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# Predicting Successful Corporate Reorganizations Using Financial Measures

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## **Abstract**

- Title:** Predicting Successful Corporate Reorganizations Using Financial Measures
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- Keywords:** Corporate Reorganization, Corporate Reconstruction, Bankruptcy, Ohlson's O-score, Financial Modeling, Financial Distress
- Purpose:** The purpose of this thesis is to investigate whether it is possible to construct a model for predicting successful reorganizations for Swedish companies and to use this model to analyze the proposed new Insolvency Act.
- Methodology:** The study is conducted using a quantitative approach which is implemented using a logistical regression model. The model is tested using a range of statistical methods to ensure validity and reliability.
- Theoretical Perspectives:** A model is constructed using: a review of previous research, a novel application of Ohlson's O-score, Coalition Behavior Theory applied to the Swedish context and a review of the difference between Swedish and U.S. reorganization processes.
- Empirical Foundation:** Companies who initiated corporate reorganizations, filed at Stockholm district court during the period 2010-2014. The data was obtained from Business Retriever
- Conclusions:** This study successfully constructs a model with a good fit, strong explanatory power and a high level of accuracy. Using the model to analyze the proposed new Insolvency Act we find that while it makes some good suggestions it misses part of the larger picture of why corporate reorganizations so often fail.

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# 1. Introduction

Every year for the last 15 years between 4800 and 6200 Swedish companies have gone bankrupt (UC.se). A company that enters bankruptcy either does so voluntarily, initiated by the company itself, or involuntarily, initiated by the company's creditors. A company in financial distress is a company that is struggling with any promises made to its creditors. Financial distress can be defined as the point at which cash flows are lower than the firm's current obligations (Wruck, 1990). If a company is unable to meet the obligations it is in default (Vassalou and Xing, 2004) where its creditors can start legal proceedings to sue for bankruptcy. For a Swedish company in distress heading towards default there are three options:

1. Make a deal with the creditors, possibly renegotiating obligations.
2. Voluntarily file for bankruptcy, either being auctioned off as a going concern or liquidate and be sold piecemeal.
3. File for corporate reorganization at the local district court.

In 2007 the government of Sweden launched an investigation into the two latter methods of dealing with distress and default. The report came in 2010 and raised several problems with the third method, corporate reorganization, and suggested sweeping changes through a new Insolvency Act (SOU 2010:2). The law governing corporate reorganizations in Sweden is the Law on Corporate Reorganization (Lagen om Företagsrekonstruktion, SFS 1996:764). The purpose of the law is to give companies in financial distress or default the option to renegotiate their debts under the direction of a court appointed trustee and whilst protected from being put in involuntary bankruptcy.

The process is very seldom used. The Swedish business and credit reference agency UC (Upplysningscentralen) found that whereas there were 31 300 bankruptcies in the period 2008 – 2012, there were only around 1000 reorganizations attempted. Of the companies initiating a reorganization, a mere 18% successfully completed the process (UC, 2013).

The low success rate for the reorganization process has been of interest to the government (through the SOU 2010:2 study) as well as to academia (Routledge and Gadenne, 2004; Tuula-Karlsson, 2015; Becker, 2015; Laitinen, 2009). The government report focuses on the difficulty of the

process, the cost, the limited influence of the trustee and lack of speed of the process (Ibid). Tuula-Karlsson (2015) focuses on the fact that debtors file for reorganization too late for a reorganization to be of any use. She claims this is because of the creditor-perspective being inherent in the Swedish system – their needs have to be served first, rather than serving the company and its survival. She also notes that the courts approve reorganizations doomed to fail (she uses the example of the SAAB reorganization in 2009<sup>1</sup>) even when they do not offer any strategy for substantially changing their business plan. She especially focuses on the need to change the management of the company so that new ideas can be tried in the company.

Another perspective comes from Becker (2015) who, in a presentation on insolvency reform given to the company SNS<sup>2</sup>, a Swedish think tank, stressed three main factors as being central to a better corporate reorganization system in Sweden:

1. First, he argued that Sweden should allow for Debtor-in-possession (DIP) financing. DIP financing is debt that holds priority over some or all of the company's secured debt, increasing the likelihood that the DIP creditor will receive an acceptable rate of recovery if the company fail its reorganization attempt. This is currently not allowed in Sweden but if allowed might help secure new funding for companies undergoing reorganization.
2. Second, he argued for a stronger role for courts. He claims that the current system with court appointed trustees running the reorganizations is inefficient. Instead he argues that specialized courts should be granted greater power to value, make guarantees and decisions for the company.
3. Finally, there needs to be a mechanism to remove owners whose equity no longer has any value when the company has more debt than assets. Since their equity is worth zero these owners no longer hold any financial interest in the company and should not be allowed to block constructive proposals.

In our review of the debate surrounding the proposed changes to the law we find one perspective lacking – namely that of providing *accurate predictions of the risk of failure*. That is, courts need

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<sup>1</sup> SAAB automobile attempted two reorganizations, in 2009 and 2011, both were unsuccessful. Ultimately the company went bankrupt in 2012.

<sup>2</sup> Studieförbundet Näringsliv och Samhälle

instruments and tools to accurately assess which companies have a chance of succeeding with their reorganization and which will most likely fail (Fisher and Martel, 2004). In the government study, emphasis is placed on anchoring the decision with the creditors. But under the current system the vast majority of companies approved for reorganization by the courts are also approved by the creditors (90% overlap). This suggests that relying on the creditors to assess the viability of companies is insufficient for determining which will be successful. Routledge and Gadenne (2004) show that by using financial measures, statistical models can consistently beat predictions by human experts. If a reliable model could be developed for the courts, the success rate could be increased, without changing the law.

Another way of discussing the weakness of the corporate reorganization process in Sweden would be to turn the whole question around and ask: why are as many as 82% of companies failing to survive despite being approved for reorganization by the courts? What is wrong with the courts' ability to predict these companies' ability to turn around their downward spiral and become profitable?

The corporate reorganization process has to be initially approved by the local district court who are asked to assess two things when making a decision:

1. Debtors must either be unable or soon unable to pay their debts
2. Reorganization should only be approved if the process has a reasonable chance of being successful.

The failure of the courts to accurately assess the second criteria is a major contributor to the massive failure rate of the corporate reorganization system in Sweden. No matter the difficulty with the system, if a model can accurately predict which companies will succeed then unnecessary losses by companies that had no chance of succeeding would be reduced, which would otherwise ultimately cost both the society and the owners substantial resources. A company that fails its bid for reorganization is still in financial distress or default and most likely in worse shape than before it started the process as it is both costly and time-consuming – resources that could have been put to better use. The Swedish bankruptcy system provides an average return of 35% to secured creditors while a reorganization process returns 40% on average. If this advantage can be leveraged

through increasing the percentage of successful reorganizations then returns from the process can be increased – of benefit to all.

Several statistical models predicting corporate reorganizational success using financial measures have been developed (Routledge and Gadenne, 2000; Campbell, 1996; Casey, McGee and Stickney, 1986). But most studies are conducted on U.S. companies and most of the discussions on the topic are framed around the U.S. Chapter 11 bankruptcy law (regulating corporate reorganizations; Title 11 USC Ch. 11, 1978). The Swedish law on corporate reorganization differs from the U.S. context in several respects, as outlined by the governmental report (SOU 2010:2). This limits the usefulness of these models as they are constructed for another context. A model adapted to the Swedish context could increase the efficiency of the law on corporate reorganizations and also provide some insight into what makes companies fail in their reorganization attempts.

## 1.2 Problem definition

Encouraged by the success of the predictive statistical models developed for the U.S. context, we decided to investigate whether we could develop similar models of relevance to the Swedish context. The problem we addressed is framed by the following two questions:

1. Can a model based on the financial data from Swedish companies be used to accurately predict which companies stand a better chance of reorganizing successfully?
2. If such a model can be constructed, are the changes suggested by the proposed new Insolvency Act in line with what this model predicts or are there reasons to question the proposed law?

## 1.3 Purpose

The purpose of our work is to bring out a predictive statistical model especially adapted to the Swedish situation for determining the likelihood of success or failure to reorganize a company making it profitable. To construct the model, we used a sample of Swedish companies that have undergone reorganization. We restrict the variables to be used as input to our model to consist only of data included in annual reports from Swedish companies – the kind of data that the courts will

have access to when a company files for reorganization. By basing the model on data that is accessible to the Swedish courts, it becomes a realistic tool, useful in the situation at hand today.

The purpose of our work is furthermore to assess the suggested changes to the Insolvency Act (SOU 2010:2). If our model can predict which reorganizations are worthwhile with high accuracy, substantially higher than that of human experts, the same model variables measuring the underlying financial factors for a company reorganization should also be addressed by this proposed law. By using the same underlying reasoning we used to bring out the model, we can analyze the proposed new law to see if it has potential of really addressing the underlying factors of success or failure.

## 1.4 Delimitations

In this thesis we will limit ourselves to using the financial variables that are available through annual reports. When Laitinen (2009) conducted a review of earlier models used for predicting reorganization success he found that financial variables and efficiency measures are the two most successful measures for predicting the success of corporate reorganizations. He finds that there is little empirical support for non-financial variables.

## 1.5 Outline

In chapter 1 we describe the problem with corporate reorganizations, formulate two research questions to focus on and describe the purpose of the study.

In chapter 2 the background and theoretical framework for this thesis is described. To assess how to predict successful reorganizations we define the term “successful reorganization” and select four sources to base our model on. The current legal framework for Swedish reorganizations is explained to provide a background to how the process works and then the sources are investigated, factors picked and hypotheses formulated.

In chapter 3 the methodology for testing the hypotheses and attempting to answer the research questions is presented, including data collection, variables, models, and diagnostic tests.

In chapter 4 the results from descriptive statistics and the logit model are presented and interpreted.

In chapter 5 the results and hypotheses are analyzed, discussing which factors were significant for reorganizational success. Then we discuss our different sources and use three different approaches to assess if we used them correctly. Then we apply our model to the proposed Insolvency Act and discuss its implications.

In chapter 6 we discuss the conclusions of our study, discuss the contribution to the field, describe limitations, suggest new areas for research and conclude with recommendations for implementing the lessons from our study.

## 2. Background & Theoretical Framework

Our purpose is to create an accurate model for predicting which corporate reorganizations will be successful and which will fail. We also intend to use this model to evaluate the changes to the law on corporate reorganization in the proposed new Insolvency Act (SOU 2010:2). To create an accurate model for predicting success we first have to discuss the corporate reorganization process in Sweden, describe what the end goal of the process is and what tools it provides to companies, and which limitations it places on them.

To create a model of “successful reorganizations” we first have to define what “success” means. There are varying definitions used in different studies (Routledge and Gadenne, 2000; Laitinen, 2009; Hotchkiss, 1995) and we need to decide which definition is the best at capturing the intent behind the Swedish reorganization process.

After deciding how to measure success the next task is investigating which factors determine whether the process is successful or not. We will use four sources for determining which financial factors are most important. Our first source is what factors the government study behind the proposed new Insolvency Act (SOU: 2010:2) determine to be most important. Our second source of factors will be a literature review of what are seen as the largest differences between the Swedish and the U.S. reorganization processes. The U.S. process is both more widely used by distressed companies and is more successful, measured by the number of companies that are successfully reorganized (Smith and Strömberg, 2005). Most countries have modelled their process on the U.S. process and consequently, most research has focused on it too. (SOU 2010:2). We will then discuss what the differences are between the Swedish process and the U.S. process, and determine which financial factors these differences affect and how they increase the success rate of the companies undergoing reorganization in the U.S. Our third source will be the theoretical and empirical models that have been proposed in previous studies on corporate reorganizations. We will determine what factors they find significant, how these factors affect the corporate reorganization process and what the predictive accuracy of their model is.

Our fourth source for factors explaining successful corporate reorganizations will be the models developed for predicting bankruptcies. The government study on a new Insolvency Act (SOU



2010:2) suggests that a major problem with reorganizations under any system is that debtors delay too long in applying for reorganization, letting their financial position deteriorate to the point where there is little hope of saving the company. If the tardiness in applying for reorganization is a significant factor in the failure of many reorganizations, we will be able to use the models for predicting bankruptcy to determine how far gone the companies applying for the process are. This will help us model which companies have the greatest chance of successfully reorganizing. We will determine which model best suits our data and what factors it includes in its model. These factors will then be useful for our model.

Having selected factors from these four sources we will summarize our findings and use them to construct hypotheses on what factors will be significantly correlated with successful reorganizations.

To select articles for these reviews we will conduct an extensive review of previous literature. We will find articles by using keywords like “Corporate reorganization”, “Predicting successful reorganizations”, “predicting bankruptcies” and variations on these themes in searches on Google scholar<sup>3</sup> and through the LUBsearch meta-database<sup>4</sup>. Priority in evaluating articles will be placed in literature that is recent and that has a large number of citations.

Since we intend to use the model we create to analyze the proposed changes to the process, we also need to review the study behind the proposal and the proposed changes to find out what factors they identify as central for improving the reorganization process. This will be done alongside the analysis of what factors the government study finds are most important. The results will be presented in a list and will be analyzed in chapter 5.

## 2.1 What is the legal framework for corporate reorganizations in Sweden?

What does a corporate reorganization in Sweden involve? The companies that apply for corporate reorganization are first assessed by their local district court. In their applications they include a

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<sup>3</sup> scholar.google.se/

<sup>4</sup> lubsearch.lub.lu.se

financial report, a list of creditors and a basic plan for how they can be successfully reorganized. This information is then used by the court to make its decision.

The criteria for granting a corporate reorganization are twofold:

1. The company must be in or close to financial distress.
2. There exists a reasonable chance that the company can become viable and keep operating (SFS 1996:764).

If the court approves the application a trustee is appointed by the court (usually recommended by the company applying for reorganization) who in turn summons all of the company's creditors to a meeting to present a plan for how the company can be reorganized to once more become profitable and to resume paying its liabilities. If the creditors agree, the company is then granted a temporary freeze in claims by creditors and cannot be sued for involuntary bankruptcy proceedings for the duration of the process. There are also limitations on how the debtor can operate their business, which include not being allowed to sell assets without creditor approval and not entering into new contracts or debt without their approval (SFS 1996:764).

This immunity is granted on a 3-month renewable basis which can be extended three times to a maximum duration of one year from first being approved. A final reorganization plan will be presented no later than three months after the first application was sent in unless a renewal is granted. If there is an ongoing process to forcibly liquidate the company when the reorganization is approved that process is frozen until the reorganization is finished. This period of immunity is meant to allow the company to raise capital, renegotiate with debtors and make whatever adjustments necessary to allow them to return to profitability. There are no provisions for adding debt with higher priority than the unsecured debt (such as DIP financing). This means that the only source of debt that can be accessed is unsecured debt. Since a company undergoing reorganization has a high risk of bankruptcy, and Swedish bankruptcies offer a rate of recovery on unsecured debt of a mere 2% (Thorburn, 2000), there is little incentive to offer any debt financing to reorganizing companies. The trustee is meant to propose a plan for the company to return to long term profitability (SOU 1992:113), but they have no special authority to force through changes in management, fire employees, sell off unproductive assets, change business strategy or do anything

else without the approval of the owners. They are also required to seek approval from creditors for selling assets, raising debt or entering new contracts.

In order for the process to be terminated successfully an accord must be reached where the unsecured creditors must secure at least a 25% rate of recovery and the secured creditors a 100% rate of recovery unless they unanimously vote to lower their claim. If no such accord can be reached within the time frame or if the trustee decides such a deal is impossible the reorganization is terminated (SFS 1996:764). After termination the freeze on creditors suing for bankruptcy is lifted and the company is likely to go bankrupt.

The Swedish law on reorganization is intended to give companies which are suffering from problems with short term liquidity but who retain the potential for long term profitability a chance to continue operating without entering bankruptcy. The process is intended to give the company breathing space where it can negotiate with creditors or raise capital through selling assets (SOU 1992:113).

Let's provide an example to illustrate the process working as intended: A distressed company is at risk of default. It files for corporate reorganization which is granted if it is deemed to have the potential to return to profitability. Without the risk of creditors seizing assets or suing for bankruptcy, the company can raise capital through finding new creditors, through selling assets or other means. They are also able to negotiate an accord with creditors where some debt can be depreciated or a payment plan be created which allows the company to exit financial distress. With the imminent threat of default averted the company can return to being profitable and viable.

## 2.2 What is a successful reorganization?

To measure success we need to determine what success means. There are several different ways of defining success:

1. The pragmatic definition: In section 2.1 we described the process for successfully leaving the corporate reorganization process. This can be used as a measure of "success" (Routledge and Gadenne, 2000; Hermansson and Karlström, 2010).

2. The purpose of the law: The purpose of the law is to let the companies keep operating outside financial distress. This measure of success is used by some researchers (Laitinen, 2009).
3. Becoming a profitable company: Defined as returning to average levels of profitability after successfully exiting the process, used by some U.S. researchers (Hotchkiss, 1995).

The third definition is mostly used in U.S. research where the process is debtor-oriented (Smith and Strömberg, 2005) which means that the purpose of the law is to resume operations to the benefit of the debtor. The Swedish process is creditor-oriented which means that while the desire is for the company to become viable, the creditors have to be satisfied as well. Therefore it seems best to use the first two definitions of success for our model.

Measuring success in this manner is useless for a court trying to determine if a company should be allowed to successfully exit the process. Instead we need some pre-ante measure of financial distress, such as a model for predicting bankruptcy.

## 2.3 What model best predicts bankruptcy?

To measure the post-reorganization viability of a company we need to find a model that can accurately predict the risk of re-entering a state of financial distress. We therefore turned to the literature on bankruptcy prediction.

### 2.3.1 Which types of models can be used?

The first problem encountered when reviewing corporate reorganization literature is to determine what kind of models are applicable to the prototypical Swedish company entering a reorganization process. In previous empirical research the median company approved for reorganization in Sweden is best classified as *small* and *nonpublic* (Hermansson and Karlström, 2010). According to their study, the majority of companies applying did not fulfill the Swedish limited companies act's definition of a *large company*<sup>5</sup> (SFS 2005:551).

Many different types of models have been developed for bankruptcy prediction. There are classical and widespread accounting-based models like Altman's Z-score (Altman, 1968) or Ohlson's O-

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<sup>5</sup> 2 of these 3: >80 MSEK in Net Sales, >50 Employees or >40 MSEK in Total Assets. (SFS 2005:551)

Score (Ohlson, 1980) as well as market-based approaches such as Merton's option pricing model (Hillegeist et al., 2004) or hybrid models such as the discrete hazard model (Shumway, 2001).

When comparing different models, the market based models, such as those based on the Black-Scholes-Merton model (BSM-models), are generally more accurate in predicting financial distress than accounting based models (Hillegeist et al., 2004). Hybrid models combining market, macroeconomic- and accounting based measures, on the other hand, have the greatest accuracy (Tinoco and Wilson, 2013).

Unfortunately, market and hybrid based approaches are not applicable to the small non-public companies most common in Sweden as they are not acting in the public marketplace, which means we lack the necessary data for such an analysis.

### 2.3.2 Accounting based models for bankruptcy prediction

There are two widely used models for bankruptcy prediction that rely on accounting-based measures: Altman's Z-score and Ohlson's O-score (Begley, Ming and Watts, 1996).

Altman's Z-score was calculated in 1968 based on data from 68 public manufacturing companies in the U.S. (Altman, 1968). Altman has two models: model A for public companies and an alternative model, model B, for non-public companies. Altman's Z-score has been criticized for being specified based on (by now) very old data (Begley, Ming and Watts, 1996). Additionally the Z-score is specified based on manufacturing companies reducing its accuracy for other types of companies.

Ohlson's O-score was calculated in 1980 based on a wider data set than Altman's. Over 2000 U.S. companies were included. The initial accuracy was better than Altman's Z-score but because its data, like Altman's, is getting increasingly out-of-date its specifications are also adapted for a different time than today. This leads to the following three different issues to be resolved:

1. Which measure has superior accuracy: O-score or Z-score?
2. Is that model useful for modern companies?
3. Is that model useful in non-U.S. contexts?

### 2.3.3 Reviewing the usefulness of Altman's Z-score and Ohlson's O-score

Hillegeist et al. (2004) studied 14 303 different U.S. companies during the 1980 – 2000 period. While they found that the BSM-model was 20% more accurate than O-score they also found that O-score in turn was roughly 33% more accurate than Z-score.

Begley, Ming and Watts (1996) investigated the accuracy of the Z-score and the O-score models using a sample of U.S. companies from the 1980's. They used their data to re-calibrate the models according to the new data and then compared their new models to both the data and to the old models. They found that the O-score had lost some of its accuracy but was still better than both the original Z-score and the re-calibrated versions of both Z- and O-score.

Dichev (1999), whilst seeking to find whether risk of bankruptcy is a systemic risk, also tested the O-score and Z-score models on his data set. He found that both the Z-score and the O-score are fairly accurate but that they become more accurate the higher the risk of bankruptcy. This means that both models are better at successfully identifying companies with a high risk of bankruptcy than identifying those at the other end of the spectrum. Incidentally this makes these models especially useful for a dataset of companies about to enter a financially distressed state – the focus of our work – as those generally have a far higher risk than normal.

Offering further support for the O-score model over the Z-score model is a study by Kumar and Kumar (2012) who tested both models along with Zmijewski's (1984) model. Zmijewski's model is an alternative accounting based model for bankruptcy prediction made to address shortcomings with Altman's Z-score. This model is not as widely used as the Z-score and O-score models. Kumar and Kumar (2012) apply the methodology to a single company, Texmo, over a number of years to see which model would be best able to model the declining status of Texmo. They found that O-score outperforms the other two methods and they recommend O-score as a good basis for this type of analysis.

The studies of Khuntong (1997) and Lawrence, Pongsat, Lawrence (2015) both applied the O-score to Thai companies. Khuntong used data from the 1990's and Lawrence et al. used data from the 2010's. Both found significant support for using Ohlson's O-score. Lawrence et al. argue that this shows that O-score's usefulness is not limited to the U.S. but can be successfully applied in different countries with different systems and traditions.

Pongsatat, Ramage and Lawrence (2004) published a comparison between Ohlson's O-score and Altman's Z-score for bankruptcy prediction and found both useful, with O-score slightly more so, but the difference was not significant.

#### 2.3.4 Summary: the best models for predicting bankruptcy for the Swedish context

Above, we narrowed our search to two models and posed three questions to determine which model would be most useful to Swedish conditions. The first question concerned which model is most accurate. Based on our literature review the O-score is the best candidate. All of the studies included in our review found either no difference or a greater accuracy for the O-score.

The second and third question referred to the age and geographical specificity of the O-score. By analyzing more recent as well as non-U.S. studies using the O-score, we found support for using O-score as a model for predicting bankruptcy.

### 2.4 What are the changes to the reorganization process in the proposed Insolvency Act?

The motivation behind the government study on creating a proposal for a new Insolvency Act (SOU 2010:2) was the weakness of the law both in its formulation and its practical implementation. The central issue motivating the study was the lack of coordination between the reorganization process and the bankruptcy process. If a reorganization fails, the bankruptcy process will not start automatically, instead the creditors have to sue for bankruptcy which may delay the process for weeks. The study decries the lack of good empirical data on the success of reorganizations and cites experts who estimate that 50% of reorganizations end with bankruptcy directly after or soon after the end of the reorganization.

The study (SOU 2010:2) describes three possible alternatives for improving the law on corporate reorganization:

- Merge the law on corporate reorganizations into the bankruptcy law.
- Leave the laws separate but improve coordination between the two separate systems.
- Collect all the rules and regulations into one new law, a unified insolvency law.

The study recommends the third option, a new insolvency law. How would this new law affect corporate reorganizations? We have collected the proposed changes that would affect the reorganization process:

- Collect all insolvency procedures under one law, allowing some within-law flexibility in court proceedings according to the case circumstances.
- Introduce the possibility to reorganize without a court-appointed trustee.
- Place higher demands on applications, on the debtor-creditor relationship and on communication for reorganizations without a court-appointed trustee.
- A more detailed regulation of the purpose and duties of the trustee, reducing confusion.
- That the debtor is responsible for wage obligations for two months after the decision to begin insolvency proceedings. Under the present system it is one month. It is believed that this will help reorganizing companies with liquidity and reaching a quick settlement.
- Introduce the mechanisms for an insolvency procedure without a court-appointed trustee to quickly be converted to a procedure with a court-appointed trustee if necessary.

Optimally, this would mean a quicker insolvency procedure, where companies that lack any potential for survival are denied reorganization, and where the coordination between reorganization and liquidation results in a higher rate of recovery for creditors than today (SOU 2010:2). Key areas are neglected in the study, the report argues that the small companies whose difficulty in managing the cost of a trustee are likely “of little value” and “there is no inherent value in reorganizing a company” (SOU 2010:2). Instead the proposal suggests that small companies use the aforementioned option of the debtors running the reorganization themselves.

From these suggestions we find that the main issues the proposed Insolvency Act will solve are: liquidity issues during the process, the expense for small companies to use the process, the difficulty, undesirability and obtuseness of the procedure and the excessive time it takes.



Transforming these into variables we get the following financial variables:

- **Size:** The cost of the process is not proportional to the size of the company. This means larger companies are better able to bear the costs incurred by the process.
- **Liquidity:** The ongoing cost of paying the trustee and making substantial changes to increase profitability is not cheap. Continuous access to capital is needed to finance a successful corporate reorganization.

And the following non-financial variables:

- **Time in reorganization:** The length of the process is a major hindrance since it runs up costs over time.
- **The desirability of the process:** For the process to be useful it has to attract the right candidates and the best candidates. If the process disincentives good candidates through needless complexity, loss of control or lack of transparency then you will not get good candidates but instead desperate candidates with no good options.

The former two factors will be included in our model, together with the time factor, since it is easily accessible through the court documents and is also accessible to the court making the decision.. We have no way of measuring the fourth factor using our data so we will set it aside for other researchers to investigate.

## 2.5 What differences are there between reorganizations in the U.S. and Swedish contexts?

The U.S. was the first country to implement a law for reorganization (Title 11 USC Chapter 11, 1978) and the government study on insolvency finds that most other countries have used it for inspiration for their own laws (SOU 2010:2). To evaluate the current Swedish framework it is therefore best to compare it with the largest and most successful corporate reorganization system. By contrasting the legal and practical differences we can ascertain some factors behind why the Swedish system is less successful.

Smith and Strömberg (2005) compare the bankruptcy laws between six countries, including the U.S. and Sweden, to assess the efficiency of each country's bankruptcy law.

According to their comparison, Sweden has the following problems:

**Difficulties with coordination among creditors:**

The voting rules play an important part in the implementation of reorganization. In the U.S., the only creditors who are eligible to vote are those deemed "impaired", i.e. those who would receive a payback larger than zero, but smaller than their face value. Creditors who would receive nothing or who would be paid back in full are precluded from voting. Creditors have to be offered a plan that covers their estimated payoff through a liquidation because otherwise, those in favor of the plan could offer some classes of creditors zero payout, effectively shutting them out from voting (Smith and Strömberg, 2005).

To write down the value of secured debt in Sweden would require unanimous approval from the secured creditors. Furthermore, unanimous approval is required from all creditors if their expected recovery ratio is below 25%. There are no changes in voting status based on who is expected to receive payoff (Smith and Strömberg, 2005). This is likely to increase the amount of unsuccessful reorganizations for two reasons: 1. the lack of flexibility in writing down debt and 2. the voting rights of creditors whose debt is either guaranteed or not likely to be repaid means that parties whose interests are not in alignment with the purpose of the reorganization are allowed to interfere with the process.

**Fewer provisions aimed at enhancing liquidity**

One important feature of reorganizations is the avoidance of inefficient asset sales due to buyers being limited by lacking the liquidity to purchase all the assets they desire at any one time. Thus, keeping the company operational during reorganization is important, and the U.S. Chapter 11 procedure offers the greatest flexibility in this regard. Liquidity can also be improved by allowing potential buyers to offer securities instead of cash. This is a feature of the U.S. system but it is not allowed in Sweden, which reduces the access to liquidity for companies during the reorganization process (Smith and Strömberg, 2005).

### **Greater protections for employees**

All bankruptcy systems compared in the study protect their employees, with the U.S. system being the relatively weakest, offering only limited protection (Smith and Strömberg, 2005). In the Swedish bankruptcy system, wages are guaranteed in liquidation, but only for the first month of the liquidation (Lönegarantilagen, 1992:497). Protection of employees is a double edged sword for the reorganization process since downsizing employees might be a key to returning to profitability and the Swedish law precludes the trustee from taking such actions without the approval of the owners.

### **Fewer reorganizations compared to bankruptcies**

The different characteristics of the U.S. and Swedish bankruptcy systems have yielded very different results regarding debtors' choice between reorganization and liquidation in each country. In the U.S., reorganizations represent 28.6% of all bankruptcy filings, whereas in Sweden the same number is less than 1% (Smith and Strömberg, 2005).

These results are in line with the traditional view that the U.S. system is more debtor friendly and more oriented toward reorganization rather than liquidation, and that the Swedish system is more creditor friendly, favoring liquidation rather than reorganization. Additionally, in the U.S. system there are provisions for allowing the company to run its own reorganization. Not being forced to cede some control to a trustee increases the likelihood of owners using the process. These differences make the Swedish process less desirable for the debtor.

### **A slower process**

The U.S. system is often criticized for its very long, drawn-out reorganizations, on average 24 months. This means that many companies, especially smaller businesses, don't have enough resources to follow through with the reorganization. Yet, despite this the process is still a more popular alternative in the U.S. than in Sweden (SOU 2010:2).

To summarize we can identify the following factors from the differences between the U.S. reorganization process and the Swedish reorganization process:

- **Creditor Orientation:** The Swedish system is creditor oriented which means that it favors the creditor over the debtor. The Swedish system is used less in relation to the number of

total bankruptcies than the U.S. system which suggests that debtors in Sweden prefer to use out-of-court measures to save their company or to file for bankruptcy instead. It is likely that debtors will delay longer before using the Swedish system since it favors their creditors and forces them to cede control to a trustee.

- **Liquidity:** The ability of Swedish companies to raise liquidity during the process is far more limited than it is for U.S. companies. This means that Swedish companies need to have higher liquidity than U.S. companies, especially liquidity measured through cash flows which is needed to cover the ongoing expenses incurred during the process.
- **Profitability:** It is harder for the Swedish companies to lay off employees during the reorganization process than it is for U.S. companies. The trustee lacks the authority to implement such measures without owner-approval which means that increasing the profitability of the reorganizing company will be more difficult. Thus having a better reorganization potential for profitability is more important in the Swedish context than it is in the U.S. context.

## 2.6 What do previous studies on corporate reorganizations say?

In a review of earlier studies on corporate reorganization, Routledge and Gadenne (2000) found that they suffer from a lack of theoretical framework. There is only one theoretical model, the *Coalition Behavior Theory*, and that model was developed to assess the decision to reorganize or liquidate, not how to assess the success criteria for a corporate reorganization (Bulow and Shoven, 1978). The Coalition Behavior Theory has since been adapted for use in predicting the success of corporate reorganization but the results are not conclusive.

There have been several exploratory empirical studies on what financial factors can predict the success of a corporate reorganization. The results have been mixed with some commonalities but no clear pattern has emerged. To determine which financial factors to use for our model we will therefore review the results of previous efforts and assess whether it is perhaps an artifact of the underlying theory rather than the factors themselves that has resulted in these mixed results. We will also attempt to apply the Coalition Behavior Theory to the Swedish context and discuss what factors it predicts will be significant in determining our model.

We will discuss the Coalition Behavior Theory and then attempt to apply it in the Swedish context. We will also examine studies that have used the Coalition Behavior Theory as a theoretical framework for their models and see what their results were. Then we will look at the purely exploratory studies to see what factors they found predicted the success of the process. Finally we will summarize our results on what factors will impact the success of corporate reorganizations.

### 2.6.1 Coalition Behavior Theory

Bulow and Shoven (1978) formulated the Coalition Behavior Theory to explain “the bankruptcy choice”. “The bankruptcy choice” refers to the decision to either liquidate or to continue operations for a financially distressed firm. The Coalition Behavior Theory postulates that this decision will be based on the competing interest of different claimants from different groups – stockholders, bondholders, bank lenders – forming coalitions to assert control over the assets and income flows of the firm.

Bulow and Shoven (1978) formulated a theory that the decision whether to liquidate or continue operations would be based on what benefits the different options offered to the claimants and on what different groups of claimants could form coalitions to seize control over this decision when they had a sizeable stake in the outcome of the decision.

The theory was further developed by White (1984, 1989) who argued that owners would ally with the unsecured creditors and form a coalition that had control over the bankruptcy choice.

This coalition would force through a reorganization if there was a sufficient stake for them to do so. Routledge and Gadenne (2000) summarize the five factors determining whether or not they would attempt this as follows:

- Equity commitment: A greater commitment of equity increases the urgency to prevent bankruptcy where that equity would become worthless.
- Leverage position: A company with too much leverage will have secured creditors with claims on all of its assets limiting the ability of the company to sell off assets or use them to secure new debt. This would lower the chance of a successful reorganization and make the option less desirable for the coalition.

- Pay-off: Unsecured creditors are motivated by the low pay-off they would receive from a bankruptcy and are determined to reorganize to increase their rate of recovery.
- Future profitability: If there is no potential for future profitability there is no reason for owners or unsecured creditors to expect any gain from reorganizing the company.
- The amount of secured debt in the company's structure: Secured creditors are likely to seek to protect their secured investments and oppose reorganization attempts.

These suggest two key factors for success of the reorganization:

- Leverage: Lower leverage is better since this means less secured debt and more assets to sell or use to acquire secured debt. It also means fewer creditors with secured debt which increases the chances of a coalition successfully taking charge of the bankruptcy decision.
- Profitability: The potential for future profits and payoff is central to whether unsecured creditors and owners will benefit from an attempt to reorganize the company.

There are significant limitations to applying this model in the Swedish context. From chapter 2.5 we know that there is a crucial difference between the Swedish and the U.S. contexts: In Sweden creditor influence is much stronger. There is no way for a coalition of unsecured creditors and owners to force a reorganization if the secured creditors are unwilling. In the U.S. the secured creditors have no voting rights if their rate of recovery is expected to be 100%. This means that there are substantial marginal cases where unsecured creditors and owners can opt for reorganizations when the secured creditors would have preferred a liquidation. This cannot happen in the Swedish context and so the effect of the proposed Leverage factor is smaller or nonexistent. The Profitability factor is still possibly important in informing the decision to reorganize or liquidate but since the secured creditors hold veto over the process it is less likely to matter.

Instead, in a Swedish context, the Coalition Behavior Theory can be reinterpreted to predict the supremacy of the secured debt holders over the reorganization process. This would mean that a reorganization is only likely when the secured creditors face lower rates of recovery under bankruptcy than under liquidation (based on the pay-off factor outlined above). This means that we expect the main factor in determining whether the reorganization will be successful to be:

- Profitability: The potential for future profit is the most important factor for the secured creditors since it limits what return they can expect from their claims if they negotiate an accord with the company to approve its reorganization.

There has been some studies focusing on using the Coalition Behavior Theory framework to analyze the success or non-success of reorganizations and those aspects of the theory are of relevance here. This tradition started with White (1980) and has continued since with Casey, McGee and Stickney (1986), Hotchkiss (1995) and Routledge and Gadenne (2000). When interpreting their results we have to keep in mind that we have developed our own operationalization of the theory which de-emphasizes the role of leverage in the success of reorganizations since it is unlikely to affect the outcome for secured creditors in Sweden.

### 2.6.2 Studies using the Coalition Behavior Theory to find underlying factors

Casey, McGee and Stickney (1986) tested the model that White (1980) developed based on the Coalition Behavior Theory. They selected 178 companies that had entered reorganization between 1970 and 1981 in the U.S. By using a probit model for their analysis they found strong support for measuring free assets compared to secured assets and profitability as measured by the operating margin the year before filing for bankruptcy. Both turned out to be positively correlated with successfully emerging from reorganization. Their model has an accuracy of 68%.

They found no significant impact from size and equity commitment from management, the other two variables they tested. The study does not examine the viability of the reorganized companies.

Hotchkiss (1995) analyzes the post-reorganization viability of 197 public companies that successfully recovered after a reorganization. His sample consists of successfully reorganized companies in the U.S. who filed for a Chapter 11 reorganization between 1979 and 1988. He uses a logistic regression analysis to test against three different success criteria: Not re-entering financial distress, not having three consecutive years of negative income and finally, no negative industry-adjusted operating margin. He uses size, pre-bankruptcy operating margin and post-bankruptcy improvement in operating margin as his three main financial variables, finding a highly significant (1%-level) support for a negative correlation between size and success and between three years of negative income and success. His other results were weak (10%-level) or non-

significant. The result suggests a larger size as one of the main determinants in post-reorganization viability for public companies. Hotchkiss suggests that this may be due to larger companies being able to sustain several business lines and are able to divest the unprofitable ones during the reorganization to emerge with better profits.

Hotchkiss' study was limited to public companies which, again, limits the ability to compare it to the conditions of the study at hand as our study will include both public and nonpublic companies. In addition, his sample has a much larger average size of companies than ours will have. Nevertheless, we will include the size measure for our post-bankruptcy viability test to see whether or not it is relevant for smaller companies.

Routledge and Gadenne (2000) did a study on Australian companies to determine which opted for reorganization and which opted for bankruptcy and they also attempted to create a model for which of the companies that opted for reorganization were successful and which were not. The second part of the study is of interest to us because it focuses on modelling successful corporate reorganizations. Their theoretical basis is the Coalition Behavior Theory and they select their variables based on that model. Their sample includes 32 Australian companies where an administrator was appointed between 1993 and 1995. They elected to use a logistic regression model, and found that companies that successfully reorganize are more profitable, have greater leverage and greater short term liquidity. Their model was able to correctly predict 87% of successful and unsuccessful reorganizations – by the far the best result amongst the studies included in our review.

Routledge and Gadenne found strong support for the coalition behavior model formulated by White (1984, 1989) but the usefulness of their study is limited due to their small sample of only 32 companies.

### 2.6.3 Empirical Studies

To compare and contrast with the studies based on the Coalition Behavior Theory model we will also review some studies of a purely exploratory nature to find what factors they found significant. Campbell (1996) analyzed what variables best predict success among 121 Chapter 11 reorganizations in the U.S. He used a probit regression model to estimate successful



reorganizations and found significant correlations with four variables: number of secured creditors, a dummy checking for the presence of unencumbered assets, larger firm size, and greater asset profitability. His model had an accuracy of 78.5%.

Campbell's results are mainly related to non-financial variables that are outside the purview of this thesis since we are basing our model on annual report data which does not include information on the number of creditors or the presence of unencumbered assets but we note that he finds significant and strong correlations in his model for larger firm sizes and greater profitability in successfully reorganizing companies. The accuracy of his model is very good even if not quite at the same level as that of Routledge and Gadenne (2000).

Laitinen (2009) evaluated the current state of reorganization research and found support for four main financial factors: the Size, Leverage, Liquidity, and Profitability. In his review of the literature he found limited support for the use of non-financial variables and widespread support for the positive effect of efficiency-oriented actions by management and the success of corporate reorganizations.

Laitinen uses all the 84 Finnish companies that applied for reorganization in the year 2000. Most of his sample firms were very small entrepreneurial firms. His sample companies came from all 16 courts in Finland. Laitinen finds a positive correlation between high leverage, relative profitability and asset turnover and how those relate to successful reorganizations. He finds a negative correlation with the rate of inventory. The overall model based on financial variables is better than chance but only has an accuracy of 66.7%. Laitinen is able to construct a much stronger model by also including non-financial variables, increasing the accuracy to 83.3%. This level of accuracy is strong enough that the model can be adapted to practical use.

Laitinen's results are useful but there are some limitations to his study. His sample is very small, only 84 companies. He suggests that a sample two or three times bigger would be needed to confirm his results. Also, his entire sample is from a single year which means that there is a likelihood that the specific conditions of that year affect his results. Finally he performs no analysis on whether the survivors are viable or whether they are limping along towards their next financial distress. His success with using non-financial factors, including corrective measures by

management, in his model is unfortunately not useful for us since we are limited to the data available from annual reports.

There are two master theses on the subject of analyzing corporate reorganizations in Sweden using financial variables. These provide us with our only empirical data for what factors work under the Swedish corporate reorganization framework.

The first, by Hedin and Johansson (2009), analyzes reorganizations in Stockholm and Göteborg during the period 2000-2007. They have a data sample of 438 companies but they do not separate those whose reorganizations were approved from those who were denied – thereby dramatically lowering the fraction of successful companies. From this group 40 survivors (out of 61) and 40 non-survivors (out of 377) were randomly selected. They used Profitability, Liquidity, Size, and Leverage as their main financial variables. By using t-tests to compare survivors and non-survivors they found a significant negative correlation with short term liquidity. Their methodology differs from other studies in both data collection and analysis (using t-tests to compare groups rather than logistic regression to determine success) in turn limiting the usefulness of their results. Since they analyzed Swedish companies, mostly from the same region as we will be analyzing (75% of their data was from Stockholm) we will use their results for comparison.

Their results are very interesting for our model since they suggest that the main factor determining success in the Swedish corporate reorganization process is poor short term liquidity. Since the process is set up to help companies with poor short term liquidity this is perhaps not completely unexpected but the positive correlation implies that larger short term liquidity problems are better than smaller ones. Since they find no significance for Profitability, Size and Leverage this means that the size of the short term liquidity problem is the sole distinguishing feature that they found between survivors and non-survivors. Profitability not having any correlation with the result seemingly implies that the process saves those with short term problems but makes no distinction on whether they have the ability to generate profits in the future. If short term liquidity remains negative and profitability remains insignificant in our model that would suggest that the Swedish system fails in its stated goal of helping companies with short term liquidity issues and long term profitability potential since it saves companies with short term liquidity issues but does not

distinguish between those with potential profitability and those who lack it. This will lead to many successfully reorganized companies returning to financial distress shortly after leaving the process.

The second master thesis study was conducted by Hermansson and Karlström (2010) who studied 231 Swedish companies entering corporate reorganization during the period 2008-2010. In contrast to Hedin and Johansson (2009) they only included companies allowed to perform a corporate reorganization – the same method used by for example Laitinen (2009). They based their choice of variables on a study of previous research settling on Profitability (as measured by two independent variables), financial measures (four variables), and Size (two variables). Their “financial measures” category corresponds to Liquidity (two variables) and Leverage (two variables). Their statistical model made use of Wald’s test and logistic regression. Their logistic regression found a significant positive correlation with size as measured using logarithmic revenue. Their logistic regression model was able to predict 59.8% of reorganizations.

Similar to most of the other studies there is no examination of the viability of the successful companies. In addition, there is also the possibility that the years they selected affected the result somewhat since the period 2008-2010 coincides with a major financial crisis.

#### 2.6.4 Summary: variables used and countries studied

Based on our literature review we have constructed a table of which variables were used in the studies, which model they used, what country the data was coming from, which year the study was published, and what the final accuracy of their model was.

**Table 1.** A summary of the studies reviewed in this thesis.

<i>Study</i>	<i>Year</i>	<i>Country</i>	<i>Statistical model</i>	<i>Significant variables</i>	<i>Accuracy of the model</i>
Laitinen	2009	Finland	Logistic Regression	+profitability +leverage +turnover –rate of inventory	66.7%
Routledge and Gadenne	2000	Australia	Logistic Regression	+profitability +leverage +short term liquidity	80%
Hedin and Johansson	2009	Sweden	T-test	- short term liquidity	-
Hermansson and Karlström	2010	Sweden	Logistic Regression	+size	59.80%
Casey, McGee and Stickney	1986	The U.S.	Probit Regression	+profitability	68%
Campbell	1996	The U.S.	Probit Regression	+profitability +size	78.50%
Hotchkiss	1995	The U.S.	Logistic Regression	+size	-

The most common statistical model in the studies examined was a logistic regression model and the most successful factors were Profitability, Leverage, Liquidity, and Size. Each of these factors is expected to be positively correlated with successful reorganizations with the exception of short term liquidity where one study shows a positive and one study shows a negative relationship. Since Hedin and Johansson (2009) have based their model on Swedish data we will be using their proposed relationship between Liquidity and successful reorganization.

Laitinen (2009) includes turnover and rate of inventory as two of his factors. Since we find no other support for these two factors and he does not offer any particular argument for their universality we will not include them in the study.

## 2.7 Repurposing the O-score model to predict reorganizational success

Above, we concluded that Ohlson's O-score is a useful measure for predicting bankruptcies. From the comparison with the U.S. in part 2.5 we found that debtors are less likely to use the reorganization process in Sweden because of its creditor-focused orientation. If this means that debtors will delay applying for reorganization until the last possible opportunity that would support using the degree of financial distress to determine who is able to successfully reorganize. If a large Ohlson's O-score accurately predicts financial distress and lesser financial distress accurately predicts successful reorganizations it can be inferred that Ohlson's O-score can be used to predict successful reorganizations.

Ohlson's O-score includes nine variables. The factors they measure are:

- Adjusted size – the size of the company through inflation-adjusted total assets.
- Leverage – the company's leverage through total liabilities divided by total assets.
- % working capital –the company's liquidity through what percentage of its total assets are working capital.
- Inverse current ratio –the company's liquidity through current liabilities divided by current assets.
- Discontinuity correction for leverage – leverage by assessing if the company has negative net book value.
- Return on assets – profitability through the return the company makes on its assets.
- Cash flows to debt ratio – liquidity through the degree by which the company can finance its liabilities with its operational income.
- Discontinuity correction for return on assets – profitability through examining whether the company has been making losses for the last two years.
- Change in net income – profitability through what the relative change in net income has been over the last two years.

From categorizing the O-score variables we note that they fit perfectly into four factors that have already been mentioned in previous research (See section 2.6): Size, Leverage, Profitability and Liquidity. Given the O-score's earlier success in measuring bankruptcies and given that there is a certain overlap with earlier empirical research it seems likely that using these variables will provide

the basis for an accurate model of reorganizational success. If there exists a similar correlation between O-score/bankruptcy and/or O-score/reorganizational success that in turn would suggest that one of the main predictors of success in corporate reorganization is how financially distressed the company is when seeking reorganization. If this theory is true that has wider implications for the courts when deciding who is allowed to reorganize and for the ability of financial analysts to identify when companies should attempt reorganization. That is, the closer the company is to bankruptcy the less likely it is that it will recover even if helped through the reorganization process. Using this theory we would predict that successfully reorganized companies are larger, have greater profitability, have greater liquidity and have to be less levered than their peers.

## 2.8 Summary

We have used four different sources for determining which factors to include in our model

1. The changes suggested by the new Insolvency Act (part 2.2).
2. The differences between the U.S. and Swedish corporate reorganization frameworks (part 2.3).
3. The factors suggested by our application of Coalition Behavior Theory (part 2.6.1) and the factors that have been successfully used in past empirical models (part 2.6.3).
4. The factors that are useful for predicting corporate bankruptcy, through Ohlson's O-score (part 2.7).

To summarize our results:

1. The proposals mainly focus on making the process more attractive to debtors through allowing them to retain control during the process and reducing confusion about the role of the trustee. The move from one to two months paying employee salaries will increase the liquidity of the companies, a factor that the study greatly stresses in reorganizational failure. The opportunity for debtors to run their own reorganization would also reduce the cost, especially for small companies for whom paying the salary of a trustee is very difficult and very negatively impacts their liquidity. Small companies are suggested to suffer disproportionately under the current system due to the large absolute costs in paying for a trustee, which suggests Size as an important and positively correlated factor.

2. Smith and Strömberg's (2005) suggestion that the negotiation between different groups of creditors and the debtors lacks flexibility echoes the criticisms by Becker (2015), that we presented in the introduction, about the Swedish process not distinguishing between those parties who have a stake in the process and those who do not. Another major difference between the two processes is the ability of U.S. companies to raise capital through more easily selling assets. Swedish companies face limitations on sales of their assets that include needing creditor approval for sales and not being allowed to accept securities instead of cash. Since we have already established in part 2.1 that the process can be costly it is likely that the difficulty in securing liquidity could be an important factor behind why the Swedish process is less efficient. This is also affected by the length of the process since costs will accrue over time, especially after the government stops paying employee salaries after the first month. We expect that long term liquidity will have a positive effect on the success rate.

3. Our review of the Coalition Behavior Theory suggests that profitability is the most important factor for successfully reorganizing companies since it is the determining factor for secured debt holders who will be the dominant coalition in the Swedish context. Our review of studies on successful corporate reorganizations suggest that Size, Leverage, Profitability and Liquidity are important factors with some studies emphasizing certain factors and other studies emphasizing others. In the two studies on Swedish data, one found a negative effect from short term liquidity and one found Size to be a significant and positive factor. Profitability and Leverage did not significantly impact success rates in the studies on Swedish companies which could imply that the Swedish process does not distinguish between those with potential profitability and those who lack it.

4. Ohlson's O-score model for predicting bankruptcies involves 9 variables spread over 4 factors: Size, Leverage, Profitability and Liquidity. The O-score model suggests that leverage has a negative impact while the others having a positive impact.

**Table 2.** Summary of literature review.

<i>Source</i>	<i>Factor(s) suggested</i>
Government Report	+Size +Liquidity
Comparison with U.S.	+Liquidity
Studies: Coalition Behavior Theory	+Profitability
Studies: Exploratory empirical studies	+Size -Liquidity (+Leverage +Profitability)
Ohlson's O-score	+Size +Liquidity -Leverage +Profitability

The government report (SOU 2010:2) suggests that the length of the process is detrimental to the success of a reorganization. This issue is also raised by Smith and Strömberg (2005) as something that is widely criticized with the U.S. process (excessive length). Since courts have influence over the length of the process we will include the time in reorganization as a measure in our model. If it is found to be significant it can be included in a model used to evaluate the company when it applies for an extension to its corporate reorganization process.



**Table 3.** Summary of the factors chosen for our study.

<i>Factor</i>	<i>Direction</i>	<i>Proposed effect</i>
Size	+	The cost of the process is not relative to company size because of the mandatory trustee who the company has to pay for. This will make the process relatively much more expensive and difficult for smaller companies.
Liquidity (General)	+	The corporate reorganization process is costly and requires that the company can generate funds to finance the process, either from internal or external sources.
Liquidity (Short term)	-	Companies who are in financial distress but have good short term liquidity are not the intended target for this process and are unlikely to succeed because the process is designed to alleviate problems related to short term liquidity.
Profitability	+	Profitability is one of the factors specifically mentioned in the Swedish law. Companies should have good potential for long term profitability and the process should help realize this potential.
Leverage (Empirical)	+	In our empirical studies we find a positive effect from increased leverage. This suggests that high leverage indicates a good candidate since less levered companies who enter reorganization are likely to have more long term profitability problems.
Leverage (O-score)	-	We expect larger leverage to indicate a greater risk of financial distress. Since a growing leverage ratio indicates that a company is heading towards financial distress and since companies who wait too long to reorganize have lower success rates we expect highly leveraged companies to have a reduced chance of a successful reorganization.

Based on the summary of our factors in table 3 above we expect a successfully reorganized company to be large, with decent mid to long term liquidity but with poor short term liquidity, to have good underlying profitability and to be either highly levered or with a below average level of liquidity. This company enters financial distress because of short term liquidity problems and is able to use its long term liquidity, and its underlying profitability to successfully make an accord with its creditors and to leave the financially distressed state upon exiting the process.

## 2.9 Problem articulation revisited: forming six hypotheses

In the introduction, we stated our first research question to be investigated as:

1. Can a model based on the financial data from Swedish companies be used to accurately predict which companies stand a better chance of reorganizing successfully?

Our second research question is tied to the results from the first and so does not require formulating its own set of hypotheses. Given our literature survey, there is a clear possibility of linking success to four underlying factors, resulting in six distinct hypotheses to be tested for the Swedish condition. Since Swedish companies in reorganization are generally small and non-public, it limits the data available to us and together with our literature survey and analysis in this chapter it leads us to the following hypotheses. The proposed effects of the factors are gathered in Table 3 above.

### 2.9.1 Size

The first hypothesis is supported by three of our four sources for the factors explaining success in corporate reorganizations.

**H1:** Financial variables based on the size factor measuring the absolute size of the company will find a positive and significant correlation between the size of the company and successful reorganization.

### 2.9.2 Leverage

Our second hypothesis is supported by two different factors. Empirical studies find a positive correlation while Ohlson's O-score predicts a negative correlation. We use these contrary claims to form two separate hypotheses to determine which theory best explains the success of corporate reorganizations.

**H2:** Financial variables capturing the leverage factor measuring the leverage of the company will find a positive and significant correlation between the level of debt and successful reorganization.

**H3:** Financial variables capturing the leverage factor measuring the leverage of the company will find a negative and significant correlation between the level of debt and successful reorganization.

### 2.9.3 Profitability

Our third hypothesis is supported by three different sources who all agree that the correlation should be positive.

**H4:** Financial variables capturing the profitability factor measuring the earning potential of the company have a positive and significant correlation with successful reorganization.

### 3.9.4 Liquidity

Our fifth hypothesis is supported by three of our four sources. Two sources (Government Report and O-score) predict a positive correlation and one source (Exploratory empirical studies) suggests a negative relationship.

**H5:** Financial variables capturing the liquidity factor measuring the ability of the company to pay its short term debts and liabilities are positively and significantly correlated with successful reorganization.

**H6:** Financial variables capturing the short term liquidity factor measuring the ability of the company to use readily available assets to pay short term liabilities are negatively and significantly correlated with successful reorganization.

## 3. Methodology

To create a model for predicting successful corporate reorganizations we have to do four things. First we need to gather the data to use as a basis for the model. Secondly we need to decide which variables will best operationalize the factors for predicting corporate reorganization discussed in the previous chapter. Third we will need to choose what model is best for determining the effect these factors have on predicting successful reorganizations in our data. Fourth we have to perform diagnostic tests to make sure that the model is reliable, valid and that it fulfills the required assumptions of the statistical method used to construct it.

### 3.1 Data

#### 3.1.1 Delimitations

On average, 250 companies sought permission for legal reorganization every year from 2008 to 2012 in Sweden (UC.se). The vast majority of these companies were not public companies. The reorganization data for these non-public companies is not publically accessible. To acquire information on which companies filed, which were accepted, which had their reorganization plans approved and the duration of their reorganizations we have to access the relevant court documents. Accessing these documents is not free and access to each document is priced at 8-9 SEK. With a limited budget there had to be compromises made on the length of the time period from which we collected our data and from which district courts we would request them.

There is therefore a possibility of regional effects on the data. To test for these effects we would need a decently sized sample from each district court in Sweden. Since this was not feasible we settled on using a single district court (Stockholm) and instead utilizing a longer time period (five years). The district court in Stockholm handles on average half of all reorganizations in Sweden every year (UC.se). Focusing on this district court will make our model directly applicable to at least 50% of Swedish reorganization filings – a reasonable size to base our recommendations on.

However, this means that the results might be specific to this region. Stockholm has similarities with other regions in Sweden in the sense that many laws and regulations are the same for the whole country, but there may be geographic and demographic differences that impact the companies. For example Stockholm has a generally more educated workforce, a higher GDP per capita and a larger proportion of high technology and multinational companies than other regions (OECD, 2006). This limitation must be kept in mind when appraising the model and our results.

For the given time period we aimed to access the most recent data possible. But as we wanted to evaluate the post-reorganization viability of companies we needed to access data from the year after finishing the reorganization process. This excludes companies still in or entering reorganization in 2015. Ideally we would be gathering ten or 20 years of data, like in some earlier studies (Altman, 1968; Ohlson, 1980), but we had to limit ourselves because of the pecuniary barrier to access. An additional advantage of picking this period is that it is post SOU 2010:2, the government inquiry into the reorganization process and thus allows us to offer a significant new block of information on how the reorganization process has been performing since the study.

All data concerning the companies undergoing reorganization, financial and accounting figures, will be gathered from the Retriever Business database and we will therefore be limited to the data accessible through that database. Retriever Business is the most complete database for small companies accessible to university students at Lund's University.

### 3.1.2 Data Collection

From Stockholm district court we received 214 successful filings for corporate reorganization.

We removed 59 companies because they lacked the necessary data for our analysis, this is because their annual reports were not available. This means we lost 28% of our data. It is possible that there is some common factor among the companies whose data is missing, separating them from the companies whose data was accessible. If this is the case our study will lose some measure of validity. To mitigate this problem we investigated what type of companies these were and found that they were small firms, similar to the ones that remain in the study.

The purpose of our study is to develop a model to measure the survival of a company in some meaningful active form. Therefore we removed companies with zero revenue or zero net sales the year before entering the reorganization process. The purpose of the law on reorganization is to create viable, healthy companies, not to turn them into inactive companies on halt. These two conditions led us to remove 9 inactive companies from our sample and also to reclassify 10 technically successful reorganizations as failed ones.

The financial data of a holding company with zero employees is substantially different from that of other companies and the variables used to evaluate them are very different. We chose to focus on non-holding companies since they make up the vast majority of companies filing for reorganization. We removed the 5 holding companies that were left in our dataset due to this. This means our model will not be applicable on holding companies, something that will affect its usability to practitioners and should be noted if our model would reach a widespread use.

Finally we removed all companies whose reorganizations were approved by the court but denied by their creditors. The purpose of our model is to assist the courts in deciding which companies to accept and which to reject. The court's main priority will be to assess which companies have the potential to become viable whilst the priorities of creditors may differ. The reorganization process can be long winded and risky and the creditors may prefer liquidating the company immediately to minimize risk. This led to the removal of a further 32 companies.

This left us with 109 companies in our sample. Of these 109, 30 are survivors (~27%). The size of our sample is similar in size to those of Laitinen (2009), Routledge and Gadenne (2000), Campbell (1996), Hotchkiss (1995) and Casey, McGee and Stickney (1986).

## 3.2 Variables

In our literature review we brought forth four factors based on our review of theories and empirical research on reorganizational success. We also formulated a series of hypotheses based on this review and to test our hypotheses we first need to operationalize our factors into variables, that can be extracted from the companies' annual reports and that can be used for our planned model.

**Table 4.** The variables extracted from Ohlson's O-score model.

<i>Variable</i>	<i>Initial</i>	<i>Equation</i>
LOG Total Assets	LOGTA	$\log\left(\frac{\text{Total Assets}}{\text{GNP} - \text{deflator}}\right)$
Total Liabilities to Total Assets	TLTA	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$
Working Capital to Total Assets	WCTA	$\frac{\text{Working Capital}}{\text{Total Assets}}$
Inverse Current Ratio	CLCA	$\frac{\text{Current Liabilities}}{\text{Current Assets}}$
Total Liabilities > Total Assets	NEGOE	Dummy: 1 if Total Liabilities > Total Assets
Net Income to Total Assets	NITA	$\frac{\text{Net Income}}{\text{Total Assets}}$
Cash Flows to Total Liabilities	CFTL	$\frac{\text{Cash Flows}}{\text{Total Liabilities}}$
Net Loss Last Two Years	INTWO	Dummy: 1 if Net Loss Last Two Years
Change in Net Income	CHIN	$\frac{\text{Net Income}_t - \text{Net Income}_{t-1}}{ \text{Net Income}_t  +  \text{Net Income}_{t-1} }$

### 3.2.1 Dependent Variable: Viability measured through Ohlson's O-score

First let us turn to how we calculate the O-score for each company. How each factor is calculated can be found in Table 4 above. There is one exception which will be made for one variable in our calculation of O-score compared to when we use it as an independent variable; LOG Total Assets. When we use LOG Total Assets in our descriptive statistics and also for our regression, we will use the base year for the GNP-index in 2009. The reasoning behind this is that it is the most intuitive choice as well as the easiest to replicate. But, when we calculate a company's O-score with the model in Equation 1 below, we will use the same base year for our LOG Total Asset as was done in Ohlson (1980), which was 1968 in his data. In addition to this, the model was designed for dividing by the GNP of the previous year to that of the annual report the Total Assets value

came from, to make the prediction model usable in real time. To use 1968 in the U.S. as base year for this GNP-index, we will use the implied GNP-index in the U.S. 2008, translate that to what it was worth in Sweden in 2008, and then, for our time period, use the Swedish nominal GNP to calculate the rest of the years. We will calculate LOG Total Assets this way only when calculating O-scores.

**Equation 1.** The calculation of Ohlson's O-score.

$$O - score = -1.32 - 0.407LOGTA + 6.03TLTA - 1.43WCTA + 0.0757CLCA \\ - 1.72NEGOE - 2.37NITA - 1.83CFTL + 0.285INTWO - 0.521CHIN$$

(Ohlson, 1980)

### Criteria for viability

If a company scores over 0.5 on the O-score model we will define it as viable. In Ohlson's O-score model a score over 0.5 predicts that the company will likely go bankrupt, and a score under 0.5 predicts that it is unlikely to go bankrupt (Ohlson, 1980). This will be translated into a dependent dummy variable which takes on the value 1 if the company is viable according to its O-score after reorganization, and 0 if it is not.

### Probability of Financial Distress

The O-score can be transformed into the company's probability of financial distress using a logistic transformation. We will use this transformed version of the O-score to create more intuitive descriptive statistics and comparisons. See Equation 2 for how the transformation is done.

**Equation 2.** The equation for transforming O-score into a probability of financial distress

$$Probability\ of\ Financial\ Distress = \frac{e^{O-score}}{1 + e^{O-score}}$$



### 3.2.2 Dependent Variable: Successful reorganization

Our second dependent variable is a dummy which takes the value of 1 if the company can be considered to still be in operation (as defined in 3.1.2 Data Collection), based on the annual report from the year after finishing reorganization.

### 3.2.3 Explanatory Variables derived from Ohlson's O-score

In our theoretical framework we developed the hypotheses that some or all of the variables from Ohlson's O-score will be significantly correlated with reorganizational success. At the same time they are also variables fitting with the four factors that were brought forth from our literature review. The four variables were Size, Leverage, Profitability and Liquidity. How to calculate the variables from O-score is presented in 3.2.1.

### 3.2.4 Size

The first factor is Size, but how do we measure size? According to the Swedish *Limited Company Law* (Aktiebolagslagen), there are three variables that separate small from large companies. These are: Number of Employees, Total Assets, and Net Sales. There is a limit for each category and if the company surpasses this limit in more than one category it is defined as a large company with a different set of legal standards (SFS 2005:551). We are already including logarithmic GNP-deflated total assets on the basis of our O-score model and we will now add the other two measurements as well to capture different aspects of company Size. These variables are GNP-deflated.

Net Sales is limited as a measure of size as it does not measure all different types of income. We will therefore also use revenue, it has the added benefit of being a better variable for international comparison as it does not account for VAT or taxes. Revenue is also used by the Swedish Statistics (SCB) and the Swedish Agency for Economic and Regional Growth (Tillväxtverket).

For Net Sales we will be using a GNP-deflator to adjust revenue and total assets for inflation. Our base year will be 2009 since that is first year from which data was collected.

## Transformations

Due to the nonlinear nature of our variables we logarithmically transform these variables, except for Number of Employees.

### 3.2.5 Leverage

The second factor, *leverage*, tells us how the company finances its assets. This factor consists of two components; equity and debt. We will be including two leverage variables from the O-score model: Leverage Measure and the Discontinuity Correction for Leverage.

In addition to these two variables, accounting for the leverage and for having a negative book value, we are also including the Equity Ratio as another way of estimating the leverage of the company since it measures the value of equity as a proportion of total assets.

**Equation 3.** The equation we will use for calculating the leverage variable Equity Ratio.

$$\text{Equity Ratio} = \frac{\text{Book value of Equity} + \text{Untaxed Reserves} * (1 - \text{Tax rate})}{\text{Total Assets}}$$

Because the tax rate for Swedish companies has been changing during the sample period, we have used different tax rates depending on in which year the annual report ended. Below, in Table 5 you can find the time periods and their respective tax rates.

**Table 5.** The different tax rates used for annual reports depending on in which year they ended.

<i>Annual report ending</i>	<i>Tax rate</i>
2008 and earlier	28%
2009-2012	26.3%
2013 and later	22%

### 3.2.6 Profitability

*Profitability*, our third factor, concerns the ability of a business to earn a profit. How profitable a company is can be measured in a variety of ways, reflecting different aspects of their business.

We are using three different measurements from the O-score model. Discontinuity correction for return on assets which is a dummy variable with a value of 1 if the company has had negative net results for the last two years. Change in net income measures the speed at which net income has been changing over the last two years. Both are measures of whether or not the company has declining profitability.

According to Whiting (2014), a good variable to measure a firm's profitability is Return on Capital Employed. Return on Capital Employed measures how efficiently a company uses its employed capital to generate returns.

**Equation 4.** The equation for calculating the profitability measure Return on Capital Employed.

$$\text{Return on Capital Employed} = \frac{\text{EBIT} + \text{Financial Income}}{\text{Book Value of Equity} + \text{Bonds} + \text{Noncurrent Liabilities to Credit Institutions} + \text{Other Noncurrent Liabilities} + \text{Current Liabilities to Credit Institutions}}$$

To assess the profitability of their core business we are also including two common measures of the margin on their sales, Profit Margin and earnings before interest, taxes, depreciation and amortization (EBITDA) margin:

**Equation 5.** The equation for calculating the profitability measure Profit Margin.

$$\text{Profit Margin} = \frac{\text{Net Income}}{\text{Revenue}}$$

**Equation 6.** The calculation of the profitability ratio EBITDA Margin.

$$EBITDA \text{ Margin} = \frac{EBITDA}{Net \text{ Sales} + Other \text{ Sales}}$$

Using these six measures we should be able to capture the underlying profitability of a corporation as well as its recent profitability, allowing us to test the effect of profitability from two different angles, the underlying profitability of the business based on total assets, capital employed, revenue, and EBITDA.

### 3.2.7 Liquidity

*Liquidity*, finally, refers to a company's ability to meet its short term obligations. It is an important variable in regards to bankruptcy and financial distress, because as inability to pay short term liabilities is often the triggering act for entering the financially distressed state. We are using three of the variables from the O-score model: Cash flow to Total Liabilities, Working Capital divided by Total Assets and Inverse Current Ratio. In addition there are two commonly used measurements that we can use to complement these two. The Quick Ratio measures the short term liquidity of the company and constitutes a good alternative measure to Inverse Current Ratio. Second, Interest Coverage EBITDA measures the ratio of EBITDA to interest payments, which is another way of calculating how much of earnings are sent off to pay for the company's debt. Thus we have three measures of long term liquidity (Working Capital/Total Assets, Interest Coverage EBITDA and Cash Flow to Total Liabilities) and two short term measures (Quick Ratio and Inverse Current Ratio)

**Equation 7.** The calculation of the liquidity measure Quick Ratio.

$$Quick \text{ Ratio} = \frac{Current \text{ Assets} - Inventory}{Current \text{ Liabilities}}$$

**Equation 8.** The calculation of the liquidity measure Interest Coverage EBITDA.

$$Interest \text{ Coverage EBITDA} = \frac{EBITDA + Financial \text{ income} - Income \text{ from investments in subsidiaries and associates}}{Financial \text{ Costs}}$$

### 3.2.8 Time in reorganization

To control for the impact of differing reorganization processes between different countries as described in our theoretical framework we will be including the number of days from when the reorganization was approved by Stockholm district court to the day it was terminated, either successfully or unsuccessfully. It will be included as a control variable as it is not directly related to any particular factor.

### 3.2.9 Summary

The variables that will be tested are presented in Table 6 below.

**Table 6.** The independent variables extracted from the four factors we want to measure, Size, Leverage, Profitability and Liquidity, plus the control variable Days in Reorganization.

<i>Variable</i>	<i>Initials</i>	<i>Type</i>	<i>Factor</i>
Number of Employees	EMPL	Continuous	Size
LOG Total Assets	LOGTA	Logarithmic	Size
LOG Net Sales	LOGNS	Logarithmic	Size
LOG Revenue	LOGREV	Logarithmic	Size
Total Liabilities to Total Assets	TLTA	Ratio	Capital Structure
Total Liabilities > Total Assets	NEGOE	Dummy	Capital Structure
Equity Ratio	EQTA	Ratio	Capital Structure
Net Loss Last Two Years	INTWO	Dummy	Profitability
Change in Net Income	CHIN	Ratio	Profitability
Net Income to Total Assets	NITA	Ratio	Profitability
Profit Margin	NIRE	Ratio	Profitability
EBITDA Margin	EBITDARE	Ratio	Profitability
Return on Capital Employed	ROCE	Ratio	Profitability
Cash Flows to Total Liabilities	CFTL	Ratio	Liquidity
Working Capital to Total Assets	WCTA	Ratio	Liquidity
Inverse Current Ratio	CLCA	Ratio	Liquidity
Quick Ratio	QUICK	Ratio	Liquidity
Interest Coverage EBITDA	INCO	Ratio	Liquidity
Days in Reorganization	DAYS	Continuous	Control Variable

### 3.3 Models

#### 3.3.1 Deciding which model to use

In 2.6.3 we summarized what models have been used in previous studies seeking to construct a model to predict successful reorganizations. The dominant model used in those studies was the logit regression model with two other studies using the probit regression model which is similar in assumptions and structure to the logit model. A linear model is not useable for several reasons:

1. Our data is not normally distributed (assumption of linear regression, not necessary for logistic regression)
2. Our dependent variables are binary dummy variables. Possible with logistic regression, not possible in linear regression due to linear regressions going above 1 and below 0 (Brooks, 2014).

A linear regression is not useable on our data so therefore we will use a binary logit model instead. We choose a logit model over probit because the differences between them is small and the majority of earlier studies chose logit.

There are a few additional considerations when using a logit model for our data. The first is that logit needs a large number of observations for each independent variable included in the model. 10 is the number usually suggested but research has shown that the difference between using 5 observations and 10 observations per variable is negligible (Peduzzi et al., 1996; Vittinghoff and McCullough, 2007). Using viability as measured by O-score as defined in 3.2.1 under Criteria for Viability, would thus correspond to only 5 observations. This is obviously not enough, and because of this we cannot use this model.

The equation for the logit model:

**Equation 9.** The equation used for estimating the logistical model (Brooks, 2014).

$$P_i = \frac{1}{1 + e^{-(\beta_1 + \beta_2 x_{2i} + \dots + \beta_k x_{ki} + u_i)}}$$

### **Interpreting the results**

When interpreting the results of a logistic regression some special care must be taken. Hypothesis tests can be used as one normally would, but when it comes to interpreting the coefficients yielded by the model, one needs to be aware of the equation of the regression, as shown above in Equation 9. The implication this has for the interpretation of the coefficients is that the slope is not represented by a straight line, but by an S-curve. This means that each increase is not linear but rather depends on where on the S-curve the increase happens (Brooks, 2014).

### **3.3.2 Selecting the Variables**

Our data only includes 109 observations. It is recommended to only use one variable for every 5-10 observations (Of the less frequent outcome, for us it is Success  $N=30$ ) which means that we should limit our final model to a range of 3-6 variables. To determine what variables to include we will use two methods: 1. A multicollinearity test to determine which variables have to be excluded for reasons of collinearity. 2. A backwards stepwise likelihood ratio test to determine which variables provide the strongest model.

#### **Multicollinearity test**

We will test the independent variables for near multicollinearity since correlated variables can give the coefficients higher standard errors and give a regression that seems to fit better than it actually does. Multicollinearity violates the assumptions of the logit model. This is because the difficulty for the model to assess which of the highly correlated variables supplies the explanatory power (Brooks, 2014). Near multicollinearity is present when two or more of the independent variables in an estimation are nearly correlated with each other.

We will use Pearson's  $r$  to determine the correlations between the variables that will be used in this model. See Equation 10 for how we will calculate Pearson's  $r$ , where  $x$  and  $y$  are two of the explanatory variables.

**Equation 10.** The Pearson's r equation.

$$r = r_{xy} = \frac{\sum x_i y_i - n \bar{x} \bar{y}}{\sqrt{\sum (x_i^2 - n \bar{x}^2)} \sqrt{\sum (y_i^2 - n \bar{y}^2)}}$$

According to Gujarati and Porter (2008), the limit for strong correlation is drawn at an absolute value of over 0.8. If the correlation between two variables is this high, it would give the regression higher standard errors and an illusory better fit but invalidate the results from the regression. Instead one of the variables in question should be dropped from the equation if it can be done in a way justified by theory (Brooks, 2014).

For variables with correlations above this limit we will run the stepwise backwards likelihood ratio test and determine which variable in each pair provides the greatest significance and explanatory power and remove the other variable from the final model.

### **Backward stepwise likelihood ratio**

To assess which combination of variables will provide us with the best model, we will use a backward stepwise logistic regression with the likelihood ratio method. This method starts off including all variables, less the ones removed for multicollinearity issues, and then works backward to eliminate variables that are not significant. Where the backward elimination model would stop when the model contains only significant variables, backward stepwise further alternates between forward entering variables and backward eliminating them until the removal or addition of a variable can no longer significantly contribute to the model. The aim of this method, in relation to other stepwise methods, is to avoid the problems that might occur when stepwise adding variables that might render already added variables non-significant (Garson, 2016). An alternative to using a likelihood ratio is using the Wald's test, but Meeker and Escobar (1995) discuss the choice between using a likelihood ratio and Wald's test method for computing the backward stepwise elimination, and cite many papers showing an advantage in using the likelihood ratio method. It would therefore be better to estimate the model using the likelihood ratio.



There are critical voices raised among some statisticians about the stepwise method. The criticism regards the way the estimation is arrived at, through the iteration over a list of variables to arrive at a best fit. These critical voices claim that a model arrived at through the use of this method needs to have its p-values adjusted upwards in comparison to a model purely theoretically arrived at (Brooks, 2014). However using this method is still best practice and has been used by previous studies (Laitinen, 2009; Routledge and Gadenne 2000).

### 3.3.3 Mean comparisons

Since we cannot use the viability dependent variable with our Logit model we will settle for a mean comparison to determine if there have been significant improvements in 1) the O-score values of the surviving companies and 2) the “Viable” dummy. Because our sample does not meet the assumption of a normal distribution, we cannot use the traditional matched pair t-test (Brooks, 2014).

Instead we will use a non-parametric test called Wilcoxon matched-pairs signed ranks test. This test has the null hypothesis of there not being a difference between the pairs. It is useable on matched pairs where the sample is random, the data consists of pairs and the data is not nominal (Gibbons and Chakraborti, 2011).

## 3.4 Diagnostics

The size of our sample demands careful testing to make sure that our model is reliable and valid.

### 3.4.1 Diagnostic Tests for Validity

To use our model we need to test it to make sure that the variables chosen actually explain the variance in the data. For this purpose we are including three different methods of evaluating the fit of the model to the data: R-Squared, Hosmer-Lemeshow test and Bootstrapping.

### **R-Squared**

We will use a pseudo-R-squared as a goodness of fit for our model. A pseudo-R-squared is made for linear binary dependent variable models and ranges from 0 to 1, where 0 indicates a 0% fit and 1 indicates a perfect 100% fit (Brooks, 2014). We will use the pseudo-R-squared as defined in Domencich and McFadden (1975). This pseudo-R-squared is called McFadden R-squared (Brooks, 2014), and will be used to further interpret the fit of our model. According to McFadden, an R-squared statistic in the range from 0.2 to 0.4 suggest a good fit to the data (Louviere et al., 2000).

To complement our McFadden R-squared we will be using the two complementary R-squared measures used by Laitinen (2009): Nagelkerke R-squared and Cox and Snell R-squared.

### **Hosmer-Lemeshow test**

The Hosmer-Lemeshow test is used to assess the goodness of fit of the estimated equation across different deciles of the sample. It will assess how well the model fits ten different subgroups from our sample. The null hypothesis of the Hosmer-Lemeshow test is that the model fits well, meaning a low p-value in this test indicates that the model does not fit the data. A higher value is better for the Lemeshow test and it can be used to assess the validity of the model (Lemeshow, Sturdivant and Hosmer, 2013).

### **Bootstrapping**

According to the findings in Steyerberg et al. (2001), the bootstrapping method for internally validating a prediction model is amongst the most effective. When performing bootstrapping on our model, we will iterate over different, randomly generated combinations of our sample to arrive at new models which best describe that randomly generated sample until we have iterated through 1000 random samples, and will then average the results of all these simulations to a new, more robust model. This will give us information about whether the coefficients we arrive at can handle different values than those in our sample. If some of the coefficients lose their significance when

we bootstrap our data, it will tell us that this variable was not really significant for measuring success in reorganizations.

### 3.4.2 Diagnostic Tests for Reliability

Because the sample of our test is so small, and the performance of a predictive model is hard to determine by only testing it on the original sample used to create it, we will use a different internal validation technique to test the model's accuracy.

#### **Prediction accuracy on estimation data**

To assess the accuracy of our model we will apply the model to the estimation data so we determine the accuracy of the model as applied to the determination sample. The cutoff point for the model is what value on the Success variable is judged to indicate a good candidate for reorganization. This cutoff does not have to be placed at Success = 0.5, instead when applying the model the cutoff point for the dependent variable will be decided based on the cutoff point with the greatest accuracy.

#### **Cross-Validation (k-fold)**

We will use a method of internal validation called cross-validation. Cross-validation works by dividing the sample into  $k$  different - randomly generated - folds, and then developing a prediction model for each based on the subjects in them, and then validating this model against the data in the other  $k-1$  folds, to see how well each fold can predict the distribution of the other subsamples. The prediction accuracies will then be averaged for all  $k$  models. This test can then be repeated  $n$  number of times, which will then also contribute to an average accuracy, to make the test even stronger. This will tell us how well our data might apply on the population; if the predictions from the folds are not accurate then our model might not be applicable on the population. According to Kohavi (1995), previous research is not clear about how many folds should be made for optimal performance, but for a small sample like ours it is suggested that we use fewer folds but run the test several times and average the results. Because of the small sample size we will make use of three folds. To partly compensate for the low amount of folds, Kohavi (1995) suggests that the results of the test will be better with more iterations, therefore we will do 10 iterations of the test

and average the results. Based on the findings in Kohavi (1995), it is suggested that Cross-Validation is the strongest accuracy estimation method when compared to bootstrapping validation or leave-one-out validation.

## 4. Results

### 4.1 Descriptive Statistics

**Table 7.** Descriptive statistics for all 109 companies in the sample one year prior to their reorganization. All ratios are shown as 1 = 100%.

<i>Factor</i>	<i>Variable</i>	<i>Mean</i>	<i>Median</i>	<i>Min</i>	<i>Max</i>	<i>Std. Dev.</i>
Size	Number of Employees	23.8	12	0	167	32.4
Size	Total Assets (thousand SEK)	45 229	5 239	153	3 587 375	343 052
Size	Net Revenues (thousand SEK)	40 244	16 740	77	744 160	88 346
Size	Revenue (thousand SEK)	40 808	16 829	340	745 529	88 734
Leverage	Total Liabilities to Total Assets	1.3	1.0	0.4	9.5	1.1
Leverage	Total Liabilities > Total Assets	0.48				
Leverage	Equity Ratio	-0.32	0.01	-8.46	0.59	1.08
Profitability	Net Loss Last Two Years	0.57				
Profitability	Change in Net Income	-0.3	-0.5	-1.0	1.0	0.6
Profitability	Net Income to Total Assets	-0.6	-0.3	-9.4	0.1	1.1
Profitability	Profit Margin	-0.21	-0.10	-2.99	0.63	0.41
Profitability	EBITDA Margin	-0.13	-0.06	-2.64	0.69	0.35
Profitability	Return on Capital Employed	0.03	0.02	-16.68	14.06	3.63
Liquidity	Cash Flows to Total Liabilities	-0.2	-0.1	-1.6	2.0	0.4
Liquidity	Working Capital to Total Assets	-0.3	-0.2	-4.7	0.5	0.7
Liquidity	Inverse Current Ratio	1.67	1.27	0.42	9.08	1.32
Liquidity	Quick Ratio	0.61	0.60	0.02	1.90	0.36
Liquidity	Interest Coverage EBITDA	-0.06	-0.05	-2.48	4.31	0.56
Control	Days in Reorganization	219.3	207	22	497	110.5

#### 4.1.1 Companies undergoing reorganization

##### Size

The sample of companies undergoing reorganization consists of 109 companies in total, divided into two groups, survivors (30) and non-survivors (79). In the year prior to their reorganization, the average company had 24 employees, total assets of 45.2 MSEK and Net Sales of 40.2 MSEK. The median company has 12 employees, total assets of 5.2 MSEK and Net Sales of 16.7 MSEK. By the definitions in the Swedish Limited Liability Company Law noted earlier neither the average

nor the median company meets the definition of a large company. The difference between the smallest and the largest companies is huge, the largest company is over 50 times larger than the median company (as measured by Total Assets or Net Sales).

### **Leverage**

The Equity Ratio and Working Capital to Total Assets measures show that the companies are highly levered with the leverage discontinuity dummy showing us that 48% of companies have negative book value.

### **Profitability**

Our net loss dummy shows that 57% of the companies in the sample have suffered losses for the last two years running. Change in Net Income shows that both our average and median companies have rapidly declining profits. Our three different ratios on returns; Return on Total Assets, Profit Margin and EBITDA Margin are all negative, showing that our companies on average are failing at every step of the process. Return on Capital Employed is 3% on average with 2% as median. This is extremely low and shows the inefficient use of employed capital.

### **Liquidity**

Liquidity measured by the Quick Ratio shows that assets covers a mere 61% of liabilities on average and 60% for median Quick Ratio. Cash flows to total liabilities and interest coverage EBITDA both show little ability to cover interest payments or repay the liabilities.

### **Time in reorganization**

Companies spent on average 219 days in reorganization with a median of 207. This means that the median company stays in the process for 3 three month cycles.

#### 4.1.2 Companies which survived their reorganization

Looking at descriptive statistics for the group of 30 companies which survived, we compare their variable values from the latest annual report they had available prior to their reorganization and the first annual report available after their reorganization.

**Table 8.** Descriptive statistics from the year prior to and the year after reorganization for the 30 companies surviving their reorganization.

<i>Variable</i>	<i>Mean</i>			<i>Median</i>	
	<i>Before</i>	<i>After</i>	<i>Diff</i>	<i>Before</i>	<i>After</i>
Number of Employees	18.7	11.6	-38%	14	6.5
Total Assets (thousand SEK)	135294	16963	-87%	5476	4054
Revenue (thousand SEK)	67945.7	31257	-54%	17905	9646
Profit (thousand SEK)	-28500	-1283		-1966	179.5
Equity Ratio	-0.81	-0.02		-0.16	0.13
EBITDA Margin	-0.22	0.03		-0.07	0.04
Quick Ratio	0.51	0.85		0.56	0.66
Interest Coverage EBITDA	-0.08	0.13		-0.04	0.05

We can see that the variables measuring their Size, Number of Employees, Total Assets and Revenue have all shrunk by considerable amounts. They have on average reduced their workforce by 38%, their Total Assets by 87% and their Revenues have shrunk by 54%. Their profits are still negative on average, but going by the median profit for the survivors we can see that it has gone from negative to positive, meaning that more than half of the successfully reorganized companies are profitable after their reorganization. Examining the underlying data we found that 26 of 30 (87%) of these companies had net losses in the year prior to their reorganization, and that number had decreased to 12 of 30 (40%) after their reorganization.

### 4.1.3 O-score values

**Table 9.** Descriptive statistics for the bankruptcy risks given by transforming the O-score values. Divided over three groups; all companies before reorganization (109 observations), and the survivors (30 observations) before and after their reorganization.

<i>Group</i>	<i>Mean</i>	<i>Median</i>	<i>Min</i>	<i>Max</i>	<i>Std. Dev.</i>
All (Before)	95.0%	98.9%	38.1%	100%	10.7%
Survivors (Before)	96.7%	98.7%	84.0%	100%	5.0%
Survivors (After)	81.8%	92.9%	0.0%	100%	24.6%

The bankruptcy risk for all companies in the sample is very high. Looking at the companies before they went into reorganization, we can see that the survivors had a slightly higher mean bankruptcy risk than the total sample.

Comparing the survivors before and after reorganization we find that the mean has decreased somewhat, from 97.6% to 81.8%. In other words, the group of companies that underwent reorganization successfully have lowered their risk of bankruptcy by almost 16 percentage points on average.

Looking at the minimum values, we see that it was 84.0% for survivors, before reorganization, and 0.0% after, this means that according to the O-score model some companies have completely exited financial distress after completing their reorganization. Examining the data, we found this to be a single company (Lennart Björklund Bygg AB).

## 4.2 Tests on descriptive statistics

**Table 10.** Results from the Wilcoxon test.

<i>Group</i>	<i>Wilcoxon test</i>	
	<i>Z</i>	<i>Asymp. Sig. (2-tailed)</i>
O-score: [After] - [Before]	-2.993	0.003
O-score < 0.5: [After] - [Before]	-2.236	0.025



#### 4.2.1 Has the number of companies with a good O-score value increased?

In the group of all 109 companies, there were 4 companies with O-scores value below 0.5, which would have indicated that they were viable. Among the 30 surviving companies, this number increased to 5, these 5 include 0 of the initial 4. The Wilcoxon test compares the 30 survivors before and after their reorganizations and rejects the null hypothesis, meaning that there is a significant difference between before and after, both in absolute terms, the O-score of each surviving company, and in terms of how many viable companies are in the groups.

### 4.3 Logit Model

#### 4.3.1 Selecting the Variables

##### **Multicollinearity test**

The output from the multicollinearity tests made between all the 19 independent variables can be found in Appendix B. Some of the size variables are strongly collinear with each other, LOG Total Assets, LOG Net Sales and LOG Revenue are all collinear.

Among the leverage variables there is also collinearity present; Total Liabilities to Total Assets being highly collinear with Equity Ratio. Total Liabilities to Total Assets is highly collinear with Working Capital to Total Assets, and Working Capital to Total Assets is equally collinear with Equity Ratio. The three variables Total Liabilities to Total Assets, Working Capital to Total Assets, and Equity Ratio are also highly collinear with the profitability variable Net Income to Total Assets. The profitability variables Profit Margin and EBITDA Margin were also found collinear.

##### **Backward Stepwise Regression**

After testing all different possible combinations of the variables which did not include two collinear variables, we arrive at the following list of variables for our backwards stepwise likelihood ratio logistic regression (Table 11).

**Table 11.** The independent variables less those omitted due to multicollinearity issues. A total of 13 independent variables including at least one from each factor and the control variable.

<i>Variable</i>	<i>Measure</i>
Number of Employees	Size
LOG Revenue	Size
Total Liabilities > Total Assets	Capital Structure
Equity Ratio	Capital Structure
Net Loss Last 2 Years	Profitability
Change in Net Income	Profitability
Profit Margin	Profitability
Return on Capital Employed	Profitability
Cash Flows to Total Liabilities	Liquidity
Inverse Current Ratio	Liquidity
Quick Ratio	Liquidity
Interest Coverage EBITDA	Liquidity
Days in Reorganization	Control Variable

After doing a backward stepwise regression on the independent variables in Table 11, we arrived at the most significant model possible using our variables. The model can be found in Table 12 below.

**Table 12.** The model generated by a combination of removing variables with multicollinearity issues and performing a backward stepwise regression.

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>z-Statistic</i>	<i>Prob.</i>
Constant	-9.39	2.758	-3.41	0.0007
Number of Employees	-0.02	0.012	-1.73	0.0844
LOG Revenue	1.64	0.611	2.69	0.0072
Inverse Current Ratio	0.81	0.264	3.05	0.0023
Net Loss Last Two Years	1.20	0.572	2.10	0.0358
Change in Net Income	0.76	0.433	1.76	0.0777

We find that the final model consists of Number of Employees, LOG Revenue, Inverse Current Ratio, Net Loss Last Two Years and Change in Net Income. The Number of Employees and the Change in Net Income are significant at the 10%-level, the Net Loss Last Two Years variable is

significant at the 5% level and the LOG Revenue and Inverse Current Ratio variables are significant at the 1% level.

### 4.3.2 Validity

**Table 13.** The pseudo R-squared values for the logistic regression model and the results from the Hosmer-Lemeshow test.

<i>R-squared</i>		<i>Hosmer-Lemeshow test</i>	
McFadden	0.219	Chi-square	2.834
Cox & Snell	0.227	Sig.	0.944
Nagelkerke	0.328		

Our R-squared values range from 0.219 (McFadden) to 0.328 (Nagelkerke). In our method discussion we decided that a McFadden R-squared of between 0.2 and 0.4 show that the model is a good fit for the data. With a McFadden R-Squared of 0.219 we are within that range. The R-squared is supported by the other two methods which both estimate higher pseudo-R-squared values. Our Hosmer-Lemeshow test has a p-value of 0.944 which indicates a very good fit of the model to the data.

**Table 14.** The results from the bootstrapping test with 1000 iterations.

<i>Variable</i>	<i>B</i>	<i>Bias</i>	<i>Std. Error</i>	<i>Sig. (2-tailed)</i>	<i>95% Confidence Interval</i>	
					<i>Lower</i>	<i>Upper</i>
Constant	-9.39	-0.74	2.59	0.01	-15.58	-5.43
Number of Employees	-0.02	.00	0.01	0.02	-0.05	0.00
LOG Revenue	1.64	0.12	0.58	0.01	0.68	2.94
Inverse Current Ratio	0.81	0.06	0.25	0.01	0.36	1.45
Net Loss Last Two Years	1.20	0.11	0.62	0.02	0.17	2.81
Change in Net Income	0.76	0.02	0.61	0.17	-0.69	2.16

The results from the bootstrapping test (Table 14) indicates that the coefficients retained significance for all of the variables in the test, except for Change in Net Income, which went from <10% significance to being non-significant. Change in Net Income is not supported by the

bootstrap test and we will treat it as non-significant. In Table 15 below we show the final direction and significance of our variables.

**Table 15.** The signs for the output variables' coefficients and their respective significance levels.

<i>Variable</i>	<i>Measure</i>	<i>Direction</i>	<i>Significance Level</i>
Number of Employees	Size	-	10%
LOG Revenue	Size	+	1%
Inverse Current Ratio	Liquidity	+	1%
Net Loss Last Two Years	Profitability	+	5%
Change in Net Income	Profitability	+	-

#### 4.3.3 Reliability

**Table 16.** The results from our classification tests with different cut off points.

<i>Cut Off</i>	<i>Type I Error</i>	<i>Type II Error</i>	<i>Accuracy</i>
0.1	69.6%	6.7%	47.7%
0.2	41.8%	20.0%	64.2%
0.3	21.5%	33.3%	75.2%
0.4	11.4%	43.3%	79.8%
0.5	6.3%	66.7%	77.1%
0.6	5.1%	70.0%	77.1%
0.7	0.0%	73.3%	79.8%
0.8	0.0%	86.7%	76.1%
0.9	0.0%	93.3%	74.3%

From our classification table in Table 16 we see that 0.4 is the best cutoff point for total accuracy since it achieves a total accuracy of 79.8%. At this cutoff we have a type-II error rate of 43.3% which we can lower to 33.3%, 20.0%, or 6.7% by successively increasing the type-I error rate to 21.5%, then 41.8% and finally 69.6%.

**Table 17.** The results from the K-fold test compared to the cut off at 0.4.

<i>Observed</i>	<i>K-fold Test</i>			<i>Cut Off at 0.4</i>		
	<i>Predicted</i>		<i>Correct</i>	<i>Predicted</i>		<i>Correct</i>
	<i>Non-survivor</i>	<i>Survivor</i>		<i>Non-survivor</i>	<i>Survivor</i>	
Non-survivor	66	13	83.5%	70	9	88.6%
Survivor	16	14	46.7%	13	17	56.7%
Overall Percentage			75.2%			79.8%

Our K-fold test (using a cut off of 0.5) achieves a 75.2% success rate compared to our model at 0.4 achieving a 79.8% success rate. Using a 0.5 cutoff our model has a 77.1% success rate. The K-fold test provides support for the reliability of our measure since its only 1.9% less accurate than the regular model.

## 5. Analysis

In this chapter we will analyze the results presented in Chapter 4 and use them to accept or reject our six hypotheses presented in section 2.9. Let us remind ourselves of the aim of this thesis: developing an accurate model for predicting the outcomes of reorganizations and using this model to analyze the proposed new Insolvency Act. We will discuss what factors were significant for the success of reorganizations and what this tells us about if and how corporate reorganization in Sweden improves the viability of the companies undertaking the process. We will also judge how well our model predicts successful corporate reorganizations and if the model can be used to improve the court's ability to decide who is allowed to start the process. Finally we will discuss what our model tells us about the proposed new Insolvency Act; is it addressing the problems with the process or not?

### 5.1 Descriptive Statistics and Tests

The first two variables that we want to discuss are: Companies successfully reorganizing and companies successfully reorganizing into a financially viable state. The former group includes 30 companies (27%) and the latter group includes 5 companies (4.5%). A success rate of 27% is poor compared to the 47-84% success rate reported in the U.S. (Thorburn, 2000), or the 54% success rate in Finland (Laitinen, 2009). When accounting for the fact that only 1 in 6 of the surviving companies is financially viable the picture becomes even bleaker for the Swedish process. In the U.S. Thorburn (2000) reports that some studies have found a 27% survival rate for companies three years after reorganization indicating that they were viable when leaving the reorganization process.

All of the companies in our sample (109) were in a financially distressed state before entering the process (as financial distress is legally required to enter the reorganization process in Sweden). Ohlson's O-score, using financial data from the year before the reorganization, successfully predicted financial distress in 105 of the 109 cases (97%). To the extent that companies entering reorganization are representative of the wider population of Swedish companies in financial

distress, Ohlson's O-score model is a very accurate predictor of distress. O-score's ability to correctly classify 97% of our sample indicates that it is useable as a proxy for bankruptcy thus validating our use of the model as one of our sources for our own model.

Our Wilcoxon test, found in Table 10, reveals that the improvements in O-score are statistically significant. There is therefore reason to suggest that the survivors have reduced their risk of financial distress somewhat, even if they have not succeeded in reaching viability yet.

## 5.2 The Model

Our model had a good fit for the data and had good explanatory power. It was able to accurately predict the outcome of 79.8% of reorganizations when using a cutoff of 0.4. This is comparable to the best results in earlier studies such as those of Campbell (78.5%, 1996) Routledge and Gadenne (80%, 2000) and Laitinen's model including non-financial factors (83%, 2009). Compared to the experts assessed by Campbell (1996) and Routledge and Gadenne (2004), our model is far more accurate.

### 5.2.1 Analyzing the significant variables

We have four significant variables in the final model, as illustrated in Table 15.

A strong significant (1%-level) positive variable is LOG Revenue. This clearly indicates that size as measured by sales is a key factor in determining the reorganization success.

This is tempered by the significance (10%-level) of the Number of Employees-variable which has a negative effect. This suggests that companies with large revenues but few employees are the best suited for corporate reorganizations.

The third significant variable is Inverted Current Ratio. It has a significant (1%-level) positive correlation with successful reorganizations, to our surprise, since a high Inverted Current Ratio is indicative of poor short term liquidity. This suggests that companies with poor short term liquidity make better candidates for corporate reorganizations.

Our fourth significant variable is Net Loss Last Two Years, a negative measurement of recent profitability. It has a positive and significant (5%-level) effect on successful corporate

reorganizations. This runs counter to our expectations and suggests that among companies filing for reorganizations, those with 2 years of consecutive losses make better candidates than those who have had positive earnings one or both years.

To summarize: The ideal candidate for the corporate reorganization process in Sweden as predicted by our model is a company with large revenues, few employees, bad short term liquidity and two consecutive years of losses. We will analyze this result in light of our four sources from the literature review in the next section.

### 5.3 Hypotheses

To evaluate our hypotheses we will compare each to our results. We have clear indication of the significance and direction of the Leverage, Profitability and Liquidity factors. For the Size factor we have found both positive and negative effects. However the positive correlation with LOG Revenue are far more significant and it is likely that the negative direction of the Number of Employees variable is because it is included with the LOG Revenue variable. The Number of Employees is negative when the size of the company is already included, as measured through the LOG Revenue variable. The mechanism behind Size is that a larger size will reduce the relative effect of the fixed costs of the process. Number of Employees is not a direct measure of this aspect of Size. Therefore we will use LOG Revenue to determine whether to accept or reject hypothesis H1.

**Table 18.** The hypotheses tested in this thesis.

<i>Hypotheses</i>	<i>Result</i>	<i>Accepted?</i>
H1: Size has positive effect	Size has positive effect	Accepted
H2: Leverage has positive effect	Leverage has no effect	Rejected
H3: Leverage has negative effect	Leverage has no effect	Rejected
H4: Profitability has positive effect	Profitability has negative effect	Rejected
H5: Liquidity has positive effect	S-T Liquidity has negative effect	Rejected
H6: Short Term Liquidity has a negative effect	S-T Liquidity has negative effect	Accepted



Earlier, in Chapter 2, we formulated six hypotheses on the basis of four different sources of information. Out of our six hypotheses four were rejected. This means that our theoretical model is not a good model of why corporate reorganizations in Sweden succeed or fail. Instead we found that our statistical model achieves great significance, fit and there are several possible reasons for why they failed:

1. Some or all of the four sources we used to create our theoretical model are not useful when seeking to predict successful reorganizations in the Swedish context.
2. Our selection of factors from our four sources do not adequately represent those sources.
3. We did not operationalize the factors in a good way and did not adequately measure the effects that the sources suggest.

We will start by analyzing why some sources were useful and others were not. Then we will discuss our selection of factors and how we measured them.

## 5.4 Failure Arising from Our Choice of Theoretical Framework

### 5.4.1 Government report

Our first approach was to use the factors that the proposed Insolvency Act emphasizes. Their study suggested that Size and Liquidity are both positively correlated with successful reorganizations. The mechanisms through which they affect reorganizations were explained as:

**Size:** A larger size allows a company to better handle the costs of the process since the main cost is that of paying the trustee's salary.

**Liquidity:** The law suggests that the length of the process makes it prohibitively expensive and suggests shortening the length of the process and alleviating the costs through offering an additional month of paying the salaries for the company's employees.

We found support for the first of these two factors. Greater revenue increases the chance of succeeding. In regards to the second factor, it is likely that Size already masks the effect that Liquidity would have on the corporate reorganization process. The two main reasons Liquidity is supposed to be needed according to the government study (SOU 2010:2) are to cover the cost of the trustee and to handle the length of the process. In our model we find no support for the assertion

that a shorter time in reorganization or that better liquidity have any positive effect on success rate that is not already explained by the other factors. In conclusion, the report is largely correct on Size. The Size factor possibly masks the Liquidity factor causing our hypothesis to be rejected.

#### 5.4.2 Comparison with the U.S.

Our comparison with the U.S. model for reorganizations yielded one likely factor behind the success of corporate reorganizations – the ability to raise short term liquidity. The increased difficulty in raising short term liquidity in Sweden as compared to the U.S. makes this factor especially important. But our empirical findings gainsay this comparison. The differences in raising liquidity are not significant, likely due to the inability of the Swedish system to properly exploit the underlying profitability of some companies. Our model shows no significant correlation between our model and Profit Margin or Return on Capital Employed. This suggests that having the short term liquidity to finance the adjustments required to turn your company profitable does not matter since the process is not likely to lead you to greater profitability anyway. And the Size factor masks a large part of the costs of the process which further reduces the impact of the Liquidity factor. In summary we find that the financial factors derived from the U.S. model do not adequately explain the success rate of the Swedish reorganization process and it is not a good source for finding significant financial factors.

#### 5.4.3 Coalition Behavior Theory

Based on Coalition Behavior Theory we learnt that Profitability would be an important factor to determine the success rate of the reorganization process. This was found not to be the case, in our model profitability was inversely correlated with success, contrary to the expectations of the Coalition Behavior Theory. Our model does not support Profitability as a factor explaining why companies succeed or fail in their reorganization attempts. If potential future profitability cannot predict successful reorganizations then secured creditors have no incentive to use it and are likely to avoid using it altogether.

#### 5.4.4 Exploratory empirical studies

In our review of earlier studies we found evidence for different factors being important in different studies but all four of our factors were found significant in some study. In our empirical study we found Size to be positively correlated with success and Short Term Liquidity to be negatively correlated with success. This was not surprising, given that these correlations have already been documented in earlier studies in Sweden, such as Hedin and Johansson (2009). The other two factors that were suggested by prior research were Leverage and Profitability. For Profitability we found the opposite effect from that found in prior studies (Casey, McGee and Stickney, 1986, Campbell, 1996), that is, we found that profitability during the last two years is negatively correlated with success. Similar to Hedin and Johansson's (2009) explanation of why Short Term Liquidity might have a negative influence on the company's ability to recover, we argue that short term profitability has a negative influence. That is, if a company attempts a corporate reorganization after turning a profit for one or two of the last two years, chances are that there is not much that can be done to improve the prospects to regain financial viability. For companies where temporary difficulties with liquidity and profitability are the main problem the process is much more useful.

#### 5.4.5 The O-score Model

The O-score model was unfortunately not very useful for predicting reorganizational success. Three of the five variables included in the final model were derived from Ohlson's O-score but all three of them had the opposite direction from what Ohlson's model predicts. Essentially reorganizational success can be derived from Ohlson's O-score by evaluating which problems a reorganizational process are best at addressing and then searching for companies whose decline in O-score is based on decline in those factors. This means that in Sweden the process is best suited for large-sized companies with short term problems in profitability and liquidity.

#### 5.4.6 Summary

Our model supports the studies done by Hedin and Johansson (2009) and Hermansson and Karlström (2010) who found support for connecting poor Short Term Liquidity and large company

Size with reorganizational success. Since the Size factor adequately captures the problems small companies face with liquidity during the process, it is not found to be important by itself. This validates parts of the government report and the exploratory empirical studies done on Swedish companies. It invalidates the other models. Unless we find that we did not accurately measure or represent the factors inherent in these sources we should reject the O-score model, the Coalition Behavior Theory, and the comparison with the U.S.

## 5.5 Problems with the factors?

Above we pointed to two other possible explanations for why four out of our six hypotheses were rejected. Both these possible explanations relate to the underlying factors we picked. We may have extracted the wrong factors or we could have measured them in a way not supported by the source. Let us turn to and discuss each of these in turn.

### 5.5.1 Government report

In 5.4.1 we found partial support for the findings of the government report. When analyzing the report we extracted Liquidity and Size as the two factors that best represented the findings of the government report. We also used time in reorganization as a control variable. We did not include the desirability factor in our model. If we use the Coalition Behavior Theory it is likely that the desirability of using the process affects the outcome since debtors can always veto the reorganization process. The proposed Insolvency Act suggested offering two months of free salaries for the company. If employee expenditure is indeed a key problem and our Liquidity measures did not capture its importance properly, perhaps it could be investigated using a ratio based on the cost of the employees at the company. If such a variable is significant it could indicate that funding the salaries for employees is a large problem for reorganizing companies.

### 5.5.2 Comparison with the U.S.

Based on our comparison with studies done in the U.S. we used the Liquidity factor to represent the greater ease of accessing liquidity for a U.S. company in reorganization. The financial variables we picked to show long term liquidity did not give us the results implied by our comparison with

the U.S. process. To further capture the different success rates between the U.S. and Sweden it might be necessary to use non-financial measures since the financial factor we identified was not able to explain the difference. Such measures could be related to the stricter demands placed on the reorganization plans of U.S. companies or the debtor/creditor perspective dichotomy where the Swedish process does not offer the debtor the tools to succeed nor the incentive to do so. Measuring this factor was outside the scope of this study, but it might explain why we failed to create a model based on this source.

### 5.5.3 Coalition Behavior Theory

If the underlying profitability has no impact on whether companies are successfully reorganized or not then that measure does not adequately represent the Coalition Behavior Theory. Further research is needed to determine which coalition controls the process and what factors they judge the most important for picking reorganization over bankruptcy.

### 5.5.4 Exploratory empirical studies

When reviewing earlier studies we decided to exclude some factors found by Laitinen (2009), namely Turnover and Rate of Inventory. Since no other studies found significant results on these factors we chose not to include them. It is possible that these are necessary in order to capture some aspect of Leverage and Profitability that is invisible using our measure and that this is why this source failed to provide a working theoretical model. We used similar variables to measure the factors as Laitinen did, which suggests that the problem can't be attributed to poor operationalization.

Both factors found in the two Swedish studies were found to have significant effects on the model. Both factors have the same direction as they had in the earlier studies. This reinforces the results of Hedin and Johansson (2009) which run counter to the results found in other countries. This offers support for their theory that Swedish reorganizations are able to help companies with short term liquidity problems only. There are no mechanisms for improving profitability or for dealing with long term liquidity problems which means that only Size and the type of problem that drove you into financial distress matter.

### 5.5.5 The O-score Model

We included the O-score model for its ability to successfully predict financial distress. If hypotheses developed on the basis of the O-score model are unsuccessful that means that this source was not useful for our theoretical model. This means that predicting reorganizations using accounting based bankruptcy prediction models does not work. Since all factors and variables in our study were taken directly from Ohlson's model there is no risk of failing to capture one of the underlying factors.

## 5.6 Why were our hypotheses rejected?

In summary we find that our model shows that the Swedish reorganization process is only able to help companies with short term liquidity problems. The process helps to provide them with breathing space, allowing them to raise the capital needed to pay their short term liabilities and thus exit financial distress. The significance of the Size factor also confirms the relative cost of the process where small companies are unable to reorganize successfully since the cost of the trustee burdens them to the point where they are unable to raise the money to meet their short term liabilities. The failure of our non-empirical sources to predict this is likely due to the differences between the processes of different countries. Our comparative study with the U.S. fails to find any financial factor to explain this discrepancy because the failure of the Swedish process is probably non-financial in nature. This theory can be tested in a new study. There is potential in using the Coalition Behavior Theory to analyze what coalition is in control and what factor it bases the bankruptcy decision on. There is room for further research to see if this model can provide some insight into why so few companies opt for the reorganization process. Using O-score as a model was a failure and the hypothesis that the "distance to distress" measure in some way captures why companies are able to successfully reorganize is discarded. Our conclusion is that the O-score model can be discarded but that the other sources need further investigation using non-financial factors before we can dismiss or confirm their validity.

## 5.7 Evaluating the proposed Insolvency Act

In the introduction we introduced the two problems that this thesis aims to address. The first was to bring out a better, functioning model to predict reorganization successes. Let us now turn to the second problem – whether the proposed Insolvency Act will improve the situation in Sweden. Our reasoning was that if we were able to construct a model with significant explanatory power we would then be able to use that same model to also analyze the suggested changes in the proposed Insolvency Act. As discussed earlier in this thesis (Chapter 2), the main changes proposed in this new Act are:

1. Enable the debtors to run their own reorganization.
2. Give debtor's one more month of salaries to sustain its employees.
3. Merge the process with the bankruptcy process to handle failed reorganizations better.
4. Require more financial data from debtors, make tougher demands on reorganization plans from debtors and demand better communication with creditors.
5. Shorten the time for reorganizations from 3-12 months to a couple of weeks.

These changes can now be analyzed in the light of our model deriving potential additional changes that needs to be implemented to make the Swedish framework more successful.

First, enabling debtors to control the reorganization is a way to reduce the Size factor, such as the salary of the trustee. As shown in our study, the larger relative cost of the process for smaller companies is one of the main factors behind their failure to successfully reorganize.

Second, giving debtors another month of salaries to sustain their employees will improve the success rate of the companies with short term liquidity problems as it gives them respite to raise more money. But this solution is insufficient when dealing with companies where the underlying problem lies in long term profitability or liquidity. To solve their problems more emphasis should be placed on changing the strategy of the company – not on raising more money to overcome a short term problem. One of the implications of our model is that the main factor determining success is if the freeze on paying debts and interest in and of itself is enough to allow the company

to recover. To improve the success rate of the process more mechanisms should be put in place to allow the company to improve its long term prospects.

Third, merging the bankruptcy and reorganization processes is a good idea if there is good evidence for choosing one or the other. This is where our model could be successfully used, as it would help decide whether to reorganize or if the company should be sent straight to bankruptcy with no loss of information or delays in the process. We will also consider the positive effect on the willingness of creditors to accept reorganization plans from debtors through the reduction in cost from a failed reorganization that an integrated framework will bring.

Fourth, demanding more detailed financial data, better reorganization plans and better communication with creditors is not enough to address the problem. The courts have to be stricter when deciding whether to approve a reorganization or not. Asking for more information is useless if the courts do not possess the instruments, such as our model, to use the new information to make a better decision. Without such a model, the risk is that the courts will continue to be too lenient in granting reorganizations to companies with poor prospects as they simply cannot distinguish them from the potentially successful ones. Additionally, the additional demands on data and planning

Fifth, our model finds no support for the idea that the length of the process is the key to success. Instead, there is some indication that the freeze on payment of short term liabilities is one of the main benefits of the process. An extended period would be beneficial in the cases where the court judges that the company could use the reprieve to strengthen itself to the point where it is able to resume paying for its liabilities.

To the contrary, given that the only successful companies are those with short term liquidity problems and a large enough size that the benefits of the freeze in payments outweighs the cost of the process, it seems that a longer process could be better for the debtor. Since we see no positive effect from the length either it appears that the length needed to return to short term financial viability varies from company to company and forcing companies to exit the process more quickly might lead some companies to fail that would have succeeded had they been given an additional month or ten. The U.S. process is far more successful (Thorburn, 2000) and it allows companies 24 months instead of 12.



### 5.7.1 Summary of effects

- The introduction of debtor led reorganizations, possibly reducing the effect of the Size factor which would improve the process for smaller companies by lowering the equilibrium point where the benefits of the freeze in payments outweigh the costs of the process.
- Giving reorganizing companies an additional month of salaries for their employees is essentially suggesting that the government should subsidize companies which are reorganizing. Given the extremely low number of financially viable companies after reorganization this is not a good suggestion by itself, but needs to be integrated into a weave of other improvements to the process so that the number of success stories can justify the expense for the taxpayers.
- Merging the different processes will reduce the costs of failing the reorganization process which will make it more attractive to the secured creditors who might otherwise see it as too risky.
- Demanding more detailed information and plans will reduce the effect of allowing debtors to run their own reorganizations since it makes the process more incomprehensible. On the other hand it increases the accuracy of our predictive models since we will have access to more data.
- Finally, limiting the length of the process and encouraging the companies to finish it in a timely fashion will further reduce the ability of smaller companies to successfully reorganize since the demands on plans, accords etcetera is the same for smaller and larger companies.

## 6. Conclusions

In the introduction we posed two research questions:

1. Can a model based on the financial data from Swedish companies be used to accurately predict which companies stand a better chance of reorganizing successfully?
2. If such a model can be constructed, are the changes suggested by the proposed new Insolvency Act in line with what this model predicts or are there reasons to question the proposed law?

Our answer to the first question is yes, it is possible to construct a model based on financial data successfully predicting which corporate reorganizations stand a better chance of rendering viable companies. We achieved a 79.8% success rate when predicting which of the companies in our sample would later become successful. The model has good explanatory power and is robust when applying internal validation methods. The model is specified to be implemented for reorganization applications filed at the Stockholm district court. For applications in other district courts the model first needs to be tested on data on reorganizations from that court.

Our theoretical model was inconclusive and taught us that the differences between the reorganization systems in different countries are far larger than we expected. We expected to be able to, with some adjustments for differences in systems, apply the same framework that has worked in the U.S. We have shown that the differences are too large for minor adjustments to compensate, the same model can't capture both systems. The Swedish context was uniquely dominated by two financial factors with no similar examples among any of the non-Swedish studies included in our literature review. The Swedish process does not focus on helping profitable companies, instead it focuses on helping large companies with short term liquidity issues. It is no wonder then that the process is not very popular and largely unsuccessful. Our conclusions could help expand the understanding of the role of the relative expense of the process in lowering the success rate for smaller companies and the need for mechanisms that promote companies with greater underlying potential profitability.

We analyzed our second research question in section 5.7 where we used our model to analyze the key areas of the proposed Insolvency Act that we identified in section 2.4. As noted in the former, our results show that some aspects of the proposed law could be useful for improving the

reorganization process but that it largely misses the mark. Our model illustrates the central position of the size of the company in Swedish reorganizations. The government report suggest that small companies are not prioritized as they seldom have any meaningful value to salvage. If this is true the logical proposal is to limit the reorganization process to larger companies. If we instead apply the intent of the law which was to save companies which had the potential to be profitable, and made no mention of size, we should instead focus on how to improve this factor. A triple approach would be best:

- Let companies run their own reorganization (As suggested in the proposed Insolvency Act).
- Make the process less complex so that it is easier to understand and more desirable to use.
- Make sure that the costs associated with the process are proportional to the size of the company.

The second issue concerns the failure to help companies whose problems are not strictly limited to short term issues but who still retain the potential for good profits. This is the sort of company that is stymied by the strict creditor-perspective in the system. To improve their situation we suggest the following three changes:

- Improve the prospects of debtors with long term liabilities by emulating the U.S. framework (see section 2.5), reducing the influence of owners or secured debt holders with no stake in the result and allow greater flexibility for negotiating accords.
- Empower the trustee to raise equity, issue DIP financing, and to sell assets without needing creditor or debtor approval.
- Make the process friendlier to small companies through letting them run the reorganization of their own companies, reducing the complexity of the process for them and making sure that the cost of the process takes on more of a proportional nature rather than strictly favoring bigger companies.

## 6.1 Limitations

This study is based on data from the Stockholm region of Sweden and the model should not be used outside this region without first retesting it extensively on data from the region where it is intended to be used.

Secondly, our model predicts the success of reorganizations as defined by surviving until its next annual report after the end of the process. We were unable to create a model predicting which companies exited the reorganization process in a viable state, and it is important to remember that only one in six reorganizations resulted in a viable company. The rest may be expected to re-enter the process or go bankrupt within a few years. This suggests that our model, despite greatly improving the efficiency of the process, will not be enough to make the process serve its purpose. Third, this study suffers from a lack of theoretical research into reorganizations, in particular Swedish reorganizations. Our own attempt to formulate hypotheses based on earlier research, theories, government reports and Ohlson's O-Score failed and further work is needed.

## 6.2 Future research

One way of improving the accuracy of the predictive model beyond 79.8% could be to use measures of corrective action of the management and certain other non-financial variables such as those utilized by Laitinen (2009). Non-financial variables of interest could include what types of creditors are involved and how many they are.

Another non-financial variable raised in our study is the desirability of using the process. This can be studied using a Coalition Behavior Theory model to find which coalition controls the bankruptcy decision and why that group overwhelmingly favors bankruptcy over reorganization. Our comparison with the U.S. raises the issue of the debtor/creditor-oriented perspectives. Further research is needed into how to reconcile a debtor-oriented process like a reorganization with a creditor-oriented country like Sweden.

## 6.3 Recommendations based on our research

Our model suggests that corporate reorganizations in Sweden are only useful for a certain type of distressed company exhibiting a very specific set of problems in Sweden. The corporate reorganization system needs to be altered to better fill its intended purpose, to salvage businesses that can still provide value, to their creditors, to their owners, to their employees and ultimately to us, to society.

Our work may contribute to address this problem in one of possible ways:

- A. Either we keep the current system for corporate reorganizations. In that case our predictive model can be used by the courts to better predict which companies will successfully reorganize.
- B. Or we can use the model, analysis and suggestions in this thesis to improve the success rate of the entire process, making the process viable for more than the mere handful of companies that is addresses today. This would necessitate in turn creating a new model that could assist the courts in making selections of companies with higher prospects of success. If the whole process of reorganization is changed in the direction hinted in this thesis, then a new model should better match the model suggested by our sources.

In the former, fewer companies will be saved but large numbers of non-viable companies will be kept from starting the process, thereby wasting time and resources. In the latter, the whole system will benefit in that more potentially profitable companies will be able to recover, even if there will be a need for a new model to predict decision-making by the courts.

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## Databases

Retriever Business, TT-Gruppen

## 8. Appendix

### Appendix A. Complete list of the companies in our sample

<i>Company Name</i>	<i>Identification Number</i>	<i>Survivor</i>
1:a Hemtjänstkompaniet Proffskraft AB	5566733720	No
3D Dentomed Dental Development AB	5561899567	No
3plåtslagare Stockholm AB	5567744635	No
AB Jobblyftet	5567800148	No
Activio AB	5566383096	No
Affärsutveckling för Besöksnäringen i Sverige AB (svb)	5561274456	No
Air Sweden Aviation AB	5567772263	No
Aktiebolaget Fido Film Stockholm	5565724282	No
Aktiebolaget Lundell & Zetterberg	5560388471	Yes
Alex & Fred The what's next agency AB	5566218169	No
Alternativ Media Stockholm AB	5566529466	Yes
Aquade Dental Care AB	5568121189	Yes
Atomgruppen Aktiebolag	5564960085	No
Avonova Vård i Jönköpings län AB	5564810330	No
Belesia Lokalvård Aktiebolag	5563378057	No
Belysningsagenturer i Scandinavien AB	5566320874	No
Bistro Pastis AB	5566282736	Yes
Björn Bengtson Sweden Aktiebolag	5562215359	Yes
Boacasa Aktiebolag	5564539343	No
Brandos AB (publ)	5567081590	No
Broad Advisors i Stockholm AB	5563611267	Yes
Butiksfabriken Järfälla AB	5564924834	No
Calibra Aktiebolag	5564157930	No
CH Bygg i Stockholm Aktiebolag	5560649765	No
CinePost Studios AB	5567112577	No
City Party Service Hyrcenter i Sverige Aktiebolag	5562929678	Yes
CMI Composites AB	5567739254	No
Comsinus i Nacka AB	5562431550	No
Convegno AB	5566726674	No
DPNOVA AB	5565418406	No
Elibelleshoes Stockholm Trading AB	5567025787	No
emunity edge AB	5565768826	No
Eurovip Aktiebolag	5565741526	No
Ferromet Ferrous Raw Materials Trading Aktiebolag	5564930245	Yes
Flemingsbergs Elektriska Aktiebolag	5561246686	No
Flexoffice AB	5565855318	Yes

<i>Company Name</i>	<i>Identification Number</i>	<i>Survivor</i>
Flux AB	5564449824	Yes
Franska Catering Matbolaget AB	5567115331	No
Garilla AB	5568035595	No
Gilla Handel i Stockholm AB	5568603434	No
Guzzi Center & MC-Service AB	5566678966	Yes
Götgatan produktion AB	5567332738	Yes
HeMi Hemtjänst Rehabilitering & Utbildning AB	5568058910	No
Higeti AB	5568167562	No
Hotell Tänninge AB	5567664536	No
IMS Bildbyrå AB	5560466723	No
Industrigatan Grafiskutveckling AB	5561181909	Yes
iNovacia AB	5565688321	No
International Production Service Nordic AB	5560807603	No
IPV Im Prima Visual Communication AB	5560540774	No
IT - relation ECTS AB	5566444773	Yes
JB Mark & Bygg AB	5567914097	Yes
JBP Enterprises AB	5567307227	No
Jerker Antoni Musik AB	5565398871	No
Järfälla Trafikskola AB	5566693676	Yes
Keybroker Group AB	5566833579	Yes
Kiddies i Stockholm AB	5566093117	Yes
KS Global Solutions AB	5567858187	No
Kultur och Näringsliv, K & N Service Aktiebolag	5563976843	No
Lang Unenge Advisors AB	5565180972	Yes
LANsourcing AB	5564069762	No
LENNART BJÖRKLUND BYGG AB	5564002805	Yes
LES RESTAURANTS STOCKHOLM AB	5568930696	No
Local act AB	5567895767	No
M.V. Metallvärden AB	5565710687	Yes
Mediacta AB	5566978507	No
Metallvärden i Sverige AB (publ)	5567102784	No
Modern Ekonomi Sverige Holding AB (publ)	5566381934	Yes
Målerijouren i Sverige AB	5566567946	No
Noble Entertainment AB	5566234935	Yes
Ortogonal AB	5566924873	No
Oxidius AB	5565660015	No
P Pocketstället AB	5566005038	No
PABART Aktiebolag	5567518963	No
Procast Media Aktiebolag	5565575965	No
Projektengagemang GMKI Elkonsult AB	5565459038	Yes

<i>Company Name</i>	<i>Identification Number</i>	<i>Survivor</i>
Propan AB	5566677943	No
Provinsor Fastigheter AB	5566768726	Yes
QCC Management AB	5565923777	Yes
R.Rum AB	5567573174	No
Raymond Sweden AB	5567799662	No
Rederi Allandia AB	5566817689	No
Remagine Digital Business AB	5566137369	No
Rushrail AB	5566741228	No
Salut Security AB	5565884912	No
Salut Security Gruppen AB	5566509070	No
SEAB Stockholms Elbyrå Aktiebolag	5563764074	Yes
Sensia AB	5561179796	No
Shoerepair Sweden AB	5566685615	No
Sincerus AB	5566846514	No
Sisu Seniorservice AB	5566832803	Yes
Skogrand Skyltdesign AB	5567242960	No
Snazer AB	5563679009	No
Something Corporate AB	5566576277	No
Specialistbygg Max G. AB	5565019295	No
Stage Magic Production i Stockholm AB	5567218945	Yes
Swedblo Trans AB	5566111729	Yes
Swedehouse Asia AB	5566431549	No
The Local Firm Sweden AB	5567362065	No
ToPeDa AB	5566791785	No
TPS VårdTeam AB	5566282744	No
Twinblade Technologies Holding Sweden AB	5566952155	No
Vasa Prefab AB	5567469654	No
Watchonwatch AB	5567231708	No
Vendexa AB	5566181268	No
Vincent & Melvin AB	5565494373	No
Wunderkraut Sweden AB	5566540422	No
WW Stores AB	5568060122	No
YFO Yrkesfoto Aktiebolag	5561967117	No



## Appendix C. Descriptive Statistics

Variable	Non-survivor**					Survivor**					All**				
	Mean	Median	Min	Max	Std. Dev	Mean	Median	Min	Max	Std. Dev	Mean	Median	Min	Max	Std. Dev
EMPL	25.8	10.0	0.0	167.0	36.8	18.7	14.0	2.0	63.0	15.4	23.8	12.0	0.0	167.0	32.4
Total Assets**	11 348	5 239	626	153 155	19 306	134 449	5 189	153	3 587 375	652 618	45 229	5 239	153	3 587 375	343 052
Net Sales**	31 181	16 740	77	317 948	46 274	64 111	16 866	1 379	744 160	149 982	40 244	16 740	77	744 160	88 346
Revenue**	31 718	16 829	340	317 997	46 586	64 743	16 957	1 422	745 529	150 558	40 808	16 829	340	745 529	88 734
TLTA	1.14	0.98	0.41	3.15	0.46	1.81	1.16	0.64	9.46	1.85	1.32	0.99	0.41	9.46	1.08
NEGOE	0.43	0.00	0.00	1.00	0.50	0.60	1.00	0.00	1.00	0.50	0.48	0.00	0.00	1.00	0.50
EQTA	-0.14	0.02	-2.15	0.59	0.46	-0.81	-0.16	-8.46	0.36	1.85	-0.32	0.01	-8.46	0.59	1.08
INTWO	0.49	0.00	0.00	1.00	0.50	0.77	1.00	0.00	1.00	0.43	0.57	1.00	0.00	1.00	0.50
CHIN	-0.41	-0.56	-1.00	1.00	0.62	-0.14	-0.38	-1.00	1.00	0.66	-0.33	-0.46	-1.00	1.00	0.64
NITA	-0.42	-0.27	-3.57	0.14	0.61	-0.92	-0.30	-9.36	0.09	1.88	-0.55	-0.27	-9.36	0.14	1.12
NIRE	-0.16	-0.09	-1.45	0.49	0.26	-0.32	-0.12	-2.99	0.63	0.65	-0.21	-0.10	-2.99	0.63	0.41
EBTDARE	-0.10	-0.06	-1.23	0.50	0.21	-0.22	-0.07	-2.64	0.69	0.58	-0.13	-0.06	-2.64	0.69	0.35
ROCE	0.11	-0.03	-8.61	14.06	3.52	-0.17	0.05	-16.68	7.88	3.94	0.03	0.02	-16.68	14.06	3.63
CFTL	-0.21	-0.19	-1.56	2.00	0.42	-0.18	-0.14	-0.94	0.25	0.27	-0.20	-0.14	-1.56	2.00	0.38
WCTA	-0.22	-0.15	-2.17	0.54	0.46	-0.61	-0.25	-4.66	0.21	1.05	-0.33	-0.20	-4.66	0.54	0.69
CLCA	1.41	1.20	0.42	4.15	0.79	2.37	1.34	0.75	9.08	2.03	1.67	1.27	0.42	9.08	1.32
QUICK	0.65	0.63	0.02	1.90	0.36	0.51	0.56	0.06	1.33	0.33	0.61	0.60	0.02	1.90	0.36
INCO	-0.05	-0.05	-2.48	4.31	0.66	-0.08	-0.04	-0.75	0.12	0.15	-0.06	-0.05	-2.48	4.31	0.56
DAYS	210.7	190.0	28.0	497.0	113.1	241.8	247.5	22.0	422.0	101.8	219.3	207.0	22.0	497.0	110.5

\* Number of observations in each group are: Non-survivor (79), Survivor (30), All (109).

\*\* As measured in thousands of SEK.

## Appendix D. Output from the Logistic Regression

Dependent Variable: SURVIVOR  
 Method: ML - Binary Logit (Quadratic hill climbing)  
 Sample: 1 109  
 Included observations: 109  
 Convergence achieved after 5 iterations  
 Covariance matrix computed using second derivatives

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>z-Statistic</i>	<i>Prob.</i>
C	-9.392613	2.758365	-3.405138	0.0007
EMPL	-0.02064	0.011962	-1.725509	0.0844
LOGREV	1.643462	0.61121	2.688868	0.0072
CLCA	0.806635	0.264483	3.049853	0.0023
INTWO	1.200932	0.572121	2.099089	0.0358
CHIN	0.764722	0.433406	1.764448	0.0777
McFadden R-squared	0.218941	Mean dependent var		0.275229
S.D. dependent var	0.448693	S.E. of regression		0.396613
Akaike info criterion	1.029228	Sum squared resid		16.20206
Schwarz criterion	1.177376	Log likelihood		-50.0929
Hannan-Quinn criter.	1.089307	Deviance		100.1859
Restr. deviance	128.2692	Restr. log likelihood		-64.1346
LR statistic	28.08337	Avg. log likelihood		-0.45957
Prob(LR statistic)	0.000035			
Obs with Dep=0	79	Total obs		109
Obs with Dep=1	30			



## Appendix E. News Article – The Weekly Business Standard

### The Law on Corporate Reorganizations under fire

**THE GOVERNMENT STUDY ON INSOLVENCY LAW PROPOSED SUBSUMING THE LAW ON CORPORATE REORGANIZATIONS INTO A NEW INSOLVENCY ACT. ESCAPING BY THE SKIN OF ITS TEETH BUT NOW A LANDBREAKING NEW STUDY BY RESEARCHERS FROM LUND UNIVERSITY SUGGEST SWEEPING CHANGES TO MUCH CRITICIZED LAW.**

**The Swedish law** of reorganization was introduced in 1996 for the purpose of offering companies facing temporary financial difficulties some breathing space to make a deal with their creditors and make the changes necessary to return to a healthy state. Since then, far fewer companies than expected have used the process and success stories have been rare. Most companies that are successfully reorganized are in bankruptcy court within a few years suggesting that the process provides no lasting solutions.

**The state investigation** SOU 2010:2 proposed a new Insolvency Act to address the shortcomings of the law, it suggested merging the Swedish law on reorganization and the Bankruptcy Law, to improve some of the shortcomings with the current system, the goal was to make the reorganization process more successful and to more easily transition failed reorganizations into bankruptcy, reducing the cost for both processes. Some critics lambasted the law for its lack of solutions for companies struggling to reorganize with much criticism reserved for the lack of progress on improving access to credit and breaking the stranglehold that creditors with secured debt have over the system. For the past six years no action have been taken. No new studies have been commissioned and no alternate proposals have been put forward in the Swedish Parliament.

**In a groundbreaking new study** by researchers from Lund university researchers develop a model to predict which companies are able to successfully use the reorganization process. The study is titled “Predicting successful corporate reorganizations for Swedish companies using financial data” and the model they construct does not reflect well on the process.

**They found** that of the Swedish companies approved for the reorganization process at the Stockholm district court, only 27% were able to successfully complete the process, and only 1 in 6 of these were anywhere close to what we might call “a healthy company”. Compared to other countries these figures are best described as disastrous. Our dour neighbors to the east, the Finns, achieve a much higher success rate with over 50% successfully finishing the process. In the U.S. that figure is estimated as sometimes reaching 84% with 27% of the total being “healthy”.

**By constructing a model** based on financial information from the companies’ financial statements, the researchers were able to accurately predict the outcome for 79.8% of reorganizations. Compared to the dismal accuracy of Swedish courts these figures are borderline magical. We reached out to Karl Johannisson, who led the research group, for comments on their predictive model: “Considering the low success rate of Swedish reorganizations, and the high accuracy of our prediction model, we believe

that by adopting a similar model as a step in the reorganization application review, many inevitable reorganization failures could be avoided”.

**Not content** with developing a model for predicting successful reorganizations under the current system they use their model to analyze the proposed Insolvency Act that has lain dormant on the desk of the Minister for Justice for the last 6 years.

**First offering** some praise for the suggestion to merging Bankruptcy and Reorganizational law into Insolvency law and for allowing companies to rear their own reorganizations they quickly turn to criticisms. “The proposals are not far-reaching enough” claims Johannisson. “The proposal lacks methods for allowing reorganizing companies to raise new debt through Debtor-In-Possession (DIP) financing and offers nothing on creating a better balance between different classes of debtors”.

**Johannisson** was optimistic about the proposals for improving the process. “We have developed a strong model and the way forward for the process is clear. The ball is now in the Minister for Justice’s court”

The Minister for Justice declined to comment.

**Frans G. Åslund**

*Reporter*