)
High leverage dummy	-0.035 (0.033)	0.025 (0.018)	0.249 (0.064)***
Distressed industry times x high leverage dummy	-0.122 (0.141)	0.014 (0.026)	-0.121 (0.144)
No. of observations	337	274	337
R^2	0.11	0.08	0.13

Panel B: Split by Industry Concentration

Dependent Variable	**Industry-Adjusted Sales Growth**		**Industry-Adjusted Stock Returns**
Sample	High Concentration	Low Concentration	High Concentration
Intercept	0.004 (0.046)	0.057 (0.096)	-0.005 (0.077)
Natural Log of Total Assets	0.018 (0.006)***	0.022 (0.009)**	-0.005 (0.010)
Industry-adjusted investment ratio	0.196 (0.693)	-0.080 (0.254)	-0.424 (1.089)
Industry-adjusted profitability	0.768 (0.326)	-1.176 (0.524)**	-1.595 (0.540)***
Distressed industry dummy	0.005 (0.044)	-0.004 (0.041)	-0.002 (0.081)
High leverage dummy	0.031 (0.034)	-0.040 (0.028)	0.002 (0.051)
Distressed industry	-0.011	0.016	0.004

times x high Leverage dummy	(0.041)	(0.032)	(0.071)
No. of observations	142	496	142
R^2	0.22	0.07	0.13

Panel C: Split by Firm Size

Dependent Variable	**Industry-Adjusted Sales Growth**		**Industry-Adjusted Stock Returns**
Sample	Natural Log Assets >8th Percentile	Natural Log Assets <8th Percentile	Natural Log Assets >8th Percentile
Intercept	-0.041 (0.037)	0.178 (0.087)**	0.030 (0.076)
Natural Log of Total Assets	0.026 (0.009)***	0.064 (0.020)***	0.029 (0.017)*
Industry-adjusted investment ratio	-1.482 (0.637)**	-0.160 (0.197)	-1.802 (1.846)
Industry-adjusted profitability	0.023 (0.390)	-1.423 (0.566)**	-0.883 (0.858)
Distressed industry dummy	0.089 (0.032)***	-0.047 (0.045)	-0.067 (0.065)
High leverage dummy	0.012 (0.027)	-0.066 (0.032)**	-0.015 (0.053)
Distressed industry times x high leverage dummy	-0.001 (0.032)	0.007 (0.046)	0.067 (0.070)
No. of observations	185	426	185
R^2	0.41	0.14	0.25

Note: Robust standard errors are in parentheses. Industry and quarter dummies included.
*** p<0.01, ** p<0.05, * p<0.10

5.1.2 Effect of Financial Distress on Corporate Decision Making

The results of Table IX are used to validate hypotheses two and three, which state that financial distress has a negative effect on investment (H_2) and employment (H_3).

Financial distress harms industry-adjusted investment growth in *Sample 1* and *Sample 2*, yet only significant ($p < 0.01$) during non-distressed times for the tenth leverage decile companies. In both samples, highly levered companies' employment growth is negatively influenced in distressed periods. Nevertheless, no significance is observed. The results only highlight a strong positive significance ($p < 0.01$) regarding the impact of financial distress on employment growth during normal times in *Sample 2*.

Table IX

OLS Regression Predicting Mean Industry-Adjusted Investment and Employment Growth from Q12019 to Q32021

Industry adjustment is carried out by subtracting the 3-digit SIC industry mean from the firm's performance. Ex-ante leverage is measured one year prior to the base year and is defined as the average LTM book value of long-term and short-term debt divided by the average LTM total equity. Employment is defined as the average LTM employees divided by the LTM total assets. Investment is measured as average LTM capital investments divided by average LTM total assets. Employment growth and investment (capital expenditures) growth are measured over a one-year period at the base year. Distressed industries had negative median sales growth and negative median year-over-year stock performance in the base year. Robust standard errors are shown in parenthesis.

Dependent Variable	**Industry-Adjusted Sales Growth**		**Industry-Adjusted Stock Returns**	
Sample	Whole Sample	Decile 1 & 10	Whole Sample	Decile 1 & 10
Intercept	0.126 (0.193)	0.224 (0.400)	-0.018 (0.028)	0.675 (0154)***
Natural Log of Total Assets	0.061 (0.059)	-0.098 (0.097)	-0.016 (0.005)***	-0.078 (0.018)***
Industry-adjusted investment ratio	9.240 (5.005)*	-12.834 (6.587)*	-0.416 (0.287)	-3.430 (0.682)***
Industry-adjusted profitability	0.365 (2.415)	5.247 (1.865)***	0.594 (0.187)***	5.411 (0.851)***
Distressed industry dummy	0.172 (0.593)	0.366 (0.969)	0.016 (0.029)	0.073 (0.081)
High leverage dummy 8-10	-0.220 (0.230)	-	0.013 (0.015)	-
Distressed industry times x high leverage dummy 8-10	-0.417 (0.335)	-	-0.052 (0.037)	-
High leverage dummy 10	-	-0.805 (0.366)**	-	0.447 (0.098)***
Distressed industry times x high leverage dummy 10	-	-1.215 (1.130)	-	-0.032 (0.098)
No. of observations	611	126	510	107
R^2	0.63	0.23	0.05	0.71

Note: Robust standard errors are in parentheses. Industry and quarter dummies included.
*** p<0.01, ** p<0.05, * p<0.10

5.2 Robustness Checks

Various checks were conducted to test the robustness of the results. Robustness was tested on all dependent variables, and all sample splits seen in the previous sections but only described in detail for *Sample 1* and *Sample 2*. A total of three different robustness tests were run on the main independent variables of interest *high leverage* and *high leverage x distressed industry* by (i) defining leverage as average LTM debt divided by the average LTM total assets at time *t*-1,

(ii) measuring leverage at *t*, and (iii) identifying industries as distressed when they experience only a negative median LTM sales growth at *t*.

The robustness tests did not alter the significance or direction of the effect of financial distress on the dependent variables for testing H_1 and H_2, only employment growth (testing for H_3) was affected by tests (ii) and (iii) in *Sample 1*. Adjustment (i) amplified the positive effect of financial distress observed during normal periods and made it significant at $p < 0.05$. The negative relationship when industries are in distress became significant at $p < 0.01$ and $p < 0.05$ for adjustments (i) and (ii), respectively.

Results for testing for H_2 were not majorly affected by the robustness tests. Only adjustment (ii) significantly decreased from $p < 0.05$ to < 0.10 of the *high leverage* interaction dummy's negative effect on investment growth. The adjustment also led the *high leverage* variable to gain significance at $p < 0.05$ and turn negative when testing for effect on sales growth (H_1). The significant ($p < 0.01$) negative effect of the *high leverage x distressed industry* dummy lost significance when testing the effect on stock returns (H_1) if the definition of distress is redefined (iii). Test (i) led the effect of financial distress on employment growth to lose all significance, while check (ii) additionally showed a strong ($p < 0.01$) negative effect during distressing times.

6 Discussion of Results

In this section, the key results of this paper are outlined. Then, the individual regression results are interpreted, from which implications for financial distress literature and practical implications are derived.

6.1 Key Results

The goal of this paper was to answer *whether highly levered firms in Germany suffered from financial distress costs during the period of Q12019 to Q32021*. High leverage negatively affected revenue development in normal times, yet not significantly. An increased effect on sales during distressed times was not observed. Operating income growth was negatively affected during the industry downturn, but significance cannot be observed. High leverage significantly impacted stock performance during normal times, while financial distress negatively affected market value if companies belonged to distressed industries. This suggests that company equity values are driven by the pure leverage effect, not financial distress costs. Considering results in the aggregate, the OLS regression suggests that financially distressed companies did not suffer from significant sales losses during normal and distressed times. Therefore, H_1 is rejected. Investment growth is negatively influenced by high leverage during distressed and non-distressed times, amplified with increased indebtedness. According to these results, H_2 can be confirmed. Employment shows an ambivalent picture, where financial distress during normal times positively affects it and vice versa during distressed times. Therefore, the paper can neither confirm nor deny H_3. In conclusion, results for H_1 and H_2 are robust, while H_3 reacts strongly to changes in the variable definition.

6.2 Interpretation of Results

It is imperative to remember that the results of the regressions did not yield significance in most cases. Therefore, interpretation is predominantly based on a given coefficient's direction of effect.

The negative coefficient estimate for the *high leverage* dummy in the sales growth equation implies that highly levered enterprises lose market share to more conservatively financed competitors even in prosperous times. These findings suggest that enterprises accumulate monetary funds when they anticipate higher sales, support higher investments going forward, and signal positive prospects to stakeholders rather than signal this with increased leverage. An ambivalent picture is painted when looking at the effect of an industry downturn, being positive in *Sample 1* and negative in *Sample 2*. This demonstrates that the effect of

leverage on sales during a distressing period is harder to measure and may be altered by other factors like a lack of cross-sectional variability. Nevertheless, the explanation of no significant adverse effect on company sales is observed during an industry downturn.

Regression results for stock returns and operating income change must be considered to understand the effect of financial distress on company sales. These results will reveal if revenue slumps resulted from effective cost-cutting by management or were caused by the change in behavior of customers and competitors.

The regression results may imply that financially troubled enterprises curtail their operations in underperforming segments to increase profitability. This could have been done by actual downsizing or may have resulted from managerial decision-making to only artificially increase margins through accounting measures during normal times to signal efficiency to the market.[5] Following this argument, the negative market value change in distressed periods could be attributed to a deterioration of underlying profitability, hinting again at possible temporary and artificially induced underlying performance improvements (Opler & Titman, 1994). Nevertheless, the more likely scenario is that the pure leverage effect amplifies stock performance in normal and distressing times. Increased operating income boosts the stock return of a highly levered firm more than it boosts the stock return of a less levered firm. In the opposite direction, a fall in operating income reduces the return on a highly levered firm more than a decrease in operating income for a less levered firm (Asgharian, 2003). This argument is likewise backed up by the fact that the *high leverage* and *high leverage x distressed industry* interaction dummies for the operating income regression are insignificant.

As outlined before, leverage harms sales during normal times, is ambivalent during distressing periods, and is insignificant. Additionally, the regression results highlight that highly indebted firms' equity value decreased more during distressed periods while their share price increased significantly more during normal times. However, it cannot be asserted that the lag of an effect on sales during distressed times is due to a lag of cross-sectional variability, and the observations for stock returns can solely be attributed to the leverage effect. This subsection aims to interpret the results of Table VII and determine if organizations that should incur the highest financial distress costs theoretically also suffer tremendous sales losses and stock price decreases when distressed. The interpretation of financial distress cost will stand on firmer

[5] As remarked by Opler and Titman (1994), enterprises experiencing financial difficulties might artificially inflate reported earnings by altering items balance sheet items. This significantly decreases the likelihood of discovering a negative relationship between profitability and leverage.

ground if the theory holds, and the mentioned cross-sectional determinants influence the change in firm performance.

The regression results can partially confirm the theory that highly specialized companies are more prone to suffering from *customer-driven* sales losses. Highly specialized companies in distressed industries lost 8.0 percent of sales while normal companies only lost ¾ of that. Nevertheless, this result is not representative since only the *Telephone Communication* industry has been in distress during the observation period.

The regression results support the theory that firms in concentrated industries in distress suffer from *competitor-driven* sales losses. Sales of companies in normal industries do not seem to be affected negatively by financial distress. Nevertheless, the leverage effects cause them to lose market value to a greater extent during normal and distressing times.

The results of Panel C in Table XIII support the idea that distress is more costly for smaller companies in normal times. Large companies increased their sales by 50.0 percent more than small firms during non-distressed times. The picture for small business stock returns points toward a leverage effect-driven development, meaning significantly more returns during good times and significantly less during distressed ones.

The investment growth regression supports the idea that levered firms underinvest compared to their less levered counterparts. This finding shows that highly levered companies in the sample suffer from an under-investment problem in distressed times, even before filing for bankruptcy. On average, companies in financial distress grew their investment by 2.0 percent, while their less levered counterparts invested four times as much. This observed behavior could be driven either by the non-existence of NPV positive investment opportunities for these companies or by an aggressive investment behavior of strong balance sheet companies trying to strengthen their market position ((López-Gutiérrez, Sanfilippo-Azofra, & Torre-Olmo, 2014) (Garcia-Appendini, 2018)). The underlying explanation could also be found by looking at the previously stated findings of the negative effect of the *high leverage x distressed industry* interaction dummy industry-adjusted operating income growth, as operating losses significantly reduce new investments (Bhagat, Moyen, & Suh, 2005).

The employment growth regressions suggest that companies are increasing their workforce to a greater extent than their less-levered counterparts in normal times. An influencing factor may have been the unforeseen COVID-19 pandemic and its impact on the economy. Firms may not have anticipated this development and increased their workforce in hopes of industry growth in the future. Nevertheless, this effect raises questions when

considering the effect of financial distress on investment. Companies simultaneously and significantly reduce their investment spending during normal times yet significantly increase their workforce. It must be added that the results for employment growth are not robust, which hints toward an increased cross-sectional variation in employment growth in the sample.

6.3 Theoretical Implications

The paper gives several implications concerning the theoretical standpoint of the financial distress literature.

First, the study provides additional evidence to Bergstrom and Sundgren's (2002) results that financial distress has a negligible impact on company sales during distressed times. Therefore, this finding is in stark contrast to more prominent findings of Opler and Titman (1994) and Ashgarian (2003), who proved that high leverage in distress times significantly reduces revenue. Additionally, this study contributes significantly to the literature above since it is the first paper to analyze financial distress costs quarterly. This represents a significant difference from previous studies by Opler and Titman (1994), Ashgarian (2003), and Bergstrom and Sundgren (2002), who use annual data.

Second, this paper can reasonably argue that changes in company equity value are predominantly driven by the pure leverage effect and cannot be attributed to an increased efficiency after unprofitable business units are restructured in normal times. This absence of this effect may have been influenced by only considering quarterly LTM values and assuming that restructuring operations normally take several months to complete. Nevertheless, this finding is per Ashgarian (2003), whose findings also point in that direction. Third, the robust significant negative effect of financial distress on investment growth validates further existing literature on the influence of high leverage on investment behavior, as highly levered companies seem to suffer from an underinvestment problem. Unfortunately, the methodology of this study cannot analyze if this effect is driven by either non-existence of positive NPV projects, as stated by López-Gutiérrez, Sanfilippo-Azofra, and Torre-Olmo (2014), or by increased investments of conservatively financed competitors as hypothesized by Garcia-Appendini (2018).

Furthermore, the study results can confirm the results of Bhagat, Moyen, and Suh (2005) and their view of the negative influence on investments if profits are negative in a distressed firm. Lastly, the study demonstrated that highly levered companies significantly increase labor in normal times and release employees during an industry downturn. This observation represents contrary evidence to the prevailing view that highly levered companies are more efficient in managing their labor force and do not tend to hoard it, as Sharpe (1994) stated. In

the aggregate, this paper may have contributed the most to financial distress literature by motivating scholars to test prevailing theories on observations during the COVID-19 pandemic, as major theories did not hold during this phase and in this study.

6.4 Practical Implications

This paper's practical implications are especially intriguing for two groups of stakeholders: managers and investors.

Managers of highly levered companies do not necessarily need to expect *customer* or *competitor*-driven financial distress costs when their industry is entering a downturn phase. Nevertheless, possible predatorial investment decisions may be taken up by more conservatively financed competitors. This may lead to highly levered companies losing market share in the long run through relative underinvestment.

Investors should only invest in highly levered companies if they operate in industries with strong growth prospects. Lastly, shareholders should not expect highly levered companies to effectively restructure operations during an industry downturn to influence their share price positively.

7 Limitations and Further Research

This chapter discusses the limitations this research faced and recommends further research that can be done.

This research has various limitations, most notably due to its sample and methodological design. Due to missing annual data points during the observation period, the paper had to resort to quarterly values, which reduced the initial sample from 1,737 companies to a mere 168 firms, reducing the studies' informative values compared to previous studies. The final sampling process led to a clustering of industries (mostly SIC-Code 737) and an unbalanced distribution of companies in distressed industries, where 50.0% of companies or four out of ten industries could not be tested on the *high leverage x distressed industry* variable.

Additionally, the small sample size, in combination with sampling for industry and firm characteristics, led to an imbalanced distribution with few observations in either one of the two samples being tested. Furthermore, the paper resorted to other proxies for R&D, concentration, and asset sales, to facilitate meaningful sampling following the previous papers since quarterly data was unavailable and the sample was comparatively small. Taking LTM values also comes with the disadvantage of being inherently influenced by seasonal effects, which may skew results. This could prove to be fertile ground for future research, which could run the same analysis on annual data, thereby including a more significant number of companies and making the results more robust.

In each regression, the model includes *high leverage* and a *high leverage x distressed industry* interaction dummy, while the control variables are restricted to be equal across two subsamples. This approach may be biased if the explanatory coefficients are not indeed the same in the subsamples. Future research may take a different approach and run the regression on the subsamples, one distressed sample and one normal sample, to avoid this bias (Asgharian, 2003).

Additionally, this study assumes that the relationship between lagged leverage and the proxy for firm performance is non-linear and defines a dummy variable to denote high lagged leverage. Using a dummy variable to define this non-linear relationship comes with the drawback that it cannot account for enterprises with leverage ratios approaching the level characterized as financial distress. Furthermore, in the dummy variable technique, one should determine a degree of leveraging a priori (and arbitrarily) that corresponds to financial distress, even if there is no a priori basis. To solve this problem, future research should use a parametric

analysis to model financial distress as this approach can include leverage as a continuous variable (Asgharian, 2003). Lastly, the assumption that endogenous capital structure choices come with two disadvantages. First, the studies' findings will tend to underestimate the negative influence of leverage on performance since firms facing the highest financial distress costs are the least inclined to leverage and vice versa. Second, the issue also diminishes the power of our subsequent analyses, which divides the sample of economically distressed industries into those with the highest and lowest financial distress costs, as it would be expected that very few highly levered enterprises operate in the industries with the highest financial distress costs.

Further research could be conducted on the effect that the introduction of federal relief programs had on financial distress costs by modeling the effect on a before and after basis. More interestingly, due to differences in economic stimulus packages between European countries, other scholars could analyze how different magnitudes of governmental intervention may have affected financial distress costs differently for companies in various countries (Council of the European Union, 2022). These findings may provide valuable information for governmental bodies when structuring future auxiliary measures in response to an economic crisis.

8 Conclusion

This study tests the hypothesis that businesses in financial distress see a more significant decline in revenue during an industry slump. Additionally, the paper analyzes stock performance and profitability changes to determine whether a sales reduction in highly levered organizations results from consumer and competitor responses or managers' efficient activity reduction. Furthermore, the study examines financial hardship's effect on corporate decision-making regarding investments and employee growth. This study chose the period between Q12019 and Q32021 since financial distress effects should be more apparent during recession periods and analyze the most recent effects.

The sampling approach and methodology used in this paper are, to a great extent, related to the study of Opler and Titman (1994). However, this study uses LTM quarterly data to analyze the effect of high leverage on firm performance, while previous scholars investigated annual values. Data availability was a critical limiting factor in this study which meant that potentially critical explanatory variables, such as asset sales, could not be included in the model. Other proxies had to be utilized to split the sample on firm and industry characteristics. Nevertheless, the methodology still enables this paper to analyze the effect of financial distress on firm performance and corporate decision-making and retrieve robust results.

Summarizing the results, firms in distressed industries do not suffer from financial distress costs. High leverage affects sales negatively during normal and distressed times, yet not significantly. Operating income reacts negatively to leverage in distressed times and vice versa in normal ones without being significant. The results show that stock returns are driven by the pure leverage effect, not by financial distress costs, with a significant positive effect in normal times and a significant negative one in distressed times. Financial distress decreases companies' investment in industry distress phases while employment increases. These results are not in line with findings by Opler and Titman (1994), while the effect on investment agrees with the results of the scholars. Generally, this study supports the outcome of Bergstrom and Sundgren (2002) that financial distress has a negligible impact on company sales during distressed times.

Overall, by examining the functional relationships between leverage and firm performance variables, the paper can conclude that the highly levered firms' relatively lower sales and higher profitability in non-distressed industries are related and are caused by managers' preferences to reduce activities in low-profit lines to be prepared for a possible industry downturn in an upcoming recession. This would support the idea that leverage acts as a transformative agent

(Wruck, 1990). Additionally, the observed decline in the stock values of highly levered firms in distressed industries and vice versa during normal phases appears to have a different explanation than a decline in market share, which could be rationalized as a direct leverage effect. Lastly, economic stimulus in the COVID-19 pandemic may have fulfilled its task by restoring confidence in the liquidity and solvency position of companies in distress, restoring consumer confidence while diminishing competitor motivation for taking aggressive actions to gain market share.

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10 Appendices

10.1 Robustness Test: *Sample 1* – Testing for H_1

Table X

Robustness Test: Sample 1 – Testing for H1

Dependent Variable	**Industry-Adjusted Sales Growth**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	0.031	0.042	0.030	0.032
	(0.176)	(0.034)	(0.027)	(0.032)
Natural Log of Total Assets	0.022	0.026	0.021	0.022
	(0.001)***	(0.008)***	(0.006)***	(0.007)***
Industry-adjusted investment ratio	0.044	0.155	-0.038	0.038
	(0.867)	(0.305)	(0.231)	(0.264)
Industry-adjusted profitability	-0.945	-1.138	-0.893	-0.940
	(0.039)**	(0.492)**	(0.429)**	(0.456)**
Distressed industry dummy	-0.002	-0.013	-0.015	-0.005
	(0.943)	(0.040)	(0.032)	(0.035)
High leverage dummy	-0.034	-0.048	-0.023	-0.037
	(0.176)	(0.032)	(0.024)	(0.265)
Distressed industry times x high leverage dummy	0.007	0.031	0.046	0.014
	(0.824)	(0.033)	(0.031)	(0.029)
No. of observations	611	536	635	611
R^2	0.06	0.08	0.06	0.06
Dependent Variable	**Industry-Adjusted Stock Returns**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	-0.079	-0.087	-0.066	-0.086
	(0.215)	(0.064)	(0.049)	(0.065)
Natural Log of Total Assets	-0.019	-0.021	-0.019	-0.018
	(0.007)***	(0.007)***	(0.007)***	(0.007)***
Industry-adjusted investment ratio	-2.712	-2.617	-2.749	-2.618
	(0.000)***	(0.383)***	(0.395)***	(0.417)***
Industry-adjusted profitability	0.707	0.928	0.687	0.662
	(0.008)**	(0.261)***	(0.255)***	(0.267)**
Distressed industry dummy	0.057	0.058	0.051	0.064
	(0.295)	(0.062)	(0.051)	(0.061)
High leverage dummy	0.200	0.201	0.151	0.222
	(0.000)***	(0.044)***	(0.045)***	(0.049)***
Distressed industry times x high leverage dummy	-0.149	-0.130	-0.140	-0.170
	(0.025)**	(0.064)**	(0.062)**	(0.075)**
No. of observations	611	536	635	611

R^2	0.08	0.11	0.07	0.09
Dependent Variable	**Industry-Adjusted Operating Income**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	0.021	0.021	0.015	0.021
	(0.118)	(0.014)	(0.009)	(0.014)
Natural Log of Total Assets	0.004	0.004	0.004	0.004
	(0.000)***	(0.001)***	(0.001)***	(0.001)***
Industry-adjusted investment ratio	-0.095	-0.077	-0.107	-0.089
	(0.169)	(0.069)	(0.059)*	(0.069)
Industry-adjusted profitability	-0.441	-0.430	-0.449	-0.443
	(0.000)***	(0.050)***	(0.430)***	(0.046)***
Distressed industry dummy	-0.001	-0.004	-0.001	-0.001
	(0.944)	(0.009)	(0.007)	(0.008)
High leverage dummy	0.003	0.004	-0.004	0.003
	(0.504)	(0.005)	(0.004)	(0.005)
Distressed industry times x high leverage dummy	-0.011	-0.012	-0.006	-0.008
	(0.326)	(0.011)	(0.009)	(0.009)
No. of observations	611	536	635	611
R^2	0.24	0.24	0.25	0.24

Note: Robust standard errors are in parentheses. Industry and quarter dummies included. *** p<0.01, ** p<0.05, * p<0.10.

(i) defining leverage as average LTM debt divided by the average LTM total assets at time t-1, (ii) measuring leverage at t, and (iii) identifying industries as distressed when they experience only a negative median LTM sales growth at t.

10.2 Robustness Test: *Sample 1* – Testing for H_2 and H_3

Table XI

Robustness Test: Sample 1 – Testing for H2 and H3

Dependent Variable	**Industry-Adjusted Investment Growth**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	0.126	0.045	0.055	0.129
	(0.193)	(0.325)	(0.158)	(0.208)
Natural Log of Total Assets	0.061	0.057	0.046	0.063
	(0.059)	(0.063)	(0.058)	(0.060)
Industry-adjusted investment ratio	9.240	9.177	7.841	9.501
	(5.005)*	(5.25)*	(4.245)*	(5.016)*
Industry-adjusted profitability	0.365	-0.231	0.281	0.246
	(2.415)	(2.761)	(2.311)	(2.474)
Distressed industry dummy	0.172	0.249	0.103	0.129
	(0.593)	(0.777)	(0.523)	(0.574)
High leverage dummy	-0.220	0.034	-0.064	-0.163
	(0.230)	(0.381)	(0.263)	(0.270)
Distressed industry times x high leverage dummy	-0.417	-0.729	-0.290	-0.460
	(0.335)	(0.512)	(0.344)	(0.352)
No. of observations	611	536	635	611
R^2	0.01	0.01	0.01	0.01
Dependent Variable	**Industry-Adjusted Employment Growth**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	-0.018	-0.010	-0.027	-0.022
	(0.028)	(0.028)	(0.023)	(0.026)
Natural Log of Total Assets	-0.016	-0.016	-0.016	-0.016
	(0.005)***	(0.005)***	(0.005)***	(0.005)***
Industry-adjusted investment ratio	-0.416	-0.291	-0.408	-0.420
	(0.287)	(0.303)	(0.259)	(0.287)
Industry-adjusted profitability	0.594	0.555	0.622	0.584
	(0.187)***	(0.194)***	(0.183)***	(0.187)***
Distressed industry dummy	0.016	0.013	0.032	0.021
	(0.029)	(0.037)	(0.028)	(0.032)
High leverage dummy	0.013	-0.006	0.028	0.023
	(0.015)	(0.021)	(0.014)**	(0.015)
Distressed industry times x high leverage dummy	-0.052	-0.055	-0.102	-0.065
	(0.037)	(0.037)	(0.031)***	(0.030)**
No. of observations	510	444	530	510

R^2	0.05	0.05	0.06	0.05

Note: Robust standard errors are in parentheses. Industry and quarter dummies included. *** p<0.01, ** p<0.05, * p<0.10.
(i) defining leverage as average LTM debt divided by the average LTM total assets at time t-1, (ii) measuring leverage at t, and (iii) identifying industries as distressed when they experience only a negative median LTM sales growth at t.

10.3 Robustness Test: Sample 2 - Testing for H_1

Table XII

Robustness Test: Sample 2 – Testing for H1

Dependent Variable	**Industry-Adjusted Sales Growth**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	0.448	0.234	0.578	0.433
	(0.075)*	(0.179)	(0.249)**	(0.250)*
Natural Log of Total Assets	0.090	0.068	0.067	0.090
	(0.008)***	(0.014)***	(0.027)**	(0.032)***
Industry-adjusted investment ratio	1.271	1.025	0.080	1.401
	(0.235)	(1.039)	(0.342)	(1.053)
Industry-adjusted profitability	-3.028	-1.717	-2.533	-3.085
	(0.024)**	(0.835)**	(0.982)***	(1.338)**
Distressed industry dummy	-0.084	0.178	-0.208	-0.076
	(0.383)	(0.092)*	(0.104)**	(0.107)
High leverage dummy 10th decile	-0.223	-0.069	-0.261	-0.213
	(0.145)	(0.106)	(0.112)**	(0.158)
Distressed industry times x high leverage 10th decile dummy	-0.022	-0.067	0.175	-0.027
	(0.833)	(0.066)	(0.122)	(0.096)
No. of observations	126	110	130	126
R^2	0.43	0.37	0.43	0.43
Dependent Variable	**Industry-Adjusted Stock Returns**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	-0.464	-0.415	0.022	-0.476
	(0.006)***	(0.085)***	(0.117)	(0.175)***
Natural Log of Total Assets	-0.011	-0.014	0.032	-0.020
	(0.747)	(0.018)	(0.028)	(0.035)
Industry-adjusted investment ratio	5.545	3.867	-3.676	5.416
	(0.001)***	(1.735)**	(1.085)***	(1.696)***
Industry-adjusted profitability	-1.081	-0.434	-0.123	-0.784
	(0.081)*	(0.369)	(0.575)	(0.589)
Distressed industry dummy	0.338	0.234	0.111	0.010
	(0.021)**	(0.153)	(0.167)	(0.149)

High leverage dummy 10th decile	0.636	0.449	0.247	0.572
	(0.000)***	(0.088)***	(0.136)*	(0.152)***
Distressed industry times x high leverage 10th decile dummy	-0.490	-0.245	-0.382	-0.111
	(0.000)***	(0.131)*	(0.217)*	(0.174)
No. of observations	126	110	130	126
R^2	0.43	0.57	0.25	0.41

Dependent Variable	**Industry-Adjusted Operating Income**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	-0.026	-0.015	0.042	-0.027
	(0.571)	(0.035)	(0.024)*	(0.046)
Natural Log of Total Assets	0.001	0.005	0.003	0.001
	(0.900)	(0.003)*	(0.003)	(0.009)
Industry-adjusted investment ratio	0.693	1.369	-0.091	0.692
	(0.064)*	(0.398)***	-0.077	(0.139)***
Industry-adjusted profitability	-0.465	-0.316	-0.291	-0.467
	(0.001)***	(0.144)**	(0.083)***	(0.024)***
Distressed industry dummy	0.012	0.013	-0.002	0.010
	(0.619)	(0.034)	(0.017)	(0.024)
High leverage dummy 10th decile	0.025	0.024	-0.013	0.027
	(0.459)	(0.029)	(0.013)	(0.036)
Distressed industry times x high leverage 10th decile dummy	-0.038	-0.020	-0.003	-0.029
	(0.107)	(0.029)	(0.019)	(0.022)
No. of observations	126	110	130	126
R^2	0.34	0.35	0.40	0.33

Note: Robust standard errors are in parentheses. Industry and quarter dummies included. *** p<0.01, ** p<0.05, * p<0.10.

(i) defining leverage as average LTM debt divided by the average LTM total assets at time t-1, (ii) measuring leverage at t, and (iii) identifying industries as distressed when they experience only a negative median LTM sales growth at t.

10.4 Robustness Test: *Sample 2* - Testing for H_2 and H_3

Table XIII

Robustness Test: Sample 1 – Testing for H2 and H3

Dependent Variable	**Industry-Adjusted Investment Growth**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	0.224	0.588	1.754	0.302
	(0.400)	(0.401)	(1.419)	(0.408)
Natural Log of Total Assets	-0.098	-0.103	0.320	-0.109
	(0.097)	(0.072)	(0.238)	(0.106)
Industry-adjusted investment ratio	-12.834	-13.325	1.495	-13.158
	(6.587)*	(6.382)**	(5.644)	(5.727)**
Industry-adjusted profitability	5.247	4.463	1.422	5.364
	(1.865)***	(2.488)*	(2.549)	(2.004)***
Distressed industry dummy	0.366	1.352	-0.679	0.574
	(0.969)	(1.357)	(0.509)	(0.594)
High leverage dummy 10th decile	-0.805	-0.911	-2.827	-0.783
	(0.366)**	(0.418)**	(1.587)*	(0.393)**
Distressed industry times x high leverage 10th decile dummy	-1.215	-1.802	1.196	-0.745
	(1.130)	(1.352)	(0.884)	(0.589)
No. of observations	126	110	130	126
R^2	0.23	0.29	0.41	0.22
Dependent Variable	**Industry-Adjusted Employment Growth**			
Robustness test	Original Definition	(i)	(ii)	(iii)
Intercept	0.675	0.611	-0.244	0.667
	(0154)***	(0.201)***	(0.118)**	(0.148)***
Natural Log of Total Assets	-0.078	-0.052	-0.022	-0.079
	(0.018)***	(0.015)***	(0.010)***	(0.018)***
Industry-adjusted investment ratio	-3.430	-4.092	-1.485	-3.435
	(0.682)***	(1.341)***	(0.463)***	(0.737)***
Industry-adjusted profitability	5.411	4.501	0.217	5.484
	(0.851)***	(1.190)***	(0.399)	(0.848)***
Distressed industry dummy	0.073	-0.144	0.155	0.053
	(0.081)	(0.118)	(0.066)**	(0.072)*

High leverage dummy 10th decile	0.447	0.258	0.060	0.499
	(0.098)***	(0.167)	(0.047)	(0.983)***
Distressed industry times x high leverage 10th decile dummy	-0.032	0.034	-0.187	-0.118
	(0.098)	(0.102)	(0.071)***	(0.076)
No. of observations	107	88	108	107
R^2	0.71	0.69	0.51	0.71

Note: Robust standard errors are in parentheses. Industry and quarter dummies included. *** p<0.01, ** p<0.05, * p<0.10.

(i) defining leverage as average LTM debt divided by the average LTM total assets at time t-1, (ii) measuring leverage at t, and (iii) identifying industries as distressed when they experience only a negative median LTM sales growth at t.