Turning the Tide in the IT Sector

Measuring the effectiveness of turnaround strategies for US IT firms that recovered from distress

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Abstract

This dissertation examines the efficacy of operational, strategic, and financial turnaround strategies for 114 US IT firms listed on US stock exchanges that experienced financial distress, recovered, and increased their profitability, all between the period from 1998 to 2022. The study evaluates the effectiveness of these turnaround strategies by analyzing changes in key variables from a prior to distress to a post-distress period. The results show that increasing the operational efficiency has a positive impact on the change on the return on assets. Reducing research and development expenditures appears to be a viable strategy for improving profitability in the short term but not in the long term. Additionally, the size of the company before distress has a positive effect on the success of restructuring efforts. This study also finds an unlikely positive relationship between distress severity and positive change on ROA which can be attributed, among other factors, to a moderate correlation between size and distress severeness. The findings of this study provide valuable insights for IT firms seeking to implement successful turnaround strategies during periods of financial distress. **Key Words:** Turnaround Strategies, Restructuring, Financial Distress, Altman Z-score, US, IT Sector.

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Resumo

Esta dissertação examina a eficácia de estratégias de reestruturação operacional, estratégica e financeira em 114 empresas de TI dos EUA listadas nas bolsas de valores americanas que sofreram dificuldades financeiras, se recuperaram e aumentaram sua rentabilidade, no período entre 1998 e 2022. O estudo avalia a efetividade dessas estratégias analisando mudanças em variáveis-chave do período anterior à dificuldade até o período posterior à dificuldade. Os resultados mostram que aumentar a eficiência operacional tem um impacto positivo na mudança do retorno sobre ativos, enquanto reduzir os gastos com pesquisa e desenvolvimento parece ser uma estratégia viável para melhorar a rentabilidade no curto prazo, mas não no longo prazo. Além disso, o tamanho da empresa antes da dificuldade tem um efeito positivo no sucesso dos esforços de reestruturação. Este estudo também encontra uma relação improvável e positiva entre a gravidade da dificuldade e a mudança positiva no retorno sobre ativos, que pode ser atribuída, entre outros fatores, a uma correlação moderada entre tamanho e gravidade da dificuldade. Os achados deste estudo fornecem insights valiosos para empresas de TI que buscam implementar estratégias bem-sucedidas de reestruturação durante períodos de dificuldade financeira. **Palavras-chave:** Estratégias de reestruturação, reorganização, dificuldades financeiras, índice de Altman Z, EUA, setor de TI."

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Preface

As a Master's student specializing in Finance with a keen interest in technology, I have chosen to delve into turnaround strategies for US-based tech firms. The topic of financial distress and the corresponding strategies to recover from such difficulties is engaging as it can provide valuable insights into the mistakes companies make, and the measures that must be taken to recover. These insights will contribute to a better understanding of the challenges faced in corporate finance.

During my time in Lisbon, I became increasingly intrigued by the technology industry due to my personal connections working in the field, together with Lisbon's reputation as Europe's tech hub. Furthermore, I believe that there is a good opportunity to contribute to the existing literature on turnaround strategies in the IT sector as it is a field with limited publications. In my opinion, the distinctive capital structure of tech firms, with a relatively higher percentage of equity financing and more R&D spending compared to other sectors, makes it interesting and a relevant area of study.

I would like to take this opportunity to express my gratitude to those who have contributed to my academic journey. I would like to start expressing my gratitude to the university Católica Lisbon in general, for giving me the chance to study at this esteemed university. I am grateful for the experiences and knowledge I gained during my time here. I would like to thank all the professors who inspired me throughout my studies, and whose lectures were always interesting. Their dedication to teaching has been invaluable for my development as a student. I would also like to thank the staff of the university, who provided me with a good working environment; from the Master's Affairs Team, who were always prompt in responding to any issues I had, to the women from the canteen, who taught me my first Portuguese words, and always gave me a good start of the day. Special thanks go to my dissertation supervisor, Professor Ricardo Reis, who has been helping me navigate the research process. I am also deeply grateful to my parents, who provided me with the opportunity to pursue my master’s degree and supported me every step of the way. Last but certainly not least, I would like to thank my fellow students, with whom I shared countless hours of studying during normal working days, weekends, and during late hours. In particular, my Portuguese colleagues, my friends, were always there to support me, answering my burning questions, and therefore deserve extra credits. Finally, I would like to express my gratitude to all other people who have contributed to this dissertation in one way or another. With this, I invite you to read and enjoy my study.

1. Introduction

The US economy heavily relies on the information technology (IT) sector. The tech industry ranks among the top five economic contributors in 23 states and among the top ten in 28 states. Almost all industries, including healthcare, manufacturing, transportation, education, and energy, are affected by technology (Deutsch, 2021). The rise of the Internet of Things, artificial intelligence, machine learning, autonomous vehicles, and augmented and virtual reality are transforming society and various industries (Deutsch, 2021). In the current dynamic business landscape, change appears to be the only constant, and organizations that are unable to keep up with the rapid pace of change and adapt to disruptive innovations often face significant challenges. Numerous well-known market-leading companies serve as examples of the consequences of failing to innovate and not correctly assessing market trends, which ultimately resulted in bankruptcy (Thangavelu, 2022). This paper focuses on the big IT sector and provides an analysis on successful turnaround strategies for financially distressed companies.

1.1 Research problem

The research problem addressed in this thesis is the lack of up-to-date and industry-specific research on successful turnaround strategies for listed US companies, specifically for tech companies. Most of the existing research on turnaround strategies for listed US companies is based on the manufacturing companies and was conducted before this millennium. Particularly the IT sector, which relies on high technology, has grown significantly since then and has become an increasingly important part of the US economy. Studying the IT sector and its turnaround strategies could be important due to their heavy investments in Research and Development (R&D) to drive innovation, resulting in a capital structure that differs from other industries. Therefore, IT firms may need to employ different turnaround strategies to recover from financial distress compared to traditional manufacturing companies. Because of the lack of studies on this topic, there is a need for research that specifically focuses on the turnaround strategies employed by listed US IT firms that have faced financial distress. This study aims to fill this research gap by examining the different strategies that were used by listed US IT firms that recovered from financial distress and improved their financial performance, with a focus on the effectiveness of these strategies.

Numerous studies have primarily concentrated on the likelihood of default and the factors that lead to it, rather than examining the effectiveness of various turnaround strategies. However, the few studies that do explore the turnaround strategies of firms that recovered, mainly focus

on the manufacturing industry or on multiple industries at once. Hence, these studies recommend to study specific industries in more detail. Although there are several studies that have examined technology companies, they either examine Mergers and Acquisitions (M&A) of distressed firms (Davis & Madura, 2015), which is a distinct topic, since these companies do not recover by themselves. Or they concentrate on turnaround strategies of growth stage unlisted companies (Pant, 1991), or focus on listed firms, but rather on only one specific turnaround strategy (Bruton & Wan, 1994). Additionally, the studies that are most related to this one are based on data that is over a decade old.

Given the limited amount of research conducted on turnaround strategies for listed US IT firms, and the fact that most relevant studies were conducted in the 90s and before, and despite significant growth in the IT sector since then, there is a need to gain more knowledge on this topic within this industry. This study will provide insights on how to effectively handle critical situations of distress in the IT sector, which can particularly now be useful, in the wake of the Covid-19 pandemic, which may have lingering economic effects.

This research on effective turnaround strategies can be valuable for IT companies experiencing financial distress or struggling to perform. It can help them identify areas for improvement and develop a plan to enhance their financial performance and competitiveness. Investors in the IT sector may also benefit from this research as it can provide insights into which companies are well-positioned to recover from a difficult period and deliver long-term value. Similarly, industry analysts covering the IT sector may find the research useful in assessing the performance of individual companies and the overall health of the sector. Finally, academics and researchers in the field of management and strategy may be interested in studying turnaround strategies in the IT sector to advance knowledge and theory on this topic. This academic research tests the effectiveness of operating, strategic, and financial turnaround strategies for 114 US IT firms that suffered financial distress during the period 2000-2017 and recovered, based on the effectiveness of recovery, distress severeness and restructuring intensity with linear regressions. Financial distress is being defined as firms that potentially go bankrupt based on the Altman z-score and recovery is defined by having an increased Return on Assets (ROA) in post-distress compared to the pre-distress period.

1.2 Study framework

This study follows a six-chapter framework, beginning with this introduction followed by a comprehensive literature review in Chapter 2. This literature review covers the topics of financial distress, bankruptcy, turnaround strategies, and other variables that can influence recovery, as well as an analysis of the tech industry. Chapter 3 outlines the methodology used in this study, including data selection and any limitations. Chapter 4 presents the empirical findings. Chapter 5 provides a summary of the conclusions drawn from the data, which are compared to the relevant literature, the research question, and the hypotheses. Finally, Chapter 6 discusses the research limitations and suggests future recommendations that could enhance the value of this dissertation.

2. Literature review

This part will provide insight on the literature related to turnaround strategies for financial distressed companies in the IT sector. The review is divided into several sections, including an introduction to the concept of financial distress, the use of the Altman Z-score as a predictor of financial distress, Chapter 11 bankruptcy, and different turnaround strategies. Additionally, this review examines the impact of company size and the severity of financial distress on turnaround success. Finally, the review discusses the unique characteristics of turnaround strategies in the IT sector. By examining the existing literature, this review seeks to contribute to a deeper understanding of financial distress and the factors that affect turnaround success in the IT sector.

2.1 Financial Distress

Although there is no universally accepted definition for financial distress, Beaver (1966) defines it as a situation in which a business is unable to fulfill its financial obligations at the time of their maturity. In a study two years later, Altman introduced the "z-score" to identify if companies are in financial distress, with a score of less than 1.8 indicating such a state (Altman, 1968). Nonetheless, later he deemed the threshold of 1.8 to be no longer valid but explained that the z-score is still a good indicator. Even though different studies use different definitions

for financial distress, all studies seem to agree that a company is in financial distress when it is at risk of going bankrupt.

Beaver's work in 1966 was among the earliest and most prominent studies investigating Corporate Financial Distress. Prior to his study, ratios were commonly used to discern information about business failure, however, no empirical research had been conducted on the efficacy of ratios in predicting corporate failure (Beaver, 1966). In light of this, Beaver's univariate ratio analysis served as a pioneering contribution, paving the way for multivariate analysis studies that followed (Altman, 2013). The Altman's Z-score, a predictive model for corporate bankruptcy based on five financial ratios, was introduced in 1968, two years after Beaver's study (Altman, 1968).

Since then, the Z-score has been widely used as a benchmark for bankruptcy prediction and has served as the basis for many other models in the field of research on bankruptcy prediction.

2.2 Altman Z-score

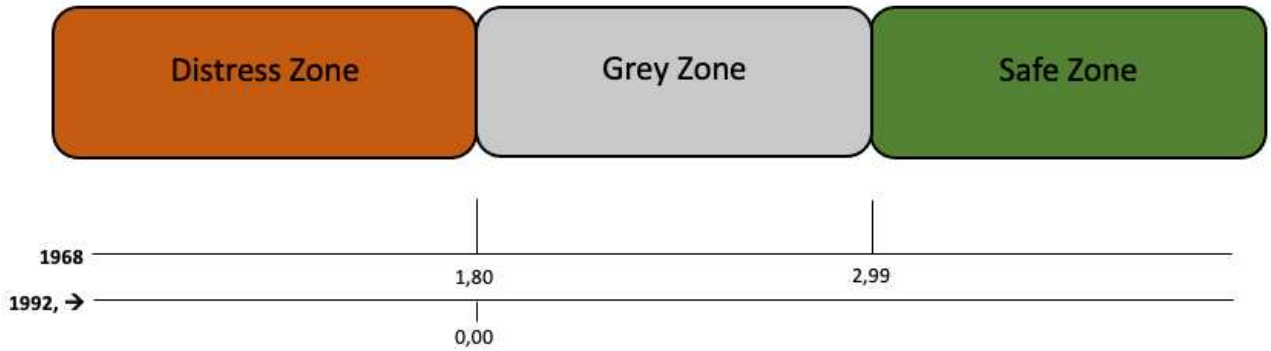
Table 2.1 Z-score formula

Formula:	$Z = 1.2 * X1 + 1.4 * X2 + 3.3 * X3 + 0.6 * X4 + 1 * X5$	
Measure	**Variable**	**Formula**
Liquidity	*X1*	$\frac{Working\ Capital}{Total\ Assets}$
Liquidity	*X2*	$\frac{Retained\ Earnings}{Total\ Assets}$
Profitability	*X3*	$\frac{Earnings\ Before\ Interest\ and\ Taxes}{Total\ Assets}$
Leverage	*X4*	$\frac{Market\ Value\ of\ Equity}{Total\ Liabilities}$
Efficiency	*X5*	$\frac{Sales}{Total\ Assets}$

The Altman Z Score is a formula developed by Edward Altman in 1968 to predict the likelihood of a company going bankrupt within the next two years. The formula uses a combination of financial ratios to arrive at a single score, which is then used to classify the company into one of three zones: Distress Zone, Grey Zone, or Distress Zone (Figure 2.1). Each of these variables (the X variables), is a financial ratio that measures a different aspect of a company's financial health. X1 is a liquidity ratio that measures the company's ability to meet short-term obligations. X2 is a liquidity ration that measures the portion of profits that have been retained in the business rather than paid out as dividends. X3 is a profitability ratio that measures a company's ability to generate earnings from its asset. X4 is a leverage ratio that measures the extent to which a company's assets are rather financed by equity rather than debt. X5 is an efficiency ratio that measures a company's ability to generate sales from its assets. The weights assigned to each variable in the formula (the coefficients for each variable) reflect their relative importance in predicting bankruptcy. The formula is designed so that companies with higher Z Scores are considered to be at lower risk of bankruptcy, while those with lower Z Scores are considered to be at higher risk. It's important to note that the Altman Z Score is not a perfect predictor of bankruptcy. Nonetheless, the formula remains a useful tool to look at a company's financial health.

The formula of the Altman Z-score is based on 5 different variables with coefficients serving as multiplier to each of these variables. The discriminant function of the Altman Z-score (2014) is shown in Table 2.1. Altman's model, developed in 1968, is a widely used tool for predicting corporate bankruptcy. However, it is important to note that the coefficients in the model would change if a different sample of companies was used. Nevertheless, the correlation between the various ratios in the model would remain relatively stable across different samples (Altman, 2019). Altman's original model divided Z-scores into three zones, with companies scoring below 1.8 being considered distressed and at risk of bankruptcy, while those scoring above 3 were deemed safe from bankruptcy. However, this scale should no longer be used, according to Altman himself. In fact, 20-25% of US listed companies now score below 1.8, even though many of them are not at risk of bankruptcy. This shift can be attributed in part to the introduction (in mid 70's) and the growth of the junk bond market, which has made it more popular to invest in riskier businesses (Altman, 2019). The junk bond market was valued at over 450 billion dollars in May 2021 (Pitchbook, 2023). In his lecture "50 Years of the Altman Score" in 2019, Professor Altman acknowledged that since approximately 1992, data has demonstrated that 0, rather than 1.8, is the value of the z-score that investors should be concerned about (Altman, 2019). While the sample in this study relies on companies' financial data in the years after 1989, this study uses the 0 as a threshold for measuring financial distress.

Figure 2.1 - Altman Z-score zones; 1968 and after 1992



This figure illustrates the three zones defined by the Altman Z Score model for assessing a firm's financial health, with their corresponding thresholds. The thresholds on the first line were derived from a study conducted by Edward Altman in 1968. Companies in this zone may not have weak financial stability but still need to be cautious of the risks. The red zone is the Distress Zone, where a company's Altman Z Score is less than 1.81, indicating financial distress and a high likelihood of heading towards bankruptcy in the near future. The grey zone indicates the moderate-risk area where a company's Altman Z Score falls between 1.81 and 2.99, indicating a moderate probability of bankruptcy in the near future. The green zone represents the Safe Zone where a company has an Altman Z Score of more than 2.99, indicating a strong financial position and less likelihood of facing bankruptcy. Since 1992 Altman advised to use the threshold of 0.00 to consider whether a firm is in financial distress or not, because firms are less likely to go bankrupt whit lower scores, mainly because of the high-yield market (junk bond market) that came up. Nevertheless, the Altman Z Score formula remains a useful tool for investors and creditors to assess a company's financial health and make informed decisions.

2.3 Chapter 11

An alternative approach for obtaining a sample of financially distressed companies is to compile a list of those that have filed for Chapter 11 bankruptcy.

When a firm is in financial distress, and it cannot meet its debt obligations it can file for the United States Bankruptcy Code Chapter 11, which is commonly referred to as a "reorganization" bankruptcy. Typically, the debtor retains control over their business operations and may continue to operate while developing and proposing a plan for reorganization. With court approval, they may also secure new funding to support the reorganization process (United States Courts, 2023). Unfortunately, I was not able to find free data on these filings for the specified period and therefore used the z-score instead, as mentioned previously. However, it is noteworthy mentioning Chapter 11, because it plays an important role in US bankruptcy.

2.4 Turnaround strategies

The structure of a corporation at any given time is the result of past strategic investment decisions. When the corporation is unable or unwilling to utilize its existing assets and capabilities, restructuring becomes necessary (Lazonick et al.). There are several turnaround strategies that businesses can use. In their research, Sudi Sudarsanam and Jim Lai (2001) outline a spectrum of turnaround strategies recognized in existing literature and analyze their practical efficacy. In this study they examine four general turnaround strategies: managerial restructuring, operational restructuring, strategic restructuring, and financial restructuring.

2.4.1 Managerial restructuring

Replacing top management is often seen as a necessary step for turning around a failing business. This is because the current management may struggle to make the major changes needed to improve the company's performance (Bibeault, 1998). When a business requires significant changes to the way it operates, the existing top management may find it difficult to modify established practices and introduce radical reforms. Financial support from banks and creditors often depends on their confidence in the management team's ability to navigate the crisis effectively. In such situations, replacing the top management could be tangible evidence

to stakeholders, such as investors, bankers, and employees, that positive steps are being taken to improve the company's performance, even if the root cause of poor performance is beyond management's control (Slatter, 1984). In Altman's lecture "50 Years of the Altman Score', he also notes that for the existing management it is extremely difficult to restructuring the business well enough, because they were the people that hired the employees in the first place and built the business to its current state (Altman, 2019). However, it's unclear if top management replacement helps the company recover in the long run, as the stock market's reaction to them is mixed. Therefore, the effectiveness of changing top management in corporate turnarounds is still up for debate (Sudarsanam & Lai, 2001). Due to insufficient data, it was not feasible to determine whether there were any managerial changes in the studied companies during the years of this research sample.

2.4.2 Operational restructuring

The primary objective of the operational restructuring is to stabilize operations and reinstate profitability through rigorous cost-cutting measures and reducing operating assets to provide more liquidity to the firm. The idea is to maximize revenues in short term by for example price cuts, while try to reduce operating assets (Hofer, 1980) (Bibeault, 1998). Operating-asset reduction is the process of selling or closing business units and integrating excess fixed assets like plant, equipment, and offices, as well as reducing short-term assets such as inventory and debtors. Its purpose is to improve the firm's efficiency by increasing the utilization of assets at the operational level (Sudarsanam & Lai, 2001). According to (Bruton & Wan, 1994), Hambrick and Schecter (1983) identified a correlation between reducing R&D spending and a successful turnaround for mature organizations. It's important to note that while short-term actions may provide immediate relief, they may not necessarily contribute to the long-term health of a business.

2.4.3 Strategic restructuring

Strategic restructuring involves reorganizing a firm into strategic business units, divesting lines of businesses that do not fit the core, acquiring companies that strengthen the core, discontinuing unpromising products, and forming strategic alliances. Asset restructuring refers to the major reconfiguration of the firm's assets which covers asset divestment and investment.

Asset divestment is imperative for turnaround and covers divestment of non-profit generating assets or non-core assets (Pearce II & Robbins, 1993). Distressed firms may merge with other firms, be taken over in a hostile bid or be bought-out by their own management. Asset investment covers business and corporate-level investments and comprises both internal capital expenditure and acquisitions. Acquisitions may contribute to successful sharpbend and sustained good performance thereafter but need to be selected and managed carefully (Sudarsanam & Lai, 2001).

2.4.4 Financial restructuring

Sudarsanam and Lai (2001) note that financial restructuring is often not included in studies on turnaround strategies. However, their study, along with ours, incorporate financial restructuring as a key component of the corporate restructuring framework. Financial restructuring involves reorganizing the capital structure by changing debt and equity. Equity-based strategies cover dividend payouts, cuts or omissions, share repurchases and issuance of equity, while debt-based strategies refer to extensive debt restructuring. Debt restructuring can be done by renegotiating the debt's principle or interest, its maturity, or it can be restructured by swapping debt to equity (Sudarsanam & Lai, 2001).

2.5 Size

Studies have revealed that the size of a company can influence its likelihood of defaulting (LoPucki, 1983). Most studies show correlation between a company's size and recovery from financial distress. However, some studies suggest that small sized companies may have an advantage in this regard, while others propose that larger firms have an advantage (Butar-Butar, Sadalia, & Irawati, 2019).

Haveman (1993) indicates that larger firms generally have a greater capacity to respond effectively to turbulent business environments and decline in performance. Companies that are larger in size tend to have a lower probability of defaulting due to their greater resilience. This could be attributed to their ability to attract external capital and the presence of multiple stakeholders.

Other studies showed a correlation between the success of a company's turnaround efforts and its size, but state that larger companies are at a disadvantage when under pressure as they are

slower changing their strategies, resulting in a lower likelihood of survival. Small companies are more flexible and can therefore adapt easier to changing market conditions, making them more likely to survive during periods of distress (Pant, 1991) (TenBrink et al., 2017).

2.6 Severity

Distress severity is a critical factor in determining a company's ability to recover from financial distress. The higher the severity of financial distress, the greater the likelihood of the company defaulting. In some cases, the distress may be so acute that liquidation may be a more viable option for the company than restructuring (Pearce II & Robbins, 1993) (Hofer, 1980).

2.7 IT-Sector

Extensive academic literature exists about M&A within the high-tech industry, particularly as it relates to the R&D investment strategies of larger firms. While most of the companies acquired by publicly traded corporations are small to medium-sized, Davis and Madura's (2015) study examines a sizable sample of listed tech firms that have been acquired by other listed tech firms. The findings suggest that financially distressed companies are vulnerable to takeovers. Therefore, we would expect that a company in financial distress is more likely to be acquired by another company than to recover independently. Surprisingly, this study included a sample of 114 firms that successfully recovered from financial distress in the period 1998 to 2022 and increased their profitability over time, without being subject to mergers or acquisitions. Taking out the characteristic of increasing the profitability over time would have resulted in an even larger sample of 320 firms that recovered from financial distress. Pant's study (1991) substantiates this, by finding a significant result on the proposition that "turnaround is more likely in an industry where investment in R&D is strong, allowing for changes in the relative positions of member firms".

The objective of this research is to determine the effectiveness of turnaround strategies, particularly for companies in the information technology sector. Given that this industry relies on high technology, there is a rapid pace of change in their environment (Bruton & Wan, 1994). According to Porter's (1985) analysis, the competitive position of a high technology firm depends heavily on its ability to innovate, and therefore, R&D plays a more significant strategic

role in this industry than it does in others. Research of Hambrick & Schetcher's (1983), finds that cost cutting R&D has a positive impact on a company's restructuring success. However, their sample consists of mature industrial products industries. Expectations are that turnaround strategies implemented by IT firms will vary from those turnaround strategies that have been successful in other industries that have been studied more broadly. Bruton and Wan (1994) confirm this and find that unlike the literature on turnarounds in mature organizations, high technology firms' operating turnarounds do not typically involve reduced levels of research and development spending. Besides, they acknowledged that high tech firms with successful turnarounds implement four operating turnaround strategies: reducing firm size, cutting capital expenditures, decreasing working capital, and reducing receivables. Besides Bruton and Wan's study of 1994, there is little literature on turnaround strategies for US technology firms. Hence, this study, with a focus on financial distressed IT firms that recovered between 1998 and 2022 contributes to the already existing literature.

3. Hypotheses Development, Methodology and Data

Table 3.1 presents the research question and the set of hypotheses that serve as building blocks of the entire research, providing the foundation of the study. These hypotheses are based on prior research that is examined in Chapter 2 - Literature Review.

Table 3.1 - Research Question & Hypotheses

Research question:

In what ways do various factors impact the degree of success achieved in turnaround for IT firms listed in the US?

Hypotheses:

H1: The intensity of retrenchment as a form of operational restructuring has a positive impact on successful turnarounds.

H2: A change in net investing activities has a positive impact on successful turnarounds.

H3: Decreasing dividends and share repurchases as a form of financial restructuring has a positive impact on turnaround success.

H4: Reduction of R&D has a negative impact on successful turnaround.

H5: Pre-distress size has a negative impact on restructuring success.

H6: Severeness of distress has a negative impact on restructuring success.

3.1 Methodology

The aim is to assess the efficacy of turnaround strategies for firms that have recovered from financial distress. To accomplish this, it is important to establish a clear definition of financial distress and determine what is meant by "successful recovery", as well as how to measure the correlation between the dependent variable and the independent and control variables. This research uses the Altman Z-score to quantify financial distress. Chapter 2 of this paper provides a more comprehensive explanation of the formula. This study considers a firm in financial distress when the firm has a z-score of zero or below. The pre-distress period refers to two consecutive years of positive z-scores immediately before a period of financial distress if that period of distress is followed by a period of two consecutive years with a positive z-score. A post-distress period refers to the latter two consecutive years described in the previous sentence. To determine whether a firm has successfully recovered, this research uses the ROA ratio. The company's ROA in a certain year is calculated by $\frac{Net\ Income}{Total\ Assets}$. A successful turnaround is characterized by a post-distress average ROA that is greater than the pre-distress average ROA value. The change in ROA is the dependent variable and should be explained by its independent variables, shown in table 3.2.

For the operational turnaround strategies, I considered the Earnings Before Interest and Taxes (EBIT) margin. The EBIT Margin measures the operating profitability. In general, EBIT margin is a helpful metric to assess a company's cost-cutting efforts, as a higher margin indicates lower operating expenses relative to total revenue.

As a strategic turnaround strategy, this study measures the company's change in net cash-flow investing activities relative to a company's pre-distress total assets. The net investing activities are Sale of Investments, Short-Term Investments, Sale of Property and other investing activities, minus increase in investments, capital expenditures and acquisitions. I chose the pre-distress total assets figure, to prevent any bias caused by the severity of decline. In situations where firms are severely distressed, their assets will experience a larger drop, which may make the process of restructuring assets appear more challenging for them compared to firms of a similar size that are not as severely distressed.

The change of dividends and repurchases relative to the number of shareholders is used as a metric to examine financial restructuring. Stock Repurchases can be seen as a form of dividend of the shareholder as it increases the value per stock. Although paying more dividends or repurchasing shares would not create more cash flow, it could be used as a strategy to increase shares' value and make them more attractive.

Table 3.2 Strategy Measurement

Turnaround strategy	Variable	Formula
Operational restructuring	Change in EBIT Margin	$\frac{EBIT(new)}{Total\ Revenue(new)} - \frac{EBIT(old)}{Total\ Revenue(old)} = \frac{Total\ Revenue - COGS - SG\&A(new)}{Total\ Revenue\ (new)} - \frac{Total\ Revenue - COGS - SG\&A(old)}{Total\ Revenue\ (old)}$
Operational restructuring	Change in R&D	$\frac{Net\ cash\ flow\ investing\ activities\ (new)}{Total\ assets\ (old)} - \frac{Net\ cash\ flow\ investing\ activities\ (old)}{Total\ assets\ (old)}$
Strategic restructuring	Net Cash Flow from Investments and Divestments	$\frac{R\&D\ expenditures\ (new)}{Total\ assets\ (old)} - \frac{R\&D\ expenditures\ (old)}{Total\ assets\ (old)}$
Financial restructuring	Dividend + Stock Repurchases	$\frac{Dividends + Share\ Repurchases - Issues\ (new)}{Number\ of\ Shareholders\ (new)} - \frac{Dividends + Share\ Repurchases - Issues\ (old)}{Number\ of\ Shareholders\ (old)}$
Control variable	Firm Size	Average Natural Log of Total Assets (old)
Control variable	Severity of Distress	Average Z-score during distress

This table displays the variables used to describe the different strategies employed by companies to recover from financial distress. The left column shows the categories of turnaround strategies. The second column indicates which variables were used to explain each strategy. The rightmost column shows the calculation of the variables that are used to measure each strategy, denoting the average of pre-distress with "(old)" and the average of post-distress with "(new)".

Control variables are used in research to account for factors other than the independent variable that may influence the dependent variable, to isolate the specific relationship between the independent and dependent variables. This study uses the average of the Natural Log of Total Assets in the pre-distress period to control for a firm's size. The second control variable this study considers is the severity of distress, which is calculated by the average z-score of the distressed period of per firm.

3.2 Data

The data for the regressions is originating from Compustat, a database that contains accounting numbers for US listed firms. Our sample period covered the years from 1998 to 2022. The IT companies were extracted by creating a list based on Global Industry Classification Standard (GICS) codes. The GICS is a technique used to categorize companies into a particular economic sector and industry group that accurately characterizes their business operations. It is one of two frameworks that investors, analysts, and economists use to evaluate and compare companies (Hayes, 2022). The codes have eight digits, and the IT sector is identified by a GICS-code starting with the number 45 as can be seen in Table 4.1.

To exclude IT firms that are related to the Financial Services industry (e.g. MasterCards Inc), I used the INDL Industry Format and excluded the Financial Services sector format by unticking the “FS” box. Additionally, I selected the variable type “Standard Industrial Classification” (SIC) codes to ensure excluding Financial Services companies by filtering out companies with SIC codes ranging from 60-67 and removing them from the dataset.

To refine the list of companies, I first excluded those with a Stock Exchange Code of 0, 1, or 20, as these codes indicate subsidiary/private companies and non-traded companies or securities (Compustat, 2022). Next, I used the variable "Current ISO Country Code - Headquarters" to identify only those companies with headquarters in the United States. Afterwards, I removed years of companies that had missing values that were needed for the variables explaining the different restructuring strategies.

A dummy variable was used for pre- and post-distress periods. As discussed earlier, to compare pre distress periods with post distress periods, pre- and post-distress periods needed to be in the correct order. All years of companies that did not meet these criteria had been removed.

Thereafter, I excluded companies that did not have a greater post-distress ROA average compared to their average pre-distress ROA. After data cleaning, the dataset for the multiple regression (Table 4.3) was left over with 114 companies. Since several companies did not state its R&D expenses, a second dataset was made for the regression on the R&D expenses (Table 4.4), encompassing 96 companies.

3.3 Limitations

The dataset has limitations, including the lack of a specific z-score formula for the IT-sector or the high-tech industry. Therefore, this study uses the regular Altman Z-score from 1968, which is based on listed US manufacturing firms. While the coefficients for the formula should differ for different studies with different samples of firms, this research uses Altman’s regular formula with its corresponding coefficients since determining the best coefficients for a specific sample is time-consuming. Altman recommends using these coefficients, which are shown in Chapter 2, for US listed non-financial firms, (Altman, 2019). However, since tech companies generally have lower retained earnings compared to companies from different industries because of investments in R&D and innovation, the coefficient of variable X2 of the z-score could be

misinterpreted. Changing the coefficient would result in different z-scores and therefore different outcomes of firms being considered as being financially distressed.

Reducing operational costs, optimize operational efficacy and create cash in short term is expected to have a high positive impact on turnaround success. The Cash Conversion Cycle (CCC) is a financial metric that measures the efficiency of a company's operations. This metric reflects the time in days required to sell inventory, collect receivables, and pay bills. In other words, it aims to determine the length of time each net input dollar remains in the production and sales process before being converted into cash received. Having a lower value is more favorable because it explains that the company needs less time to sell its inventory and has more cash on hand (Hayes, 2022). Although the CCC is typically a useful metric for measuring cash flow and operational restructuring, it is not relevant in this situation due to the unique characteristics of the software and services industry group. Since the IT sector encompasses both manufacturing and service-oriented businesses that use different methods for recording their inventories and cost of goods sold COGS, it was determined at a later point to disregard the calculation of the CCC for the IT sector. Table 4.1 displays the dataset's division of companies belonging to different (sub) industry groups.

Another limitation could be the examination of R&D expenses as a strategic investment strategy. Although I included only companies that stated their R&D expenses, R&D has a broad definition and companies are not legally required to disclose comprehensive data on it. The competitiveness within the IT industry also discourages companies from sharing too much information on this matter. As a result, these costs may provide a distorted representation of R&D expenses.

4. Empirical findings

Table 4.1 depicts the division of the dataset companies between different Industry Groups, Industries, and Sub-Industries, respectively. The number of companies related to the Software & Services Industry group (59), is approximately half of the sample size. This industry group generally use a different approach for denoting COGS and inventories compared to the other two manufacturing industry groups. Therefore, it is harder to compare accounting numbers and that is a reason why the CCC is not a reliable indicator of performance to take into consideration for the regression as explained previously.

Table 4.1 – Division of Sample Firms

Sector Name	N	Industry Group Name	N	Industry Name	N	Sub-Industry Name	N
Information Technology	114	Software & Services	59	Internet Software & Services	10	Internet Software & Services	10
				IT Services	12	IT Consulting & Other Services	7
						Data Processing & Outsourced Services	2
						Internet Services & Infrastructure	3
				Software	37	Application Software	32
						Systems Software	5
						Home Entertainment Software	0
		Technology Hardware & Equipment	42	Communications Equipment	19	Communications Equipment	19
				Technology Hardware, Storage & Peripherals	5	Technology Hardware, Storage & Peripherals	5
				Electronic Equipment, Instruments & Components	18	Electronic Equipment & Instruments	13
						Electronic Components	1
						Electronic Manufacturing Services	4
						Technology Distributors	0
		Semiconductors & Semiconductor Equipment	13	Semiconductors & Semiconductor Equipment	13	Semiconductor Equipment	3
						Semiconductors	10

This table depicts the division of the dataset companies within the IT Sector based on the Global Industry Classification Standard (GICS), into three levels: Industry group, Industry, and Sub-Industry. The specific GICS codes are omitted for clarity. The Industry Group column presents that more than half of the companies in the dataset are from the Software and Services industry.

4.1 Multicollinearity

A correlation matrix was constructed to assess the correlation between the independent variables and check on multicollinearity, which can lead to unstable and unreliable estimates of the regression coefficients, making it difficult to interpret the results. Typically, a correlation value of above 0.7 or below -0.7 is regarded as indicating high correlation. However, as shown in table 4.2, only the control variables “Size” and “Severity of Distress” show moderate correlation with each other. The results of the other independent variables range from -0.0004 to 0.052. Therefore, all independent variables included in this matrix are deemed valid for inclusion in a multiple regression analysis.

To further examine the possibility of multicollinearity, Variance Inflation Factors (VIFs) were incorporated into all regressions. VIF measures the extent to which multicollinearity increases the variance of the estimated regression coefficient. A VIF value of 1 indicates that the variable is not correlated with the other independent variables. A value from 1-5 indicates low to moderate correlation between variables, possibly indicating the presence of multicollinearity, while a value exceeding 5 suggests high correlation (The Investopedia Team, 2023). In this study, the independent variables of interest in all regressions had VIF values ranging from 1.01 to 1.15, indicating low correlation.

Table 4.2 Multicollinearity - Correlation Matrix

	EBIT Margin	Net Investing Activities	Dividends + Repurchases	Size	Severity of Distress
EBIT Margin	1	-0.0004	0.052	0.330	-0.244
Net Investing Activities		1	0.040	0.182	-0.144
Dividends + Repurchases			1	0.185	-0.097
Size				1	-0.522
Severity of Distress					1

This correlation matrix displays the correlation coefficients between the "independent" variables used to explain the dependent variable ROA in a multiple regression analysis (Table 4.3). The correlation coefficients range from -.0004 to 0.052, indicating a low degree of correlation among the independent variables. However, the control variables show a slightly higher degree of correlation. This matrix is used to see if multicollinearity exists, a condition in which two or more independent variables are highly correlated, and therefore potentially affecting the reliability of the multiple regression results.

4.2 Multiple regression

Model 1 and Model 2 in Table 4.3 present the intensity of restructuring strategies concerning positive changes in ROA, including outliers, and excluding outliers, respectively. The EBIT Margin in the regressions is based on the change between pre- and post-distress EBIT relatively to pre- and post-distress Total Assets, respectively. Conversely, the change between pre- and post-distress Net Investing Activities are both relative to pre-distress Total Assets (Table 3.2). Model 1 in Table 4.3 reports that 39.7% of the variance in the dependent variable is explained by the independent variables. The adjusted R-squared of 39.4% presents a more accurate estimate of the model's true explanatory power and penalize including unnecessary independent variables. The table reveals that all independent variables, except for the change in Dividends + Repurchases, are significant at a level of 1%. Alternatively, Model 2 in Table 4.3, which excludes outliers with more than three standard deviations from the mean, reports a smaller value for the R-squared and the adjusted R-squared. This model output displays an insignificant result of the independent variable "Net Investing Activities". The difference between the two models mainly derives from the exclusion of larger sized firms.

A higher EBIT Margin is typically associated with lower operating costs and is therefore a benchmark for operational retrenchment. The change in EBIT Margin shows a significant correlation with a beta coefficient that is close to zero, indicating that, on average, for one additional unit of the change in EBIT Margin, the change in ROA will stay relatively constant. Interestingly, when outliers with more than three standard deviations from the mean are removed from the dataset, the coefficient increases to 4.87%, and 98.5% of the original

observations remain. Since Table 4.3 implies that the results are highly influenced by extreme results of only two companies, the results of Model 2 seem more reliable. The results in both regressions indicate that change in Net Investing Activities/pre-distress Total Assets positively affects the change in ROA (4.31% and 0.5%, respectively). This implies that investing rather than divesting, relative to the Total Assets before distress, should have a more favorable impact on a company's profitability. Nonetheless, these results should not be considered in the conclusions, since the second model is more reliable, and the result is not significant. Furthermore, this study examines the correlation between dividends & share repurchases and ROA as a financial turnaround strategy. The beta coefficient indicates a positive correlation between a higher change in dividends and/or share repurchases and larger change on the Return on Assets. However, once again it should be emphasized that the outcome lacks statistical significance. Given the p-value above 0.1 in both models, with and without outliers, this regression can be disregarded. Additionally, the output of model 2 suggests that the control variables "Size" and "Severity of Distress" have a significant impact on the dependent variable "Change in ROA". Model 2 seems to depict that larger firms, as well as more severe distressed firms have a positive impact on the change in ROA, even though severeness of distress is expected to have a bad influence on the change on ROA according to prior literature. There are two reasons that could explain this unusual result. Firstly, larger firms are more likely to recover and have a larger change in ROA compared to smaller firms, although they also tend to suffer distress more severely than smaller companies. The moderate correlation between size and distress severity, show in Table 4.2 substantiate this statement. Secondly, it should be noted that the transformation in the dependent variable is based on the absolute change between pre-distress and post-distress ROA. The dataset used in this study comprises of firms that underwent financial distress, successfully recovered from it, and demonstrated an increase in their ROA. It is generally easier for firms with lower pre-distress ROA to achieve a larger shift in ROA compared to firms that had a higher ROA prior to financial distress and need to attain an even higher ROA post-distress. Simultaneously, firms that experienced more severe financial distress tend to possess a lower pre-distress ROA. This finding could suggest that firms in greater financial distress are more likely to experience a larger shift in ROA compared to firms with a higher pre-distress ROA.

Table 4.3 Multiple Regression

Dependent variable:	Model 1 - outliers included		Model 2 - outliers excluded	
Change in ROA	R-squared	0.397	R-squared	0.282
	Adj. R-squared	0.394	Adj. R-squared	0.278
	F-stat	114.7	F-stat	66.49
	Prob. F-stat	0.000	Prob. F-stat	0.000
	coef	**t-stat**	**coef**	**t-stat**
Operational				
EBIT Margin	-0.0006***	-4.685	0.0487***	19.133
Strategic				
Net Investing Activities	0.0431***	3.203	0.0050	1.501
Financial				
Dividends + Repurchases	0.0420	0.612	0.0205	1.276
Control variables				
Size	-0.0803***	-6.206	0.0226***	6.995
Severity of Distress	0.1791***	16.745	0.0129***	5.079

Table 4.3 – Multiple Regression displays two models: Model 1, which includes outliers, and Model 2, which excludes outliers, based on values that are larger than 3 standard deviations from the mean (1%-2% of dataset companies). The multiple regression analysis examines the relationship between the dependent variable (change in ROA from pre-distress to post-distress) and several independent and control variables: Change in EBIT margin, Change in Net Investing Activities, Change in Dividends and Repurchases, and the control variable size, and severity. The R-squared and adjusted R-squared values indicate the percentage of the variation in the dependent variable that can be explained by the independent variables. The F-statistic and probability (p-value) indicate the overall significance of the model in explaining the dependent variable and are significant at the 0.01 level for both models. The significance of the regressions of the independent and control variables are indicated with stars as shown below.

**: Correlation is significant at the 0.10 level*

***: Correlation is significant at the 0.05 level*

****: Correlation is significant at the 0.01 level*

4.3 R&D regression

Given the IT-sector's reputation for relatively high R&D expenditures, the paper incorporates a regression on change in R&D expenditures relative to pre-distress Total Assets. Table 4.4 indicates that firms that increase their R&D expenditures relative to pre-distress Total Assets experience a negative impact on the speed on recovery. Consequently, reducing R&D expenses is expected to have a positive influence on the company's profitability as a financial turnaround strategy. The observed negative relationship between change in R&D expenditures and change in profitability may be attributed to the generally significant amount of R&D expenses by

companies during the pre-distress period. Firms facing financial distress may be able to reduce R&D expenditures and profit from that in the short term, as they are typically long-term investments that may not yield immediate returns. By doing so, companies may be able to generate revenue and improve their profitability in the short term, thereby facilitating their recovery from financial distress.

Table 4.4 R&D Regression

Dependent variable:	Model 1 - Incl outliers		Model 2 - Excl outliers	
Change in ROA	R-squared	0.446	R-squared	0.234
	Adj. R-squared	0.444	Adj. R-squared	0.231
	F-stat	196.3	F-stat	71.32
	Prob. F-stat	0.000	Prob. F-stat	0.000
	coef	**t-stat**	**coef**	**t-stat**
Operational strategy				
Change in R&D	0.588***	9.387	-0.516***	-5.101
Control variables				
Size	-0.034***	-2.714	-0.014**	-2.204
Severity of Distress	0.185***	16.173	0.065***	8.971

Table 4.4 – R&D Regression displays two models: Model 1, which includes outliers, and Model 2, which excludes outliers, based on values that are larger than 3 standard deviations from the mean. The R&D regression analysis examines the relationship between the dependent variable "change in ROA from pre-distress to post-distress" and the independent variable: Change in R&D expenditures relative to pre-distress Total Assets. The R-squared and adjusted R-squared values indicate the percentage of the variation in the dependent variable that can be explained by the independent variables. The F-statistic and probability (p-value) indicate the overall significance of the model in explaining the dependent variable and are significant at the 0.01 level for both models. The significance of the regressions of the independent and control variables are indicated with stars as shown below.

**: Correlation is significant at the 0.10 level*

***: Correlation is significant at the 0.05 level*

****: Correlation is significant at the 0.01 level*

4.4 Financial characteristics

Table 4.5 reflects the average of several financial ratios of the total dataset, pre-distress, in-distress and post-distress. The Net Profit Margin measures a company's net profit relative to its revenue. In the period prior to experiencing financial distress, the margin of -3,412 highlights the company's insufficient profitability due to its operating activities. This lack of profitability can be attributed to the financial distress the company faced in the subsequent year. While it was anticipated that the company's financial performance would worsen during the period of distress, the net profit margin of -2,008 remained negative, but saw some improvement

compared to the pre-distress period. Subsequently, during the post-distress period, the company continued to experience a negative net profit margin of -0.501. However, the company showed a significant improvement in its financial performance as compared to the period of distress. During the pre-distress period, a negative ROA value of -0.443 indicates that the company is not utilizing its assets efficiently to generate profits. During the distress period, the ROA value worsens significantly, dropping to -9.566. This substantial decrease in ROA may be attributed to a reduction in the company's assets while incurring losses, leading to a larger negative margin. Companies may have utilized their assets to generate cash flow and pay off debts during this period. However, during the post-distress period, the company's ROA value shows improvement, rising to 0.021, signifying that the company has been able to restore its profitability to some extent.

Tabel 4.5 Financial Characteristics pre-, in-, and post-distress

Metric	Pre-distress	Distress	Post-distress	N
Net Profit Margin	-3,412	-2,008	-0,501	114
ROA	-0,443	-9,566	0,021	114
ROE	-0,573	-1,202	0,055	114
R&D/Total Assets	0,169	0,280	0,200	96

Table 4.5 presents the mean values of certain financial metrics for the 114 companies of the dataset in pre-, in-, and post-distress periods and are compared with the results of the Multiple Regression output and the R&D Regression output from Table 4.3 and Table 4.4, respectively.

In contrast to decreasing total assets during financial distress which negatively impacts the ratio, but can be positive for cash flow purposes, decreasing equity is not favorable for the company, which can explain the less severe drop of ROE. During the post-distress period the ratio improves as is expected. The average R&D relative to Total assets exhibits a notable change from the pre-distress period to the post-distress period. Firstly, the change from pre-distress to the distress period is likely due to a relatively larger reduction of Total Assets than R&D expenditures during the distress period. Yet, the average margin is higher post-distress compared to the pre-distress period, despite the regression in Table 4.4 demonstrating that this change has an adverse effect on the (short-term) Return on Assets. This is likely since R&D expenditures are very important for the long run and would therefore still be used as an investment strategy, even though it would not benefit the “short term” profitability, which is previously explained in Chapter 2 – Literature Review.

5. Conclusions

In conclusion, this study aimed to investigate the impact of various restructuring strategies of financially distressed companies that recovered. This chapter answers the hypotheses that were derived from prior research.

Hypothesis 1, which claims that retrenchment, as a form of operational restructuring, has a positive impact on successful turnarounds, is supported in many studies. The regression in this research reveals that a positive change in EBIT margin on has a small but positive change on a company's profitability, indicating that a more significant intensity of retrenchment leads to a more positive change in Return on Assets. However, the dataset in this research includes only companies that survived distress and had a positive change in ROA. Unfortunately, since a significant part of the dataset consists of software and services companies, this study did not consider the cash conversion cycle, which would have been another useful metric to test for this hypothesis.

Hypothesis 2 suggests that a change in net investing activities has a positive impact on the change of the return on assets. Literature suggests that a company should divest in assets that are irrelevant in the short term to create cash and potentially sell off business units or invest in the business to increase efficiency and reduce operating costs. Uncertainty remains regarding whether the extent of investing or divesting has a higher impact on the profitability of a firm. One of the regressions in this study reveals that increasing investments rather than divestments has a positive impact on the absolute change of ROA, but only when the outliers were included. Due to the lack of statistical significance in the results with outliers excluded, this study is unable to provide a definitive conclusion regarding the hypothesis.

The third hypothesis is particularly interesting because managers could increase dividends as a strategy making shares more attractive and increasing their value through share repurchases or by paying out more dividends, while the literature review supports the opposite, that reducing dividends and repurchases works positively in restructuring because it helps creating more cashflow. Despite the positive beta coefficient in this regression, the absence of a significant correlation means that it is not possible to provide an answer to this hypothesis.

Hypothesis 4 focuses on the reduction of R&D costs and its impact on successful turnarounds. Prior studies based on more mature manufacturing firms, revealed that cutting costs on R&D has a positive effect on restructuring success, although Bruton and Wan, who studied tech

companies, suggest that companies that survive distress show no decrease in R&D costs. This research supports both statements from prior research, since the regression shows that positive changes in R&D costs result in a reduction in the change in ROA, while the averages of the R&D cost ratio in Table 4.7 reveal that the margin of R&D costs relative to pre-distress Total Assets does not decrease. These results can be logically explained because increasing expenditures during restructuring is likely to lead to lower profitability, while it is necessary to continue investing in R&D for the long run.

Finally, Hypotheses 5 and 6 focus on the correlation between the change in ROA and the companies' pre-distress size, and severity of distress, respectively. Most studies suggest that companies that are larger prior to distress, show a higher level of profitability after distress. Nonetheless, other research that specifically studied tech companies suggest that smaller firms have a greater chance of recovery from distress. The regression analysis in table 4.3 indicates that the size prior to distress has a positive effect on successful turnarounds. Due to a moderate correlation between size and the severity of distress, and the tendency for larger companies to experience more severe distress, it is plausible that the coefficient for distress severity becomes positive as a result. Another possible reason for this unexpected result stems from the assumption that it is easier to make a larger absolute change in ROA when a company has a lower ROA prior to distress, compared to a company that already had a high ROA before distress. In addition, companies with lower profitability prior to the distress period are more likely to experience a stronger degree of distress.

In summary, the findings of this study provide valuable insights into the strategies that impact the success of corporate restructuring in financially distressed companies. Retrenchment as an operational strategy positively affect the change on ROA, and while reducing R&D costs seem to be a viable strategy for improving profitability of tech firms, it is not expected to be beneficial for the long run. Moreover, the size of the company before distress has a positive impact on restructuring success, and it cannot be determined that severity of distress has a negative impact on the change of profitability.

6. Limitations and further research

Despite the valuable insights obtained from this study, there are several limitations that should be acknowledged. Firstly, it is important to note that different industries within the IT sector generally use different cost structures, especially costs that are related to operations. Therefore, the accounting numbers from different industry are less comparable. Operational turnaround strategies are very important to analyze as they should have a high impact on a firm's recovery in the short term. It would therefore be better if there was more data available on operational level. In further studies it is highly recommended to split the sector analysis between different industries to compare firms' accounting numbers to other firms that are more comparable and especially analyze (software and) service companies rather than manufacturing companies which have already been studied extensively. A second limitation pertains to the relevance of examining the timing of revenues and expenditures within a fiscal year to evaluate the interdependence of variables. For instance, if a company generates high profits at the beginning of the year and invests later during that same year, the dependent variable would be the change in investments rather than the change in ROA. Hence, it would be recommendable to see the change of accounting numbers either over a longer period of several more years or based on quarterly accounting data, preferably based on time series (e.g. VAR regression) to examine change in different variables over time. Another limitation concerns the assessment of the impact of managerial decisions on a company's recovery. While considerable effort was dedicated to collecting information on this topic for this study's dataset, the available managerial data from certain databases was not sufficient for this research.

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