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MASTER THESIS

**Determinants of Claims Satisfaction
in Insolvency Proceedings
in the Czech Republic**

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Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

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Prague, January 5, 2017

Signature

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Abstract

This paper examines determinants of creditors' claims satisfaction in insolvency proceedings in the Czech Republic. To our knowledge, it is the first research to such extent in the Czech Republic covering this field. Combining microdata from Insolvency Register, Business Register, Ministry of Finance and other sources, we construct a unique dataset of more than 2,600 cases. We identify several basic determinants of satisfaction: a higher share of secured claims, real estate and cash in assets of a company, submission of financial statements into Business Register, selling the business as a whole within the proceedings, and entrepreneur cases. We find no such effect for the audit of financial statements or for the age of a company. Moreover, we search for other indicators that may result in the lower satisfaction of claims, out of which five are statistically significant: a homeless person in statutory body, registered office at a firm nest, being listed as unreliable VAT payer, a connection to persons that have multiple records in Insolvency Register and a substantial increase in depreciation in the period between the last two submitted financial statements. In contradiction to the bankruptcy prediction literature, we show that the financial data are unreliable for predicting the outcome of insolvency proceedings. Our findings bring a practical contribution for creditors in credit risk management as well as for the state.

JEL Classification G33, K20

Keywords insolvency, insolvency proceedings, claims satisfaction

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Abstrakt

Tato práce se zabývá hledáním determinant uspokojenosti pohledávek věřitelů v insolvenčních řízeních v České republice, k čemuž využíváme unikátní dataset sestavený z mikrodat z insolvenčního rejstříku, obchodního rejstříku, Ministerstva financí a dalších zdrojů pro více než 2 600 insolvenčních řízení. Pokud je nám známo, je to v České republice první práce věnující se tomuto tématu v takovém rozsahu. Výsledky ukazují několik základních determinant, jako je výše podílu zajištěných pohledávek, nemovitý majetek a hotovost v aktivech společnosti, odevzdávání finančních výkazů do obchodního rejstříku, prodej podniku jako celku v průběhu insolvenčního řízení a případy živnostníků. Výsledky však nenaznačují podobný vztah pro audit finančních výkazů či pro stáří dané společnosti. Dále zkoumáme faktory, které mohou mít na uspokojenost pohledávek negativní vliv. Mezi signifikantní patří člověk s bydlištěm na úřadu ve statutárním orgánu společnosti, sídlo firmy v "hromadném sídle", označení firmy jako nespolehlivého plátce DPH, spojení s osobami, které mají více záznamů v insolvenčním rejstříku a výrazné navýšení odpisů v období mezi posledními dvěma odevzdanými finančními výkazy. Zatímco literatura využívá data z finančních výkazů společností pro predikci insolvence, naše výsledky ukazují, že pro odhadování výsledků insolvenčních řízení v českém prostředí jsou tato data nespolehlivá. Naše závěry mají praktické využití nejen pro věřitele při řízení rizik, ale také pro stát.

Klasifikace JEL

G33, K20

Klíčová slova

insolvence, insolvenční řízení, uspokojenost pohledávek

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Master Thesis Proposal

Author	Bc. Petr Pařízek
Supervisor	PhDr. Ing. Jiří Skuhrovec
Proposed topic	Determinants of Claims Satisfaction in Insolvency Proceedings in the Czech Republic

Motivation The Act No. 182/2006 Coll. (Insolvency Act), coming to force in 2008, brought major changes to insolvency proceedings in the Czech Republic. Since then, a considerable number of insolvencies has been resolved.

While the Insolvency Act is considered a successful change in the Czech insolvency law, the recent research (e.g. Smrčka et al., 2016) show that the satisfaction of creditors' claims remains very low. Besides the satisfaction of claims, the research is predominantly focused on statistics such as number of filings or number of insolvency declarations, including regional, time or industry analyses. The existing theoretical literature relevant to the topic of insolvency covers mainly the issue of insolvency determinants and possibility of its prediction (e.g. Altman, 1968; Edmister, 1972). However, the analysis of potential causes of the claims satisfaction in insolvency proceedings from the economic perspective is missing.

The aim of this thesis is to examine determinants of satisfaction of claims in company insolvency proceedings in the Czech Republic. Using data from Insolvency Register, Business Register and other data sources, we will examine what information about the company have effect on satisfaction of claims.

The first area we focus on is based on general data about a company and data from insolvency proceedings. We will examine influence of claims structure and various types of company's property on satisfaction of claims. Besides that, we will add several indicators that should serve as a proxy for suspicious behavior or suspicious subjects in the ownership structure.

The second area arises from the financial data of companies. Using submitted financial statements from Business Register, we will examine effect of financial ratios that are used in insolvency determinants literature. More-

over, we will look for anomalies in the financial figures that may be sign of withdrawing money from the company before the insolvency.

Hypotheses

- Hypothesis #1: Companies with higher proportion of secured claims should have higher satisfaction of claims.
- Hypothesis #2: Tangible assets such as real estate, movable assets or cash should have positive effect on satisfaction of claims.
- Hypothesis #3: Suspicious subjects in ownership structure such as homeless people or foreign legal entities should have negative effect on satisfaction of claims.
- Hypothesis #4: *Own capital/assets* financial ratio should have positive effect on satisfaction of claims.
- Hypothesis #5: Company's sales in the last year of operation should positively effect satisfaction of claims.

Methodology The data from Insolvency Register, Business Register and other data sources will be used to construct cross-section dataset.

We will construct two linear models and for their estimation, OLS method will be used. The assumptions of the OLS will be checked and method will be corrected for any potential violation of assumptions. Based on coefficient estimates and significance levels, we will be able to decide whether our hypotheses can be confirmed or not.

Expected contribution This thesis should contribute to the field that has been almost untouched by the academic literature. The results should show some of the determinants of satisfaction of claims in insolvency proceedings, which can be very useful for institutional creditors, especially for banks. The findings could be used for identification of problematic debtors, estimation of expected return when considering entering insolvency proceedings or prevention from withdrawing money from the companies.

Outline

1. Introduction
2. Theory & Literature Overview
3. Data & Methodology
4. Results
5. Conclusion

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Chapter 1

Introduction

Business insolvency is a fundamental part of capitalism. In the Czech Republic, thousands of companies are filed for insolvency every year, including several major companies in recent years (e.g. SAZKA a.s. or OKD, a.s.) which brought more public attention to the topic. Despite the fact that the insolvency proceedings do not commence in almost half of the filings (Smrčka et al., 2016), there are still hundreds of insolvency proceedings that commence every year, putting enormous amounts of creditors' money at stake. Creditors' claims in insolvency proceedings in the Czech Republic closed in 2013 reached 25 billion CZK (InsolCentrum, 2016), accounting for approximately 0.6% of GDP. It is without a doubt, that insolvency proceedings and especially practical consequences for creditors from proceedings are important issues to be examined.

The Czech insolvency law has undergone major changes in the last decade. The former Act No. 328/1991 Coll., on Bankruptcy and Composition, which was perceived as one of the worst in Europe (Schelleová, 2007) was replaced by the Act No. 182/2006 Coll., on Insolvency and Methods of Its Resolution (Insolvency Act), coming to force in 2008. Several amendments followed, with the most significant Act No. 294/2013 Coll., coming to force on 1st January 2014 ("The Large Amendment" or "The Revision Amendment").

The aim of the new Insolvency Act was to modernize Czech insolvency law in order to make the insolvency proceedings faster, more efficient and more transparent with better protection for creditors. In order to achieve this, new concepts and features were introduced, such as an institution of professional insolvency administrator, altered insolvency recognition and new ways of its resolution or changes in the treatment of creditors. For a better understanding

of the insolvency proceedings, these concepts and changes are discussed in more detail in the following chapter.

The Czech academic law literature admits that the insolvency law is rather new in the Czech environment, which brings along a lack of academic literature and a lack of court decisions that would help to interpret the law (e.g. Hovězák, 2012). The academic interest and an increasing number of closed insolvency proceedings will, however, eliminate these practical flaws in time.

The Insolvency Act itself is often considered a successful change of Czech insolvency law (e.g. Hájek, 2011; Doing Business, 2016); however, the statistics show that the real results are far from satisfactory situation. Since protection of creditors is one of the major goals of the insolvency law and since the Insolvency Act was aimed to ensure better protection, we should focus on such results. While the official data from the Ministry of Justice provide limited information with limited applicability because of methodology flaws and contradictory results (Smrčka et al., 2016), there are several institutions that provide relevant data.

InsolCentrum (2016) show that the actual satisfaction of claims was 6.4% in 2013 based on the real and complete data from insolvency registry. Even smaller figures are presented by Smrčka et al. (2014), who present satisfaction of claims of 3.62% on a representative sample of data (with 187 observations) in the period 2012-2013. On much larger data sample, Smrčka et al. (2016) show satisfaction of around 8% (depending on the perspective). While these figures may seem quite distant from each other, the important conclusion is that the level of satisfaction of creditors' claims remains on an extremely low level. The authors often provide descriptive statistics and regional, time or industry analysis; however, the explanation of potential causes of such results remain only on the field of the law perspective.

The existing literature focusing on the insolvency from the economic perspective covers mainly the issue of insolvency determinants and possibility of its prediction. Many papers focus on the finance industry, where the insolvency problem is most tempting and may have an impact on the whole economy. Other literature focuses on the topic of insolvency determinants of small companies or companies in general; however, academic research using similar models for the satisfaction of claims resulting from insolvency proceedings is missing.

The aim of this thesis is to start filling in the missing literature focusing on the numerical perspective for an explanation of results of insolvency proceed-

ings. We search for determinants of satisfaction of creditors' claims in company insolvency proceedings in the Czech Republic. Our dataset contains all insolvency proceedings that were filed in the period from 2008 to 2013 (i.e. under the new Insolvency Act), commenced for liquidation and were eventually closed in the years 2011-2013, counting more than 2,600 cases. Using publicly available data from Insolvency Register, Business Register and Ministry of Finance, we examine what company's financial and non-financial information may have an effect on satisfaction of creditors' claims when a company becomes insolvent and goes through the proceedings.

In the course of our work, we develop two models. First, *Base model*, is based on the information from insolvency proceedings and some other sources. Such data include a share of secured claims, structured assets of a company, several suspicious signs about the company, and other information. For the second model, *Financial data model*, we employ data from last two submitted financial statements, using findings and methods from bankruptcy prediction literature (e.g. Edmister, 1972). Besides equity, sales and cash flow, we also search for substantial changes in depreciation and personal costs to address potential asset stripping.

The results show that the data from financial statements is highly unreliable for estimation of insolvency proceedings results in the Czech Republic. These findings are in contradiction with the bankruptcy prediction literature, which commonly uses financial data for predicting insolvency (e.g. Beaver, 1966; Edmister, 1972). However, we provide a number of alternative determinants of claims satisfaction.

We find a higher claims satisfaction in cases with a higher share of secured claims, for companies that submitted their financial statements and also for entrepreneurs. We provide evidence that the real estate and cash are the only assets of a company that has significant positive effect on claims satisfaction. We propose seven suspicious signs (*red flags*) that may decrease satisfaction of claims. Four of them have a significant effect: a presence of a homeless person in statutory body, registered office at a firm nest, being listed as unreliable VAT payer and a connection to persons with multiple records in Insolvency Register. We also find that substantial increase in depreciation in the period between the last two submitted financial statements leads to a lower satisfaction of claims, which suggest potential intention of asset stripping.

The results can be useful especially for creditors for credit risk management and for estimation of potential return from entering insolvency proceedings.

There are several implications for the state. The state should create more pressure on submission of the financial statements and it should use the information it has more efficiently in order to improve its payoff as a frequent creditor in the proceedings. The government may also consider introducing a new law to prevent the situation of debtors with multiple insolvencies.

The thesis is structured into five chapters. The following chapter contains relevant theory and literature overview. The third chapter describes the data, their shortcomings and used methods. Subsequently, the results are presented and discussed. The last chapter concludes the thesis.

Chapter 2

Theory & Literature Overview

In this chapter, the theoretical background and literature overview is provided. The chapter is divided into four sections. First two sections, *Introduction to Insolvency* and *The New Insolvency Act* should provide an overview of the insolvency law from a general perspective. Next section, *Insolvency Proceedings Statistics*, is focused on the existing statistics that examine results of the insolvency proceedings from numerical perspective. The last section, *Bankruptcy Prediction Models*, examines literature focused on these models since they represent close theoretical background for our research.

2.1 Introduction to Insolvency

The term *insolvency* refers generally to a situation in which the debtor has troubles repaying the debt. A proper definition is, however, more complicated as there are more perspectives under which basic terms may have different meanings. Therefore, it is important to comment on terminology, before we provide an overview of the purpose and principles of the law. A complication with defining the terms is the fact that the Insolvency Act does not have an official English translation; however, there are several published unofficial translations of the law that we can build on (e.g. Mrazáková, 2011).

2.1.1 Terminology

Richter (2008) distinguishes three views on insolvency: *financial capital structure perspective*, *law perspective* and *financial theory perspective*. We will go through each of the perspectives and show how the terms are used in these

perspectives. Some issues with the meaning and translation will be discussed subsequently.

Financial Capital Structure Perspective

This view is based on a basic capital structure of a corporation, which can be denoted as $A = L + C$, where A stands for assets, L for liabilities and C for equity (own capital). Simply put, the claims of debtholders (creditors) on company's assets, represented by L , are preferred to the claims of shareholders/owners (residual claims), that are represented by C . The C is also connected with the decision rights as long as the company is solvent since the owners are those affected by marginal loss or gain.

As the company operates, the variables change, affected by company's performance. At some point, it may happen that $L \geq A$, which means that $C \leq 0$. In such case, there is no residual property that the owners could claim and the marginal loss or profit affects debtholders. Fischel & Easterbrook (1991) state that the decision rights should follow marginal loss or gain. That is quite intuitive since such subject or person has the largest motivation to invest money and energy to gain prosperity of the company.

Richter (2008) points out, that the capital structure of the corporation is in reality much more complex. It often involves senior, junior and general debt, common and preferred stock and assets that may serve as collateral for securing the debt. That means that even when the residual value of a company for holders of both preferred and common stock is zero, there is still a number of parties that are involved. It is up to insolvency law to provide a framework in which the claims of these parties are rightfully settled.

From this point of view, when $C < 0$ (i.e. $L > A$), we are talking about a type of insolvency that is called *over-indebtedness*.

Law Perspective

In comparison to financial structure perspective, the law perspective requires much more precise definition. According to Richter (2008), it is a natural possibility to interpret insolvency as a state of a company in which the value of assets of the debtor is not sufficient to cover his debts. Insolvency law often uses this definition; however, the key question is how to find out that it is the case.

There are generally two tests that are used to inspect such state of a company: *cash flow test* (or *liquidity test*) and *balance sheet test*.

The *cash flow test* is concerned with liquidity. It checks whether a company has enough liquid assets to cover liabilities that are due. This test refers to the definition of *insolvency* according to a common economic definition. The law should state the minimal period for how long the payment has to be overdue, in order to consider a company insolvent. Although the test is focused only on the short-term financial state of a company, Richter (2008) argues that it is a sign of a potential bankruptcy. The reason behind is that a healthy company with a liquidity problem should easily overcome this problem with a short term loan and thus should not have a liquidity problem. However, as it will be showed in the financial theory perspective, there could be an exception in the case of financial markets failure. The main advantage of this test is that problems with liquidity are easily observable.

The *balance sheet test* is focused on a comparison of the value of debtor's assets and value of debt. The main problem is that determination of the value of debtor's assets is often difficult and may be questionable (since the real value may be different from the book value), which lowers the usability of this test (Richter, 2008).

Most modern insolvency acts include both tests. The differences are in their connection and mutual relationship and in the definition of specific thresholds (Smrčka et al., 2016). The Insolvency Act puts more weight on the *cash flow test*, although it recognizes both tests and either of them can be used to prove insolvency. Some issues connected to the insolvency tests in the new Insolvency Act will be described in the section *The New Insolvency Act*.

Looking at the terminology, the *cash flow test* checks for *inability to pay debts as they fall due* (in Czech "platební neschopnost") and the *balance sheet test* examines *over-indebtedness* (in Czech "předlužení"). If either of the tests is positive, the company is in *insolvency* (in Czech "úpadek").

Financial Theory Perspective

In this perspective, Richter (2008) looks for potential circumstances under which a healthy company could be labeled as insolvent.

The first reason may be *economic distress*, under which the net present value of company's cash flow is negative. Such company is considered as insolvent and its assets should be sold in order to satisfy claims of the creditors. Such

statement is, however, based on the Modigliani & Miller (1958) theorem of capital structure irrelevance. Richter (2008) argues that this may not be true in reality and thus a change of the capital structure may reverse the situation. Nevertheless, he admits that there is no help for a company that offers products or services that nobody wants to buy.

The second reason is a *financial distress*. That is a situation in which the net present value of future cash flow is positive but lower than the liabilities of a company. Even in this case, the restructuring of a capital structure may be an efficient solution.

The last reason, *liquidity constraints*, has already been mentioned. The financial markets may not be able to provide a company with liquidity for some reason, which may cause financial problems for the company (i.e. problem to cover its short-term liabilities for the lack of liquid assets). In such situation, the insolvency proceedings would be an inefficient solution. The resolution should be in liquidity provision or deferred due date.

Translation Issues

So far, we have defined terms *over-indebtedness*, *inability to pay debts as they fall due* and *insolvency*. *Insolvency proceedings* (in Czech "insolvenční řízení") is a name for the whole process that the insolvency law is dealing with. One of the most common terms that is used in the literature is *bankruptcy*. Within the Insolvency Act and its translations, *bankruptcy* refers to one of the insolvency resolution methods under which assets of the company are sold and the money is used to satisfy creditor's claims (in Czech "konkurz").

These terms and their definitions are in accordance with the translation of Insolvency Act by Mrazáková (2011) and with other articles written by professionals (e.g. Hájek, 2011; Schweigelová & Dančišin, 2006). We use this terminology except for the section *Bankruptcy Prediction Models* where we extend the definition of *bankruptcy* on general state of a company that is not able to repay its liabilities, since it is the way how this word is commonly used in the economic literature¹.

It is worth pointing out, that in the view of classical economic theory, *insolvency* is a financial state of a company that is not able to repay its debts on time. It has nothing to do with the ability to repay in the long term or in the terminal stage. This definition corresponds rather with the *inability to*

¹Although there are differences among the definitions as well.

pay debts as they fall due then the meaning of *insolvency* as defined in the Insolvency Act translations, although it has been explained that the rationale behind the *cash flow test* is to check for inability to repay the debt at all.

According to a common economic definition, the *bankruptcy* is viewed as an inability to repay debt, i.e. the time does not matter; it is a situation in which the debtor is not able to repay the full amount of borrowed money at all. That corresponds to the term *over-indebtedness*, whereas the meaning of *bankruptcy* in our view is a term for the process of selling assets of a company and satisfying creditors, which is usually called *liquidation*. The term *liquidation* (in Czech "likvidace") is, however, used for a different procedure in the context of Insolvency Act.

While some of these translations may seem to be unfortunate as the meaning is shifted, it is the way they are commonly used in the literature regarding Insolvency Act and we respect that in our work.

2.1.2 Importance and the Purpose of Insolvency Law

The area of insolvency resolution and enforcement of creditors' rights is not usually considered to be very important part of economic theories (Smrčka et al., 2016). That is quite surprising since insolvency law (and thus insolvency proceedings) plays very important role on both macroeconomic and microeconomic levels. We take a closer look at each role.

Macroeconomic Importance

From the macroeconomic perspective, Richter (2008) views insolvency proceedings as a platform for the "exit of economically unsuccessful subjects from the market."² The exit of a company is a fundamental part of capitalism and the purpose of the insolvency law should be to make it efficient in terms of reallocation of the capital to subjects that can use it in a more economically efficient way, under as low transaction costs as possible (White, 1989). Insolvency law, that would keep the capital in the hands of unsuccessful businessmen may have negative consequences on the productivity of an economy since it does not allow for efficient allocation of capital.

Smrčka et al. (2015) found an evidence that there is a link between the efficiency of insolvency proceeding and productivity of an economy (in terms of GDP per capita at current market prices), which supports these theories on

²Translated by the author of this text.

the real data. They conclude that such evidence is a clear sign that the area of insolvency law should be an important political issue since it is one of the necessary conditions for a highly developed economy with efficient markets.

Richter (2008) argues that the insolvency proceedings is not the only way for an economical subject to exit the market. It is, in fact, a marginal option since most exits are based on the decision of owners to quit without a requirement of insolvency proceedings. However, resolution of business failure or providing an option to exit the market are not true reasons for the existence of insolvency law. As Richter (2008) points out, the main purpose is to resolve such exits or corporate failures in which there is a *common pool problem*, as described in the following paragraphs.

Before we get to that, there is another way to show the importance of insolvency law, which is through the amounts of money claimed by the creditors in the insolvency proceedings. It has been proved that such amounts are enormous and that the satisfaction of these claims is actually very low. As we have already mentioned, InsolCentrum (2016) shows that registered claims of the creditors reached almost 25 bil. CZK in 2013 (accounting for 0.6% of GDP) and that the satisfaction of these claims was only around 6.4%. Kislingerová (2015) estimates the total loss of creditors in the period 2008 to 2014 to approximately 142 bil. CZK, which translates to 0.7% of GDP every year, in accordance with the findings of InsolCentrum (2016). Kislingerová (2015) also makes very rough approximation of the claims that were not registered, accounting for up to 4% of GDP every year (155 bil. CZK). Although such calculations may be subject to many objections, the idea of importance of insolvency law is clear.

Microeconomic Function and the Common Pool Problem

The *common pool problem* is a problem of collective choice and it is one of the problems in which the rational individual action of all actors does not lead to an efficient solution.

The idea behind the concept is relatively simple. If there is a pond with fish and there is only one owner, he will probably catch only that much fish so that the fish population is stable³ and thus he can fish forever. If there are more owners of the pond, the most economically efficient decision is still to catch that much fish so that the population is stable. However, by such action, an owner risks that another owner can catch all the fish in order to

³We make the assumption that the population can not grow since there is no room for more fish. It will serve our example well enough.

maximize his immediate personal profit. Facing such a risk does motivate each owner to catch as much fish and as soon as possible, before the others do so. It is a completely rational decision for each of them but it is not economically efficient.

In the context of insolvency, this situation may arise when one of the creditors finds out that the debtor may be insolvent. The creditor will probably try to exploit such information to maximize personal gains, without consideration of the social welfare (Richter, 2008). For example, the creditor may take out part of the company's property in order to satisfy his claims; however, if the property was crucial for company's operation, the extraction may destroy the value of everything that was left in the company. As a result, Richter (2008) concludes that it is a purpose of the insolvency law to prevent from such inefficiencies. This perception of the function of insolvency law is corresponding to the definition of Schwartz (1999): "The only goal of a business bankruptcy⁴ law should be to reduce the cost of debt capital, which the law best does by maximizing the debt investors' insolvency state payoff."

There is another function of insolvency law defined by Richter (2008), which is the resolution of a situation of diverse ownership interests. This problem is related to the *financial capital structure perspective* of insolvency, especially to the case of more complicated corporate structure, when there are different types of debt. In that case, there are various parties that may have different preferences. It should be a function of the insolvency law to resolve such situation in an economically efficient way.

These functions of the insolvency law are on the microeconomic level. However, if we consider how many insolvency proceedings there are every year and what amounts of claims are registered in them, it is easy to see that the efficiency of insolvency law has an impact on the whole economy.

2.1.3 A Brief History of Insolvency Law in the Czech Republic

Insolvency law has a long history and evolved through the ages. However, it would be a mistake to assume that insolvency law is finalized. If we consider only the practical consequences of the law we have mentioned, the law definitely does not work as we would like to. While the evolution and perception of the

⁴In this case, it is the shifted meaning of the word bankruptcy against translations of the Insolvency Act.

insolvency law are quite interesting parts of a history, it is beyond the scope of this text to examine it in detail. We provide only very brief overview with the focus on the insolvency law in the Czech Republic prior to the Insolvency Act, as the Insolvency Act was created in order to overcome the shortcomings of the previous Act no. 325/1991 Coll., on Bankruptcy and Composition. For more details on the history of insolvency law, see e.g. Smrčka et al. (2016) which is also the main source for this subsection.

The roots of the insolvency law are in the Roman law. It is interesting that there was a focus on the order in which the debtor's property was sold to satisfy creditors and it was assumed that the creditors' claims will be fully satisfied, which is unimaginable in present. In comparison, Ancient Greece did not know the insolvency law; the debtor became a slave of the creditor for as long as it was needed to repay the debt with physical work.

In the Middle Ages, the insolvency law has been known since Renaissance period, especially with the inflow of wealth from the New World and consequent fluctuations of price levels. It is not surprising that the evolution of the insolvency law leaped forward in times of financial distress.

In the territory of contemporary Czech Republic, a proper insolvency law was created in the first half of 17th century (part of Austro-Hungarian Empire at that time). It already contained many features that we know today, such as priority for covering costs of the insolvency proceedings. The law was changed and updated many times, especially with the evolution of financial institutions. The first Czech (or Czechoslovak, to be more precise) insolvency law was created in 1931 and was also based heavily on the former Austro-Hungarian law. It was applied till 1950 when it was abolished by the communists. Throughout the socialism, which in Czechoslovakia lasted until 1989, the bankruptcy basically could not happen. As Smrčka et al. (2016) point out, the only way to bankrupt was to plan it in advance.

The Czech insolvency law after the era of communism was reestablished by the Act no. 325/1991 Coll., on Bankruptcy and Composition. The Act had high ambitions to allow resolution of inability to pay debts and to help economically non-viable companies to exit the market. Such ambitions, however, could not have been satisfied as the Czech economy was in process of transition and structural reforms towards capitalism, overwhelmed by a number of problems and complications such as low productivity, trade liberalization or socialistic banking system. It was also difficult to recognize the true cause of inability to pay debts (Smrčka et al. 2016).

The Act no. 325/1991 Coll. had significant shortcomings. Although there has been a number of amendments, which solved some of the issues, there was a number of substantial problems that remained in the law through the period of effect. The major issues were connected with the rights of creditors. The creditors had very limited powers in the decision-making process; they were usually in a position of the observer in the proceedings. This was especially problematic because of poor experience and knowledge of the judges, insolvency administrators and others involved in the proceedings. Though only a few cases were proven, it was very well known that many proceedings were a subject of corruption. Generally, the Act on Bankruptcy and Composition was perceived as very rigid and impractical, with the results of unacceptably long insolvency proceedings that creditors could not influence almost at all (Smrčka et al., 2016).

Although the Act on Bankruptcy and Composition did not assume to be the only necessary option to resolve insolvency, any other possible way would require a consensus of all creditors, which is unrealistic. It was sufficient for one of the creditors to cooperate with the debtor and the whole process could have been paralyzed or may have taken different direction.

The effort to overcome these problems was the main motivation for the creation of the new Act. Another important issue was the absence of insolvency for individuals, an importance of which increased severely with the development of financial products and institutions. This issue, however, has a minor effect on our research, since we focus only on business insolvency.

2.2 The New Insolvency Act

The Act No. 182/2006 Coll., on Insolvency and Methods of Its Resolution (Insolvency Act), the results of which are examined in this thesis, was designed to substantially change the Czech insolvency law. The roots of the Insolvency Act are in the modern German and American law, in contrary to the former Act on Bankruptcy and Composition, which was based on the former act from 1931 with the roots in Austro-Hungarian Empire (Smrčka et al., 2016). In this section, we describe the main goals of the Insolvency Act and how it works in practice, followed by comments on its amendments.

2.2.1 Main Goals of the Insolvency Act

As we described, the main motivation for the new act is connected to the shortcomings of the former Act on Bankruptcy and Composition, especially to the lack of creditors' rights. Hájek (2011) distinguishes four key elements of the new Insolvency Act that represent main goals of the reform: *transparency*, *user-friendly*, *expediency* and *reinforcement of creditors' rights*.

- *Transparency* of the insolvency proceedings should decrease the risk of influencing the proceedings by any of the parties. This element addresses the issues with corruption or more generally, any potential influencing of any party. It is ensured by public Insolvency Register, which actually serves as a source for substantial part of the data we use in this research. Insolvency Register provides all the important documents regarding the case in real-time. However, as Hájek (2011) points out, this level of transparency may be harmful since it may undermine the reputation of the debtor.
- The Insolvency Act is written in *user-friendly* way, meaning that most of the steps, requirements and rights of the parties within the proceedings are well-described so that the law is comprehensible for the public. This involves also simplification of the claims registration.
- *Expediency* of the new law is strengthened by the new possibilities of insolvency initiation (which will be described later). To prevent withdrawing money from the company by owners during the insolvency proceedings, the owner (debtor) is restrained from any actions and decisions beyond the ordinary business of the company after the insolvency is filed. The repayments of the claims are also deferred until the proceedings is over. Moreover, once the insolvency petition is lodged over a debtor, it should be made public just within two hours.
- *Reinforcement of creditors' rights* refers to strengthened power of the creditors, who can enter the proceedings and partially control what happens with the assets of the debtor. Moreover, a penalty system for fabricated or highly contestable claims was developed. This was a major shift in the law in comparison to the past.

Similarly to the Act No. 328/1991 Coll., the aims of the new Insolvency Act were relatively ambitious. To what extent the creators of the law succeeded we examine later.

2.2.2 Insolvency Proceedings in Practice

This subsection focuses on the process of insolvency proceedings and its major steps. We highlight the features and elements that were introduced to fulfill the aims of the Insolvency Act. We can identify three main steps of the process of insolvency proceedings: *initiation of the insolvency proceedings*, *decision on insolvency* and *insolvency resolution*. We will also briefly comment on *treatment of creditors* and *insolvency administrators*.

Initiation of the Insolvency Proceedings

Under the Insolvency Act, the proceedings starts with filing insolvency petition (either by creditor or debtor), which is almost immediately recorded in the Insolvency Register.

The petition filed by creditor should be supported with the facts showing the insolvency of the debtor, which is usually existence of overdue debts of the debtor. The most problematic part to prove is the condition that the debtor should have several [more than one] creditors with receivables that are more than 30 days overdue. While it is not difficult to find other creditors (including "intuitive" creditors such as employees or financial administration), proving that their receivables are due for more than 30 days may be difficult (Richter, 2008). On the other hand, this condition is one of the few methods how to prevent from abusive insolvency filings. The petition of the debtor should be supported with the financials of the company showing that the debtor is over-indebted or that there is a threatening (imminent) insolvency.

The filing of the petition and the record in the Insolvency Register has similar consequences as the declaration of insolvency by the court under the previous legislation, which used to be the only (and often long) way how to start the proceedings. The debtor should restrain from any actions with its property beyond ordinary business processes, what should prevent withdrawing property or money out of the company by the debtor.

Decision on Insolvency

Before the decision on insolvency is made, the court may ask the creditor who filed the petition to deposit up to 50,000 CZK to cover the costs of the proceedings. In the case of a petition filed by creditors, the debtor can respond to convince the court that he is not insolvent. The decision on insolvency should be made within 15 days from the filing of the petition. As we show later, there is almost always more time needed in reality, especially in the case the debtor wishes to defend against the insolvency.

In order to help the system decide on insolvency sooner, the Insolvency Act offers a possibility of separating declaration of insolvency from the decision on proceedings type. This change allows deciding on insolvency quickly without a potentially long discussion about the method of the resolution. However, such possibility is available only for cases when there are more options possible. If there is only one possible method of resolution, the court must decide the method together with the declaration of bankruptcy. That actually involves substantial share of the cases. For example, any company filed for insolvency that does not satisfy conditions for reorganization method has only one possible method of insolvency resolution and that is bankruptcy. In such case, the decision on method is made along with the declaration of insolvency.

There are three ways to recognize the debtor as insolvent, specified in §3.

The first way is described as follows: "(1) A debtor is insolvent if they have (a) several creditors (b) outstanding financial liabilities for more than 30 days overdue and (c) they are not able to fulfill such liabilities [...]. (2) It is believed that the debtor is not able to fulfill their financial liabilities if (a) they stopped the payments for the substantial part of their financial liabilities, or (b) they have defaulted for more than 3 months overdue, or (c) the satisfaction of any outstanding financial receivables against the debtor may not be achieved by the enforcement of a decision or the execution, or (d) they failed to comply with their obligation to submit the lists referred to in Section 104 Subsection 1, imposed upon them by the insolvency court," (Mrazáková, 2011). This is basically a specification of the *cash flow test* that we have mentioned.

The second way is: "(3) A debtor who is a legal entity or natural person, i.e. an entrepreneur, is considered insolvent even if they have excess debts. If a debtor has several creditors and the total of their liabilities exceeds the value of their property, the debtor has excess debts," while taking into consideration further operation of the company (Mrazáková, 2011). This is basically a spec-

ification of the *balance sheet test* and it checks for *over-indebtedness*. It is not surprising that this method is predominantly used in petitions filed by debtors. This method is slightly vague in the condition that the further operation of a company should be estimated and taken in account, which can be very flexible depending on the view. In fact, Smrčka et al. (2012) suggest to completely remove this condition and to leave the only condition in form $L > A$. They argue that there would still be some problems (e.g. fluctuation of the value of assets); nevertheless, this formulation would be more efficient.

The last way is the threatening insolvency (or imminent debt): "(4) An Imminent bankruptcy occurs when given all the circumstances, it may be reasonably assumed that the debtor will not be able to duly and timely fulfill the substantial part of its financial liabilities," (Mrazáková, 2011). This way should help honest debtors declare insolvency if they expect financial troubles; however, it is often abused by relatively healthy companies who use this procedure to get rid of their debts.

Insolvency resolution

Insolvency resolution can have three possible forms. The first option, bankruptcy, is a common process in which the business is liquidated and creditors' claims are settled from the sale of assets. The second option, which is entirely new in the Czech insolvency law, is reorganization (restructuring of debtor's business), which is available only to large companies with a turnover of at least 100 mil. CZK or at least 100 employees (have been lowered to 50 mil. CZK or at least 50 employees since 2014) unless specifically agreed by the creditors and the debtor. The reorganization keeps the business running and the creditors supervise the operations (Dančišin & Schweigelová, 2006). The third, entirely new option is a discharge of debts (debt clearance), which was designed only for non-entrepreneurs (entrepreneurs are allowed to use discharge of debts since 2014). Within this process, the debtor is required to repay 30% of his debts in 5 years.

Treatment of Creditors

The Insolvency Act brought many changes in the treatment of creditors and their claims. The creditors may enter the insolvency proceedings from its early stage up to 2 months after insolvency declaration (except for consumer insolvencies, in which the period is shorter). After the review meeting (which

examines the validity of creditors' claims) they may participate in creditors meetings. If there is such possibility, they may decide the type of proceedings and such decision is then binding for the court.

The new Act also changes settlement of claims of secured and unsecured creditors. A secured creditor is now entitled to 100% settlement of his claims from the sale of assets used as collateral whereas under the old insolvency law the settlement to secured creditors was capped at 70%. Only after the claims of secured creditors are satisfied, the excess gains from the collateral sale are distributed proportionally among unsecured creditors (including other non-satisfied claims of secured investors).

A new system of penalties for wrongly registered claims was developed. If a claim registered in the insolvency proceedings is disputed and the court assess the actual claim to be less than 50% of the registered amount, then such creditor loses the right for claim satisfaction in the proceedings (even if the claim is secured) and such creditor has to pay the difference between registered and actual amount if the creditor uses its creditor's rights during the proceedings (Dančišin & Schweigelová, 2006). Besides that, the Insolvency Act also removed the right to deny registered claims of other creditors in order to eliminate blackmailing (Kotoučová & coll., 2010). However, this right was returned to the creditors in 2011 based on the argument of a basic right to access courts to protect individual's property.

The Insolvency Act also brought new possibilities to set off the claims by netting the claims between debtor and creditor. Such change is, however, rather irrelevant to the area this thesis is focused on.

Insolvency Administrator

The Insolvency Act established an institution of professional insolvency administrator (trustee), who is responsible for the insolvency case and for supervising the actions of the company during the insolvency proceedings. The administrator must be nominated no later than upon the declaration of insolvency, but if there is a need, the nomination can be made sooner.

In many cases, the nomination and remuneration of the administrators were disputed. As a result, there have been several changes in amendments that are, among others, discussed in the following section.

2.2.3 Amendments and Updates

The Insolvency Act has been subject to many adjustments. By the end of 2015, there have been around 35 changes or amendments. As Smrčka et al. (2016) comment, many changes in any economic law should not be surprising since the real situation in the economy is evolving very quickly and the insolvency law should reflect the changes. The major update was done by the Act No. 294/2013 Coll. ("the Large Amendment" or "The Revision Amendment"), coming to force on 1st January 2014. In the following paragraphs, we comment on it⁵.

The Amendment abolished the possibility of not declaring insolvency because of the lack of property of the debtor. Since the creditors may pay the deposit for covering the cost of proceedings (and in such cases, it is common practice), the absence of debtor's property cannot be a reason for not declaring insolvency. That means that under the current legislation, the responsibility and risk of such situation are undertaken by the creditor, who must decide whether there is a possibility to recover enough money from proceedings to cover the deposit.

For the increasing use of discharge of debt resolution method by consumers (approximately 23 filings per 10,000 inhabitants in 2012), the lawmakers extended this possibility also for entrepreneurs (self-employed) and introduced joint insolvency cases of spouses (Richter, 2014).

The reorganization method of insolvency resolution became quickly popular not only for large businesses but also 20% of restructuring cases in the first four years of Insolvency Act did not meet the size condition, meaning that the creditors agreed to this option (Richter, 2014). As a result, the condition was halved to the minimum of 50 mil. CZK turnover or 50 employees.

The amendment also strengthened the rights of secured creditors by giving them the power to decide on the sale of collateral as an exclusive power.

As a reaction to the disputes on insolvency administrators appointments, the Amendment No. 294/2013 Coll. introduced a new system for rotation of the administrators while taking their specialization into account. The rules, under which the creditors can apply for replacing the administrator, were also softened. However, this fact in combination appointment of the administrator by creditors of their choice provides a possibility for large creditors to cooperate

⁵A useful comment on the Act No. 294/2013 Coll. was created by Richter (2014), who was a consultant to the government in the creation of Insolvency Act as well as its amendments.

with some of the administrators. The amendment also altered the scheme for the remuneration of administrators. Particularly, it created more progressive success-based fees in bankruptcy and separated remuneration for the verification of claims.

Currently, a preparation of a second large amendment is in progress. One of the planned changes is to increase requirements for insolvency petition in terms that the claims of several creditors should be confirmed by the court before the petition. While we have commented that finding another creditor with receivables more than 30 days overdue is a common problem, the legislature would like to reflect problems with abusive (vexatious) petitions. Whether it will address problems with administrators appointments, the definition of over-indebtedness or any other issues, we will see in the future.

2.3 Insolvency Proceedings Statistics

The Insolvency Act is generally viewed as a good and modern insolvency law, especially by law professionals and academics on the field of law. According to Hájek (2011), the first four years of practice have shown the new Insolvency Act as a "one of the most significant and successful legislative initiatives in the Czech legal system." Hovězák (2012) evaluates the Insolvency Act as successful as well, especially the effort to make the proceedings much faster than in the previous legislative and the new possibilities of insolvency resolution which may be beneficial for all parties. However, we are interested in economic consequences of the law, which are represented by the results of proceedings, especially by payoff to the creditors.

In this section we go through the existing statistics about insolvency proceedings, categorized by the institutions that provide the data.

2.3.1 Institutions Providing Statistics

As we have mentioned, many changes in the insolvency law were aimed to fasten the insolvency proceedings and to protect the creditors. However, the results and consequences of the insolvency proceedings show that the real situation is not satisfactory.

The only official statistics are provided by the Ministry of Justice. Their data cover figures such as counts of cases and their division by methods of resolution or length of the proceedings. Their examination of claims satisfac-

tion, i.e. a key result of insolvency proceedings, are based on only dozens of cases and are categorized; with the category of lowest satisfaction as *less than 30% satisfaction*. Consequently, the value of the data is very limited and they cannot be used for any useful statistics. Moreover, Smrčka et al. (2016) argue that insolvency data of Ministry of Justice show inconsistencies, which decrease overall credibility. One of the few credible figures is the length of proceedings. The data show the average length of proceedings was around 2 years in 2014 and that it was getting longer. That is not surprising since in the early years after the Insolvency Act came to force, the long proceedings had not been closed yet.

Since the official national statistics are not useful for evaluation of the results of proceedings, we examine data and findings provided by academic and private subjects.

Doing Business

Doing Business (2016), a research organized by The World Bank and International Finance Corporation (IFC), is providing a comparison of insolvency proceedings effectiveness among the states all over the world. The results are shown in Table 2.1. The selected indicators are *average length of proceedings*, *overall DTF*, *resolving insolvency DTF*, *recovery rate of creditors in cents per dollar (percent)* and *Cost of proceedings as percentage of estate* (percentage of cost against income from the sold property of debtor). The DTF represents *distance from frontier*, where 100 is a level of the best result in a category and anything below is percentage expression of how close the result is to the best one.

Many authors have disputed results of Doing Business (2016), particularly the recovery rate (e.g. Smrčka et al., 2014; Smrčka et al., 2016; InsolCentrum, 2016). As we show in the following paragraphs, more precise research (Smrčka et al. 2014) and especially statistics on complete data (InsolCentrum, 2016) show that the recovery rate is substantially lower, below 10% in the recent years, what is in the sharp contrast with values above 50% or 60% provided by Doing Business (2016). The reason is that the methodology of Doing Business (2016) is based on an example case of insolvency proceedings but not on real data.

Smrčka et al. (2016) point out that whereas interpretation of recovery rate by Doing Business (2016) as average recovery rate is a mistake, we may consider

Table 2.1: Doing Business: Resolving Insolvency

Year	Average length of proceedings in years	Overall DTF	Resolving Insolvency DTF	Recovery rate	Cost
2003	9.2	X	8.29	15.4	18.0
2004	9.2	X	9.05	16.8	18.0
2005	9.2	X	9.60	17.8	14.5
2006	9.2	X	9.94	18.5	14.5
2007	6.5	X	11.46	21.3	14.5
2008	6.5	X	11.24	20.9	14.5
2009	6.5	63.19	11.24	20.9	14.5
2010	3.2	67.88	30.11	55.9	17.0
2011	3.2	68.59	30.16	56.0	17.0
2012	3.2	69.74	30.31	56.3	17.0
2013	2.1	71.66	75.63	65.0	17.0
2014	2.1	75.89	75.94	65.6	17.0
2015	2.1	76.43	76.17	66.0	17.0
2016	2.1	76.71	76.42	66.5	17.0

Source: Doing Business (2016).

indicators such as *average length of proceedings* or *resolving insolvency DTF* as a good proxy for the quality of the insolvency law. Indeed, there is a significant increase of *resolving insolvency DTF* and decrease of *average length of proceedings* in the years following the introduction of the Insolvency Act. Since the *resolving insolvency DTF* reached the levels of the *overall DTF*, it is possible to conclude, that Doing Business (2016) consider the resolving insolvency as an average in comparison to other aspects of the economic environment in the Czech Republic.

It is worth pointing out that Doing Business Reports are almost always based on the data from the previous year, i.e., for example, the 2017 report covers data collected in June 2016. We have made this adjustment in the table; however, in the literature, the data are sometimes presented in the wrong manner. Nevertheless, it does not affect the validity of their conclusions.

Insolvency Research

Insolvency Research (in Czech "Výzkum Insolvence") is a research project within the University of Economics in Prague. The scientific team has published a series of papers (e.g. Smrčka et al., 2014; Kislingerová, 2015). Their findings are summarized in a very recent book "Insolvency Proceedings : (Ex-

Table 2.2: Claims Satisfaction

	Claims (mil. CZK)	Satisfaction (mil. CZK)	Satisfaction (%)
Secured creditors	11 331	1 474	13.0%
Unsecured creditors	28 210	918	3.3%
Claims for covering cost	1 039	895	86.1%
Other priority claims	809	387	47.8%
Total	41 389	3 674	8.9%

Source: Smrčka et al. (2016).

pectations, the Reality and the Future of Insolvency Law)”⁶ (Smrčka et al., 2016), which is the most comprehensive publication focused on quantitative view on Czech insolvency law. They examine a sample of 3,222 cases of insolvency filings (i.e. including cases in which insolvency was rejected) solved under the Insolvency Act.

First, they show that the insolvency is declared only in 54% of cases. That means it is impossible to calculate the loss of the creditors in the rest of the cases. As the possibility of rejection of insolvency filing due to the lack of property of the debtor was removed from the law, this percentage should decrease (rejection for lack of property accounts for 40% of the cases where bankruptcy was not declared); however, the loss of creditors will remain. The average length of the period between insolvency petition filing and decision on bankruptcy was 76 days for cases with declared insolvency and 143 days for the rejected filings. The average length of the insolvency proceedings up till its closure is 740 for cases where insolvency has been declared, what is in accordance with the data of Ministry of Justice. The authors highlight the fact that there are significant regional differences in both rejections of filings (and among the underlying reasons) and the average length of proceedings up till decision on bankruptcy.

The satisfaction of creditors’ claims has been examined on a sample of 1,750 cases, with the total satisfaction of 8.9%⁷. The findings are presented in the Table 2.2. Smrčka et al. (2016) show that the unsecured creditors’ claims are by far the largest part of the claims and their satisfaction has been very low. The examination of the results on regional basis showed that there are significant differences; however, the satisfaction of claims in a particular region

⁶Translated from the original name ”Insolvenční řízení : (očekávání, realita a budoucnost insolvenčního zákona).”

⁷The authors provide various methodologies. We have selected the one that corresponds with our methodology. For more details, see Smrčka et al. (2016).

can be easily changed by single large bankruptcy. Because of that, the authors created a reduced sample by removing two cases of large insolvencies. The major shift is in satisfaction of secured creditors, which more than doubled. It is a good example of the fact that insolvency data should be treated with caution since even few cases can significantly affect aggregate results.

Smrčka et al. (2016) provide many other statistics involving various aspects, such as adjusting the satisfaction of claims of unsecured creditors by including unsatisfied claims of secured creditors, which in principle become unsecured claims. Using this method, they arrived to satisfaction of 14.9% for secured and 1.4% for unsecured creditors, arguing that these results are close to the common sense perception of the division of creditors. The authors also provide more statistics based on regional division and offer results on subsamples based on the structure of creditors. However, they use only descriptive statistics whereas this thesis is searching for causalities.

Creditreform

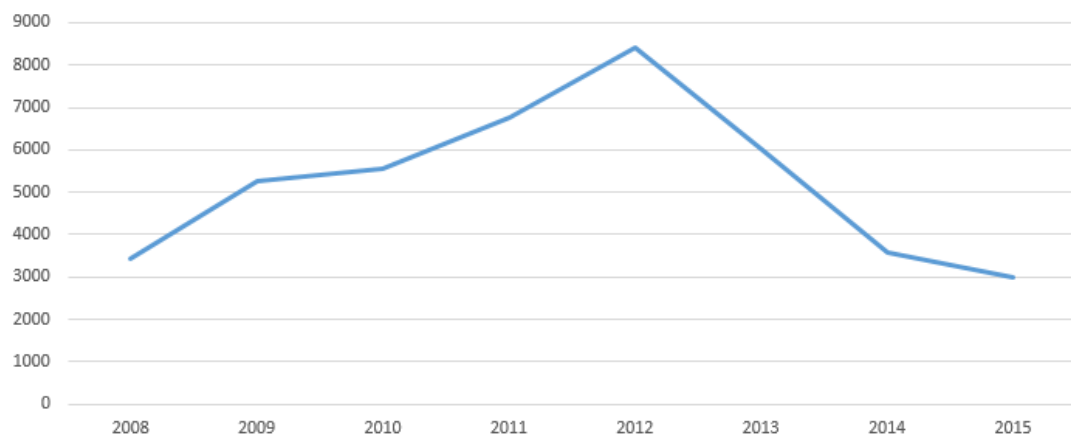
Creditreform (2016) is a private subject that collects and provides the data of counts of proceedings, divided by time and industry. In figures 2.1 and 2.2 we show the number of business insolvency filings and the number of insolvency declarations in time.

The flaw of their methodology is that it is a count of petitions filed, which means that if there were several petitions on one subject, then it is counted several times. This is probably the explanation why, considering data for declared insolvencies, the percentage of filings in which the insolvency is declared is far from the data provided by Smrčka et al. (2016).

For the data beginning in 2013, Creditreform changed the methodology, reflecting introduced possibility of discharge of debt for entrepreneurs. That means that the business insolvency filings up till 2012 count corporations and entrepreneurs together whereas in following years they count only corporations. Although this makes interpretation of the data difficult, the decision seems to be reasonable, since there has been a significant increase of filings for entrepreneurs. Nevertheless, the data for all insolvency filings (though there is the problem with multiple counts) show that their number was rising until 2013 and it is decreasing since then.

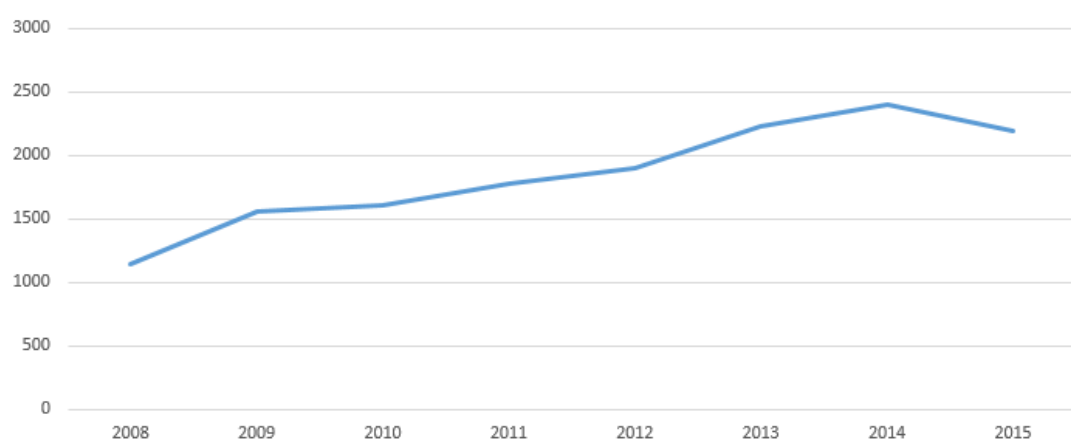
Creditreform (2016) also shows that in 2013, there has been significant heterogeneity among regions in terms of share of companies filed for insolvency to

Figure 2.1: Business Insolvency Filings in the Czech Republic



Source: Creditreform (2016).

Figure 2.2: Declared Insolvency in Business Insolvencies



Source: Creditreform (2016).

all companies (failure rate; though the bankruptcy did not have to be declared), while in the recent years this heterogeneity almost evaporated. It seems that the insolvency proceedings worked well when clearing the market during the financial crisis and since then the volume of filings is slowly returning to a "normal level".

Another interesting finding is that beside few exceptions, there are no predictable patterns in business failure rate based on the industry. Even the industries whose development could be expected to be correlated to each other (either positively or negatively) do not show such patterns in failure rate. Smrčka et al. (2016) suggest that the explanation for some unexpected patterns may be rather in external economic conditions, such as changes in legislation or large public tenders.

InsolCentrum

InsolCentrum is another private subject that collects data from insolvency proceedings. Their dataset contains available data from Insolvency Register for all business insolvency proceedings that were resolved through bankruptcy and were closed in the period 2011-2013. The most important information captured in the data is the satisfaction of creditors' claims, including the division of satisfaction based on the type of claim (secured, unsecured, and other) and by the type of creditor (state, banks, and other creditors).

The main findings show that in 2013 there have been 1,133 closed cases in which there were 25 bil. CZK claimed by creditors. The sales of property earned 2.9 bil. CZK, out of which 1.4 bil. CZK was used to cover the costs of insolvency proceedings. That means that approximately only half of the gains from sales are used to cover claims of creditors. The satisfaction of creditors was 6.4% in 2013 (Insolcentrum, 2016).

InsolCentrum (2016) also shows that the Czech Republic as a creditor has lower satisfaction than the average creditor or that in the majority of the cases there was zero satisfaction of creditors (i.e. the company had no property).

For our research purposes, we have been provided with the dataset of InsolCentrum and we examine it together with data from other sources in more detail in the chapter *Data & Methodology*.

2.3.2 Areas for Exploration

As we have shown, there are several subjects that are concerned with the data regarding insolvency proceedings. They provide various information about the proceedings, such as the number of filings, the number of insolvency declarations or satisfaction of creditors' claims, together with the analysis based on regional, time, industry and other divisions. It is quite surprising, that no statistical analysis aimed at the determinants of claims satisfaction has been presented yet. This thesis thus aims to fill in this part of missing literature.

2.4 Bankruptcy Prediction Models

So far, we have discussed insolvency law, the Insolvency Act and its amendments and the literature that evaluates the Insolvency Act from various perspectives. In this section, we examine the literature relevant to the model used in this thesis. Since the area of searching for determinants of claims satisfaction in insolvency proceedings is missing in the academic literature, it is necessary to search on the fields that are not perfectly, but at least partially relevant to the topic.

The area we focus on is the literature that covers bankruptcy prediction models and especially models that are based on financial ratios. The following subsection should provide a background for the empirical part, particularly to the financial data and their expected effect on claims satisfaction. Subsequently, we comment on other models of bankruptcy prediction. Such background is needed to explain why we are using specific figures from companies' financials and what should be the expected effects of those figures in the model.

2.4.1 Models Using Financial Ratios

The reason why we have chosen bankruptcy prediction models for the starting point of our analysis of claims satisfaction is the partial similarity in what the models capture. The financial ratios depict the condition of the company and most of the models (e.g. Altman, 1968; Edmister, 1972) combine those ratios to depict the overall condition of a company, which can be seen also as a credit risk of the company or the probability of insolvency of the company. While some models may be more appropriate than others, the main idea remains the same.

The major difference is that many ratios used in bankruptcy prediction models are focused on the state of the company in a short-term perspective. We are examining satisfaction of creditors' claims when the insolvency proceedings resolved through bankruptcy is closed, when all the assets of the company, including long-term assets, are sold. The standard definition of long-term in the economic context is that all the assets are sellable which corresponds with the case of insolvency proceedings. That means that if we are interested in satisfaction of claims, it is the long-term financial health of the company we care about. As a result, financial ratios focused on short-term company's health are much less relevant or even not relevant at all when it comes to prediction of the claims satisfaction. This is a very important difference between our claims satisfaction model and bankruptcy prediction models and it is necessary to use takeaways from bankruptcy models literature with caution. On the other hand, ratios that capture long-term condition of a company can be used in our model.

In our dataset, we are considering only cases with declared insolvency, which excludes not only rejected insolvency proceedings, but also all the other healthy companies which would be included in the data samples for bankruptcy prediction models. However, we are interested in the condition in which the insolvent company is, as the insolvency could be seen as a (non)surviving point below which the company fell. Such company may vary from empty indebted "shell" to almost fully operational company with some financial trouble. It is quite straightforward to expect that a company in better condition should bring higher satisfaction of the creditors' claims. It is important to realize, that the expected effects of ratios would be opposite than in the case of bankruptcy prediction models. The logic behind this is straightforward - the result from bankruptcy prediction models is that the worse the condition of the company is, the higher is the probability of default. In the case of claims satisfaction model, the logic is that the better the condition of the company, the higher the satisfaction of the claims in insolvency proceedings should be.

Early Models of Beaver (1966) and Altman (1968)

The development of the ratio analysis started at the beginning of 20th century with a single ratio, the current ratio, with only one aim of credit-worthiness assessment (Beaver, 1966). During the decades, new ratios were developed and became used by creditors, rating agencies, investors or corporate management.

The first and still fundamental bankruptcy prediction models based on financial ratios came with the works of Beaver (1966) and Altman (1968).

Beaver (1966) emphasizes that his aim is to empirically verify the predictive ability of accounting data and his concern is not that the ratios would be an inappropriate form of financial data presentation, but rather how good is the predictive ability of the financial statements. Beaver (1966) identifies six categories of ratios: *cash-flow ratios*, *net-income ratios*, *debt to total-asset ratios*, *liquid-asset to total-asset ratios*, *liquid-asset to current debt ratios* and *turnover ratios*. Each of the categories could be represented by several ratios, out of each the author always picked the one with the lowest percentage error for each sample. The findings of Beaver (1966) show that *cash-flow to total-debt ratio* has the best ability to correctly predict default of a company not only in the one-year horizon but also in the five-year time horizon with reasonable accuracy. Based on that he concludes that evidence suggests that the ratio analysis can be useful in the prediction of bankruptcy at least five years in advance.

Looking in the ratio categories defined by Beaver (1966), *liquid asset to total-asset ratio* and *liquid-asset to current debt ratio* are clearly irrelevant for determining claims satisfaction as they capture only short-term financial health of a company. On the other hand, *net-income ratios*, *cash flow ratios* and especially *debt to total-asset ratios* could be relevant for the long-term state of the company and thus for our model. The *turnover ratios* may be relevant; however, real numbers from companies falling to insolvency are highly unreliable, as it is discussed in the data description later on.

Altman (1968) conducted research similar to the one of Beaver (1966). He chose five ratios in his model: *working capital/total assets*, *retained earnings/total assets*, *earnings before interest and taxes/total assets*, *market value of equity/book value of total debt* and *sales/total assets*. His findings show that all the ratios contribute to the explanatory power with the highest contribution of profitability ratio (*earnings before interest and taxes/total assets*).

Connecting the ratios used by Altman (1968) to the categories defined by Beaver (1966), we can see that *working capital/total assets* does not fit perfectly, but is very close to the group of *liquid asset to total-asset ratios*. *Retained earnings/total assets* is a specific expression of a *debt to total-asset ratio*. Both *earnings before interest and taxes/total assets* and *sales/total assets* belongs to *net income ratios* category. The *market value of equity/book value of total debt* ratio is new in the analysis; however, it is applicable only to the companies listed

on the stock market and thus cannot be applied to many datasets including ours.

Though it may seem that the model of Altman (1968) was a specific (and slightly altered) case of the model of Beaver (1966), Altman (1968) started to search for new methodologies to be used for these cases and he was the first to use multiple discriminant statistical methodology. This methodology proved to be very efficient for predicting in which group (bankrupt or non-bankrupt) should a company be placed.

The exploration of using different methods continued. Three decades later, Altman & Saunders (1998) identified four main categories of methods that can be used to develop multivariate credit risk assessment system: *the linear probability model*, *the logit model*, *the probit model* and *the discriminant analysis model*. Altman & Saunders (1998) argue that the discriminant analysis model (in variations) is the dominant methodology. Recent papers also often build on the discriminant models (e.g. Kiyak & Labanauskaite, 2012). Nevertheless, these methodologies do not have implications on the methodology used in this thesis, since they are all used to explain binary variable (whether a company will bankrupt or not), what in practice means defining the probability of failure of a company or classifying the company into a specific group. In our case, we are looking for claims satisfaction which is a continuous variable. The methodology is described in detail in the chapter Data & Methodology.

It is worth pointing out that Beaver (1966), Altman (1968) and many following authors chose a specific sample for their research by country, industry or/and by the asset size of the company so that the companies in the sample are as comparable as possible. It has also implications for our research. First, these papers are mostly based on companies from the US, which have different typical capital structure than continental Europe. These differences in financing have implications also for insolvency proceedings and thus our results may vary. However, even for Anglo-Saxon countries, there are studies that show a problematic application of the models on datasets that are not similar to original ones, as we discuss later in this section. Second, because of the data availability, Beaver (1966) and Altman (1968) were selecting mainly publicly traded companies, which are relatively large. For example, Altman's (1968) sample consisted of companies of size between \$0.7 mil. to \$25.9 mil. This will almost never be the case of insolvency proceedings. While there are some large companies in our sample, publicly traded companies do not occur in our data sample.

Models Focused on Small Companies

The focus on smaller companies and prediction of their failure began with the work of Edmister (1972). He found that most of the ratios do not have sufficient predictive power when they are used on the sample of smaller companies. As a result, he was searching for methods of alteration or specific use of ratios in the model, where is his main contribution. Edminster (1972) offers 5 possible methods of analysis: (1) *classification of ratio into quartiles within the sample*, (2) *observation of an up- or down-trend for a three-year period*, (3) *combinatorial analysis of ratio's trend and recent level*, (4) *calculation of the three-year average*, and (5) *division of a ratio by its industry average ratio*.

Using these methods of analysis, Edmister (1972) identifies seven ratios that best explain the failure rate for small companies, all of them adjusted to dummy variables based on specific rules. The used ratios are *annual fund flow/current liabilities ratio*, *equity/sales ratio*, *working capital/sales ratio*, *current liabilities/equity ratio*, *inventory/sales ratio*, *quick ratio* and *borrowers quick ratio*, i.e. very similar ratios to those used in the models of Beaver (1966) and Altman (1968).

Whereas the use of some of the methods of analysis proposed by Edmister (1972) would not be beneficial within our claims satisfaction model (either because of their irrelevance or because of data unavailability), other methods may prove to be useful. As we discuss in the chapter Data & Methodology, we use some of these methods, such as averaging or capturing trends.

The models focused on small companies were further developed. For example, Keasey & Watson (1986), Watson & Everett (1999) or Pindado & Rodriguez (2004) examined prediction of a bankruptcy of small businesses using different datasets and methods. These papers try to address most common problems that are connected to bankruptcy prediction models. Since these problems may be relevant to our model, we examine them in detail.

Common Problems in Bankruptcy Prediction Models

Papers that followed the early models of Beaver (1966) and Altman (1968) (e.g. Keasey & Watson, 1986; Watson & Everett, 1999) show a problem that the results do not work very well on any other sample except for the samples that are very similar to the original one. Watson & Everett (1999) see a potential explanation of these difficulties in the right definition and thus the indication of insolvency. Whereas Beaver (1966) defines insolvency as "a situation of a

firm which can no longer meet its financial obligations, when these become due" (*cash flow test*), Edmister (1972) and many following papers used a *loss borrower* indicator of US SBA⁸. This *loss borrower* indicator basically shows whether the business was successful or not, based on the ability to repay a debt to a bank. Fortunately, the right definition of insolvency and its recognition is solved through the insolvency law and insolvency proceedings for our dataset.

One of the major problem that many models using financial ratios are facing is multicollinearity. Since the financial ratios are based on the common set of underlying financial information, multicollinearity is a problem that may be expected. Early models of Beaver (1966) and Altman (1968) address it. Beaver (1966) is concerned with the correlation between ratios and asset value since the average of asset size of the non-failed companies was greater than that of failed companies. He found only very little or no correlation between the ratios and asset size. However, he admits that if a strong correlation had been found, it would be impossible to distinguish partial effects of individual variables. Altman (1968) uses evaluation of inter-correlation as a second most important factor for selecting the right set of ratios, just after the statistical significance and relative contribution of each independent variables.

Edmister (1972) is the first to offer a procedure for limiting inter-correlation. When adding more variables in the model, a variable with significant correlation coefficient with an already included variable is excluded from the model. In fact, Edmister (1972) did not accept a variable with a correlation coefficient of more than 0.31 with any already included variable. As he points out, with three or four variables in the model, the number of variables that could enter the model is substantially reduced as they tend to be highly correlated with the variables in the model. Edmister (1972) admits that such method may be too arbitrary; however, it clearly handles the problem of interdependence between any pair of variables.

The intuitive advantage of multicollinearity among the ratios is that it allows creating a model with a relatively small number of variables but with high potential of explanation of the independent variable (Altman, 1968; Horrigan, 1965). Pindado & Rodriguez (2004) tried to use this advantage and reduce the number of variables as much as possible. Starting with 42 variables, they used an extensive research based on the explanatory power of the variables. In the end, they arrived to a model with only two significant variables: *accumulated profitability/total assets* and *interest charges/total income*. With these

⁸United States Small Business Administration.

two variables, they achieved 90% classification accuracy one year before the bankruptcy and more than 80% accuracy three years before bankruptcy.

Multicollinearity is definitely a problem that we may face when building our model and we address it in the chapter Data & Methodology. While we have to select the ratios carefully, our main advantage is a large dataset. Many of the studies mentioned in this subsection examine bankruptcy prediction on the datasets with only dozens of companies; our dataset that involves publicly available financial data contains more than thousand companies.

2.4.2 Other Models of Bankruptcy Prediction

The bankruptcy prediction models based on the financial ratios are not the only models that try to capture the failure of companies. Liu (2004) takes a macroeconomic view on determinants of corporate failure. In the data over the period 1966-1999 for corporate failures in the UK there is an evidence that the failure rate is correlated with national landing, price level, corporate birth rates, company gross profit and especially the interest rate. When the interest rates rise, a company has more difficulty to borrow money and to service its debt which may result in insolvency.

It is worth pointing out that Liu (2004) examined period that was relatively very long, including energy crises in the 1970s, Black Monday in 1987 and early 1990s recession. Even though our examined period covers the financial crisis, macroeconomic conditions in the Czech Republic were relatively stable in comparison to those in the UK in the period examined by Liu (2004). Similarly to most of the papers examining bankruptcy prediction based on financial ratios, we focus on a relatively short period of time while focusing on macroeconomic conditions (including changes in legislative) requires a much longer period.

Another approach was taken by Bradley & Cowdery (2004), who perform a soft data analysis of company failure rate. They examine determinants such as personal issues, natural disaster or poor location. They found evidence to support the links between these indicators and failure rate; however, such approach is not applicable on a larger dataset. Moreover, a significant part of required data would not be available for companies that became insolvent and liquidated in the past years.

Chapter 3

Data & Methodology

In this chapter we provide overview of data and methodology we use for our research. First, we describe the data, their sources and how we link the data from various sources together. Followingly, we examine characteristics and the scope of the dataset using descriptive statistics. In the last section, we develop the model and we comment on the methods we use.

3.1 Data Sources

Since we focus only on cases where insolvency proceedings was resolved through bankruptcy, a company may have only one entry (observation) in our dataset. Therefore, we use company's identification number (in Czech "identifikační číslo") to connect data from various data sources.

3.1.1 Insolvency Proceedings Data

The basis of our dataset comes from the data we have been provided with by InsolCentrum for research purposes. As we have mentioned in the previous chapter, the dataset contains data from all insolvency proceedings that satisfy following conditions: (1) insolvency petition was filed after 1st January 2008, i.e. under the Insolvency Act, (2) the insolvency was declared, (3) the insolvency was resolved through bankruptcy, and (4) the proceedings was closed in the period 2011-2013.

While we have commented that in Insolvency Register there are actual and complete data about the proceedings, there is no export of these data. The Insolvency Register collects the information about proceedings as scanned documents without any unified form. Moreover, there may be specific documents

that correct previous ones or other specifics that may vary from case to case. That means that possibility of automatic collection of the data using software is very limited. Because of that, InsolCentrum collects some of the data manually.

The dataset contains general information about the company, its identification, industry classification according to NACE¹, the date of insolvency declaration and the date of proceedings closure. The debtor's asset value is captured in three ways: (1) the value of assets according to debtor, (2) the value of assets according to the insolvency administrator, and (3) earnings from assets sale. In practice, the valuation of the debtor is relatively far from the reality (as we show in *Descriptive Statistics* section) or such valuation is missing (in such case, InsolCentrum uses valuation according to the insolvency administrator). As a result, the value of assets according to the debtor is relatively useless information. In all the categories the assets are divided into categories such as movable assets, real estate, intangible assets and other.

The most important part of the dataset is in the results for creditors. The dataset contains amounts of registered claims and amounts paid to the creditors. These claims and money paid out are divided into secured and unsecured claims. Within each category, they are divided based on the type of creditor into claims of state (the Czech Republic), banks, employees and remaining creditors. Other provided information is claims (receivables) set on the same level with receivables for assets. This group of receivables is (similarly to the receivables for assets) a priority group since it covers the cost of the proceedings, receivables incurred during the proceedings, claims of employees and some other costs. These claims, however, are separated from the other claims since they do not reflect the loss of creditors.

The original dataset contains 2646 cases (including 445 entrepreneurs whose insolvency were resolved through bankruptcy), out of which there were 42 cases with zero registered claims from both secured and unsecured creditors. That means that either no creditor registered their claims or, for example, the claims may have not been recognized by the court. These cases may also be examples of abusive (vexatious) insolvency filings. Since satisfaction of creditor's claims does not make sense in these cases, we exclude them from the dataset. Considering size of the dataset, this action should have none or almost none effect on the results.

This dataset of insolvency proceeding information for 2,604 cases is our starting point to which we add data from other sources.

¹European system of classification of economic activities.

3.1.2 Financial Data

Any company in the Czech Republic is obliged to submit financial reports every year. These reports are then published in Business Register. The aim of searching for such data is to see financial reports in the last years of company's operations and to look for figures that may have an effect on claims satisfaction. Business Register, similarly to Insolvency Register, does not offer any data export.

For obtaining financial data, we use MagnusWeb, a database provided by private company Bisnode Česká republika, a.s. This database contains up-to-date information from Business Register and offers export of the data. For each company in our dataset, we searched for the last two balance sheets and the last two income statements. The financial reports are based on Czech Accounting Standards (CAS)² and reports no older than 2003 are provided.

Out of the 2,604 companies in our dataset, only 1,175 submitted their financial statements. If we account for 438 entrepreneurs who did not submit financial statements since they may not have the obligation, it would still leave 991 companies (46 % of companies, 38 % of cases) that did not submit their financial statements ever or that they did not submit them in at least 5 last years of operations, which is in terms of value of such financial information the same as if they did not submit them at all. One of the possible explanation may be a very short lifetime of a company; however, there are only 47 companies that did not submit financial statements and had shorter life³ than 18 months. That suggests that there is a weak pressure on companies to meet their obligations regarding submission of financial statements. Consequently, we examine whether submission of financial statements has an effect on claims satisfaction by employing it as an explanatory variable into our model.

Out of the 1,175 companies that submitted financial statements, there are 1,037 companies that also submitted financial statements at least once more before the last financial statements. The difference is partially explained by companies with short lifetime; however, most companies just decided not to submit them. Since we want to use some of the methods suggested by Edmister (1972) that counts with more financial statements, we use this sample of 1,037 companies for the model that tries to capture determinants of claims satisfaction in the financial data. Besides that, we also use a subsample of

²Czech accounting standards based on the IFRS.

³Period between foundation and insolvency declaration.

this sample, keeping only 758 companies that have submitted the last financial statement in the last three years before insolvency declaration.

3.1.3 Other Data

Besides the data from insolvency proceedings and financial data we also look for some suspicious signs, that we call *red flags*. The data for these flags was provided by EconLab z.s. for research purposes. We go through each of the captured signs and describe what it captures and what data source it is based on.

- *Anonymous shares*. Using data from Business Register, we look if the company or any company in the ownership structure had anonymous shares. Since anonymous shares conceal real owners of the company, they are often used in companies that use illegal practices. Such practices may include turning a company into insolvency on purpose while withdrawing money from the company at the cost of creditors.
- *Offshore subjects*. This indicator, based on the data from Business Register, shows whether there was any foreign legal entity in the ownership structure, i.e. including ownership of companies that owned the company we examine.
- *No employees*. In this red flag, we denote companies that have no employees, using data from Business Register.
- *Homeless person*. Using the list of municipal offices in the Czech Republic, we check if there is any person in the company's statutory body that would have a permanent address at a municipal office, meaning the person is homeless. This indicator checks for the practice of using homeless people to take personal property responsibility for the actions of a company since they have nothing to lose.
- *Firm nest*. This sign shows whether the company's registered office is at one of the firm nests. Any address is considered a firm nest if (1) there are registered offices of more than 25 companies (limited-liability and joint-stock companies) and (2) at least 50 or 50 % of companies on such address is labeled as economically inactive by Czech Statistical Office. For the definition and list of firm nests, we use zIndex database

(provided by EconLab z.s.). The company with registered office at firm nest has higher probability that the company is not physically present at such address which may cause problems with any enforcement of rights.

- *Unreliable VAT payer.* Using data of Ministry of Finance, we check whether the company was on the list of unreliable VAT payers.
- *Insolvency Register record.* The last red flag indicates whether there is any person within the ownership structure, statutory body, board of directors or supervisory board that is linked (in any way) to other company that was subject to insolvency proceedings (the proceedings did not necessarily have to commence). The data capture the distance of the person from the company in ownership structure and a number of companies in Insolvency Register that such person is linked to. Combining the entries, we also obtain how many such persons are linked to a company.

3.2 Descriptive Statistics

For the beginning, we provide an overview of the scope of our data. In the table 3.1 we see a count of cases in our dataset in given years based on insolvency declaration and proceedings closure. As we have mentioned, we are focused only on insolvency proceedings that were closed in the period 2011-2013. We see that the peak of insolvency declaration for our cases was in 2010, which is logical. In the early years (especially 2008), there was generally a low number of cases as the Insolvency Act just came to force and also some of the cases have been closed before 2011. On the other hand, the cases that had bankruptcy declaration in 2012 or 2013 were not closed by the end of 2013.

As showed in the table 3.2, the average length of the proceedings from insolvency declaration to closure is 23.1 months and it is getting longer in time. This trend has been at least partially caused by the fact that all proceedings began after 1st January 2008, which means that long proceedings could not have ended in 2011. This trend is in accordance with the findings in the literature.

In the table 3.3, we see figures for the *Full dataset*, which refers to the dataset of all 2,604 cases, accompanied by two mutually exclusive subsamples, one containing only companies and another containing only entrepreneurs. We can see that the satisfaction of claims is 6.55 % for all cases and satisfaction for secured creditors is much higher than for unsecured. These figures are in accordance with the findings in the literature.

Table 3.1: The Count of The Cases in Our Dataset in Time

# of cases	2008	2009	2010	2011	2012	2013
Closure date				668	803	1 133
Insolvency declaration	176	505	782	696	379	66

Table 3.2: Length of Proceedings from Insolvency Decl. to Closure

	Total	2011	2012	2013
Length of proceedings	23.1	18.0	21.8	26.9

In months, by the year of closure.

There are several interesting observations in the table 3.3. First, the entrepreneurs have a significantly higher satisfaction of claims than companies. Second, in company cases, the valuation of assets by the debtor is by 73 % higher than valuation by the administrator, which suggest that the debtors provide unrealistic numbers. Third, as we would expect, the insolvency proceedings of entrepreneurs are much less important in terms of amounts claimed; however, they are not negligible.

For the *Full dataset*, we provide a histogram of the claims satisfaction in the figure 3.1. As we can see, most of the cases have claims satisfaction of 0% (1,502 cases) or less than 5% (477 cases).

The table 3.4 shows two mutually exclusive subsamples of *Companies only*. First contains companies with no or only one submission of financial statements, the second captures the rest. *Current financials* is a subsample that contains companies with at least two submissions of financial statements with the last one in the last three years of operation⁴. The total satisfaction is higher for companies with submitted financials and slightly higher even more for companies with relatively recent financials. Interestingly, this situation does not apply to satisfaction of secured claims, which is, however, partially caused by 4 large insolvencies⁵.

Figure 3.2 show what amount of money in comparison to the claims should be in the company based on the asset value (determined by debtor and administrator), what is the real income and what remains left for the creditors. It is obvious that even at the beginning of the proceedings, the company has assets

⁴In the last three years of operation before insolvency declaration. Since the declaration takes on average approximately 2.5 months from filing, this period does not significantly influence our conclusions.

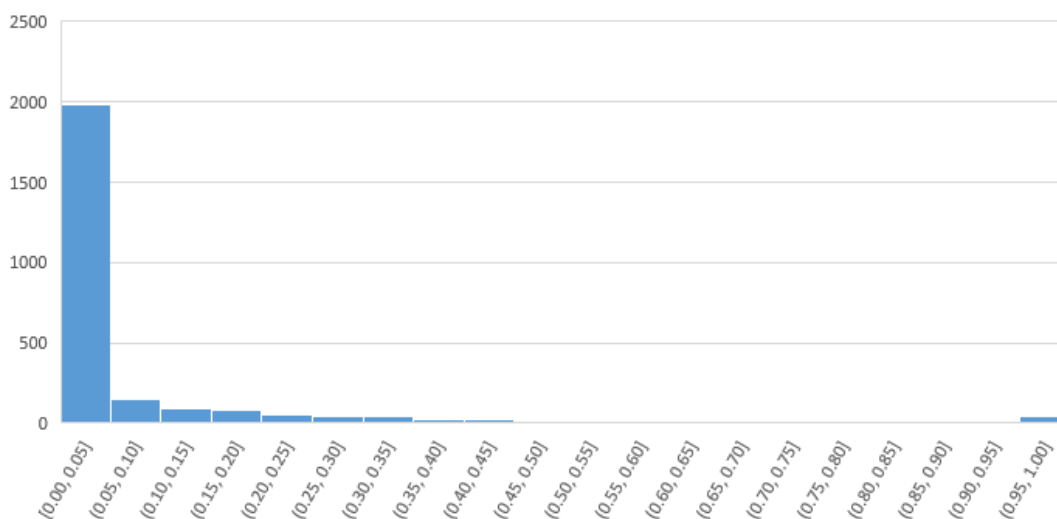
⁵These 4 cases account for approximately 43% of the total payoff to secured creditors in cases without financial statements.

Table 3.3: Basic Figures

	Full dataset	Companies only	Entrepreneurs only
# of cases	2 604	2 164	440
Claims	44 313 286	41 732 843	2 580 443
— Secured	11 737 816	10 997 677	740 139
— Unsecured	32 575 470	30 735 166	1 840 304
Asset value (debtor)	18 733 414	17 950 025	783 390
Asset value (admin.)	11 172 351	10 366 667	805 684
Income from sales	3 924 267	3 491 091	433 176
Claims satisfaction	2 900 311	2 508 546	391 765
— Secured	1 966 322	1 669 822	296 500
— Unsecured	934 019	838 754	95 265
Satisfaction (%)	6.55%	6.01%	15.18%
— Secured	16.75%	15.18%	40.06%
— Unsecured	2.87%	2.73%	5.18%

In thousands of CZK.

Figure 3.1: Histogram of Claims Satisfaction



In # of cases, by satisfaction of claims.

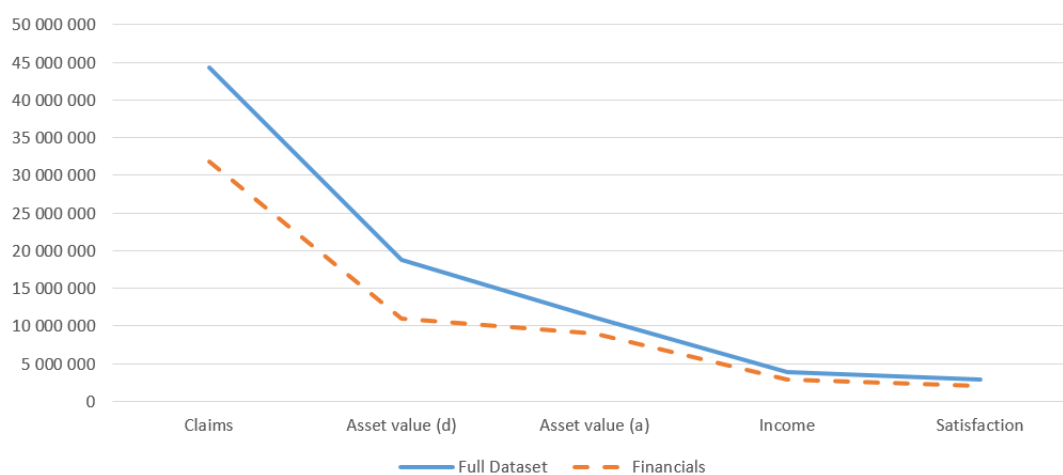
Table 3.4: Basic Figures Cont.

	Without financials	Financials	Current financials
# of cases	1 129	1 037	758
Claims	9 956 659	31 798 718	28 537 631
— Secured	1 258 282	9 748 063	9 366 064
— Unsecured	8 698 377	22 050 655	19 171 568
Asset value (debtor)	7 041 977	10 914 073	10 235 008
Asset value (admin.)	1 332 927	9 039 765	8 644 230
Income from sales	597 012	2 899 322	2 729 824
Claims satisfaction	462 386	2 050 765	1 914 174
— Secured	378 364	1 296 064	1 191 411
— Unsecured	84 052	754 702	722 763
Satisfaction (%)	4.64%	6.45%	6.71%
— Secured	30.07%	13.30%	12.72%
— Unsecured	0.97%	3.42%	3.77%

In thousands of CZK.

of value that is a fraction to its obligations. The assets are sold for much less than their estimated value and when we finally deduct costs of proceedings, the creditors recover only tiny part of their claims.

Figure 3.2: Difference between Amounts Claimed and Received Income



In thousands of CZK.

Alarming figure is that in 58% of cases with registered secured claims, the total asset value (based on valuation from the administrator) is lower than se-

Table 3.5: Basic Figures in Years

	2011	2012	2013
# of cases	668	803	1 133
Claims	5 522 600	13 539 339	25 251 348
— Secured	739 399	4 355 691	6 642 726
— Unsecured	4 783 201	9 183 648	18 608 621
Asset value (debtor)	1 490 571	5 146 422	12 096 421
Asset value (admin.)	946 024	5 127 274	5 099 054
Income from sales	418 043	1 350 350	2 155 874
Claims satisfaction	334 189	943 148	1 622 974
— Secured	242 560	713 849	1 009 913
— Unsecured	91 659	229 300	613 061
Satisfaction (%)	6.05%	6.97%	6.43%
— Secured	32.81%	16.39%	15.20%
— Unsecured	1.92%	2.50%	3.29%

In thousands of CZK.

cured claims. If we take in account only real estate and movable property of the company which is typically used for securing the debt (even the moveable property is questionable), we reach 71.5% of cases. That means that the creditors fail in securing their landings or the value of the property has fallen or the property has been withdrew from the company. While the value of property may have been a real cause since we capture the period of financial crisis, the prices did not drop that much to explain such difference. The *House price index* of Eurostat (2016) show that the difference between the peaks (Q3/2008 and Q1/2013) is less than 10%. In reality, there will be probably some combination of these potential causes.

The table 3.5 shows the satisfaction of claims in particular years of proceedings closure. Basically, all absolute figures grow in time. This has been partially caused by the gradual impact of financial crisis and the fact that the Insolvency Act was rather new and the long proceedings could not have been closed as early as in 2011. The satisfaction of claims remains relatively stable in time, with exception of secured creditor's claims satisfaction, which, however, has been driven by 2 large relatively successful insolvencies in 2011⁶.

⁶These 2 cases account for more than 42% of claims satisfaction in absolute terms in 2011.

3.3 Model & Methodology

In this section we develop our two models. First model, which is be our *Base model*, works with data available in our full dataset, i.e. it covers data from insolvency proceedings together with the *red flags*. In the second model, which we call *Financial data model*, we add data from last two submitted balance sheets and income statements. Consequently, this model is examined on reduced dataset that contains only companies with available financial data. We also describe our methodology and we address potential problems such as multicollinearity or heteroskedasticity.

3.3.1 Base Model

We start with *claims_satisfaction*, our explained (independent) variable. We define it simply as *money paid to secured and unsecured creditors* divided by *registered claims of secured and unsecured creditors* in each of the cases. Since we have excluded cases with zero value of registered claims, our explanatory variable is always defined and its value is between 0 and 1.

In our models, we generally do not use financial data in absolute values, we keep them relative (usually to the claims). This helps us to offset differences between large and small insolvency cases and it also ensures that our results will not be affected by few large insolvencies.

First, we capture general information about the company in the explanatory variables that are showed in the following list.

- *Financial_report* is a dummy variable indicating whether the subject submitted financial reports at least once from 2003. We expect that companies with submitted financial statements are more transparent and thus should have a higher satisfaction of claims.
- *Audit* is a very similar dummy variable indicating whether the company has been audited. We expect again positive influence.
- *Entrepreneur* is a dummy variable denoting entrepreneurs. Since we have shown in *Descriptive Statistics* section that they have on the average higher satisfaction of claims, we use this variable to correct for this difference. We also perform regression on the dataset with companies only to check whether inclusion of entrepreneurs may have caused structural differences in the results.

- *Years_in_operation* is a length of company's life between its foundation and declaration of insolvency. Since we expect that some short-life companies may be designed to end up in insolvency and that young companies may get easily over-indebted, we expect that the older companies should have a higher satisfaction of claims. It would be reasonable to expect that the influence will get smaller with the age of the company, i.e. the difference between 1-year-old and 3-years-old company could be bigger than between 10-years-old and 12-years-old company, thus we also try to employ square root of the age instead of age itself.

Second, we construct following variables using data from insolvency proceedings.

- *Secured_to_total_claims* is a ratio between secured and all registered claims in the proceedings. We expect that higher the share of secured claims (as approaching the value of 1), the higher the satisfaction of claims.
- We capture asset value based on the valuation of the insolvency administrator. We use following categories of property: *real estate*, *inventory*, *receivables*, *cash*, *intangibles* and *other property* (including movable property). We take each category to create a variable so that we can evaluate effects of particular categories of property. In order to get relative values, the numbers are divided by the registered claims in each case. The total amount of claims is the best figure for the property to be related to since it is always larger than zero and at least approximately reflect the scope of the case and size of the company. The value of assets, which would be our first choice, is unfortunately hardly usable since there are many companies that managed to take all or almost all assets from the company and thus the value of assets does not reflect the size of the company (the zero values would represent another problem). We expect that especially real estate, inventory, receivables and cash should have a positive effect.
- *Business_sale* is a dummy variable that indicates cases in which the company (or at least some operational part) was sold as a whole. While the possibility of such sale means that there is at least some property in the company (which is not always the case), the property is captured in the asset variables and thus this variable should at least partially isolate

the sale method. The motivation is that we expect that sale of a business or part of the business should be more valuable than just selling individual assets.

Third, we also add the *red flags*: *presence of anonymous shares, offshore subject in ownership structure, no employees, a homeless person in statutory body, unreliable VAT payer* and *record in Insolvency Register*. All of them are in a form of dummy variables and we expect them to have a negative effect.

The only difficult indicator is the *record in Insolvency Register*. Since we have several pieces of information that capture the reality (number of persons with the record, number of records for individual persons, distance in ownership structure), we experiment with the conditions to form the variable. We employ these formed variables one after another into the model and we observe the results.

Using all these variables, we obtain our *Base model* for claims satisfaction:

$$\begin{aligned}
 \text{claims_satisfaction} = & \beta_0 + \beta_1 \text{financial_report} + \beta_2 \text{audit} + \beta_3 \text{entrepreneur} \\
 & + \beta_4 \text{years_in_operation} + \beta_5 \text{secured_to_total_claims} \\
 & + \beta_6 \text{prop_real_estate} + \beta_7 \text{prop_inventory} \\
 & + \beta_8 \text{prop_receivables} + \beta_9 \text{prop_cash} \\
 & + \beta_{10} \text{prop_intangibles} + \beta_{11} \text{prop_other} \\
 & + \beta_{12} \text{business_sale} + \beta_{13} \text{anonymous_shares} \\
 & + \beta_{14} \text{of_shore_subject} + \beta_{15} \text{no_employees} \\
 & + \beta_{16} \text{homeless_person} + \beta_{17} \text{firm_nest} \\
 & + \beta_{18} \text{unreliable_vat} + \beta_{19} \text{insolvency_record} + u
 \end{aligned} \tag{3.1}$$

3.3.2 Financial Data Model

In the second model, we employ financial data from the last two submitted financial statements, which means that we use this model on a subsample of cases with financial data. The subsample selection based on the value of explanatory variable represents potential endogeneity problem. Since we keep most of the variables in both our models and the *Base model* does not suffer from this problem, we observe whether the results of the models remain consistent. The rest of the variables is connected to the financial data and we should be aware that their applicability is limited.

The selection makes some of the variables from our *Base model* obsolete. Particularly, we take out *financial_report* and *entrepreneur* from the model since the first variable is constant and the other is almost constant (only 2 entrepreneurs submitted financial data).

In the literature overview, we have already commented that some financial ratios from bankruptcy prediction literature are useless for our model, as they capture only short-term financial health of a company. We focus only on representatives of *net-income*, *cash flow* and *debt to total-assets ratios*. In comparison to the bankruptcy prediction literature, we are limited by availability and reliability of the data, thus we have only a few particular ratios that we can choose. We add following financial data and other relevant information:

- *Years_from_last_fin* captures a length of the period between insolvency declaration and the date of the last submitted financial statements. We assume, that the longer the period, the lower the satisfaction, since the decision of not submitting financial statements in the last years of operations may be a sign of concealing real condition of the company.
- As an adjusted representative of a *debt to total-assets ratio*, we use equity divided by claims (*equity_to_claims*) since assets are highly unreliable. Equity should be a "buffer" to cover the potential loss of creditors; therefore, we expect that this ratio should have a positive effect on the satisfaction of claims. It is worth pointing out, that average equity is negative in our dataset.
- As a *net-income ratio* we use *average_sales_to_claims*, which is an average of income from sales of goods from last two submitted income statements, divided by total claims. We have examined the influence of sales of goods, sales of services and sales of goods and services combined and for each of them sales from the last income statement only and some of the methods suggested by Edmister (1972), particularly averaging and capturing trend. Since the average of sales of goods has the best predictive value, we use it in the model. Detailed comments are provided in the chapter *Results*. If a company has sales, we may assume that the company was not just an empty shell and has some production factors. Consequently, sales should have a positive effect on the satisfaction of claims.
- Since cash-flow statements were not included in our data, we had to estimate cash flow from the income statement in order to employ a representative of *cash flow ratio* into the model. We compute cash flow as *operation profit + depreciation + change in reserves*. Similarly to the

net-income ratio, we use average cash flow divided by total claims. Again, we expect a positive influence on claims satisfaction.

- *Signif_deprec_increase* is a dummy variable capturing a significant change of depreciation. We experiment with conditions for this dummy and eventually we use the definition of substantial change as an increase at least by 100% and at least by 100 ths. CZK between last two financial statements. We assume that acceleration of depreciation may serve to clear some assets out of the balance sheet in order to withdraw the assets from the company. A significant increase of depreciation thus should lead to lower satisfaction of claims.
- We also try to capture a significant increase in personal cost, which can be an attempt of company owner to withdraw money cash the company through salary. We use dummy variable *signif_pers_cost_increase* for which we have again examined several definitions out of which we use that the variable equals one if the personal costs rose at least by 50% and at least by 100 ths. CZK. Again, we expect a negative effect.

As a result, we arrive to the following *financial data model*:

$$\begin{aligned}
 \text{claims_satisfaction} = & \beta_0 + \beta_2 \text{audit} + \beta_4 \text{years_in_operation} \\
 & + \beta_5 \text{secured_to_total_claims} + \beta_6 \text{prop_real_estate} \\
 & + \beta_7 \text{prop_inventory} + \beta_8 \text{prop_receivables} \\
 & + \beta_9 \text{prop_cash} + \beta_{10} \text{prop_intangibles} \\
 & + \beta_{11} \text{prop_other} + \beta_{12} \text{business_sale} \\
 & + \beta_{13} \text{anonymous_shares} + \beta_{14} \text{offshore_subject} \\
 & + \beta_{15} \text{no_employees} + \beta_{16} \text{homeless_person} \\
 & + \beta_{17} \text{firm_nest} + \beta_{18} \text{unreliable_vat} \\
 & + \beta_{19} \text{insolvency_record} + \beta_{20} \text{years_from_last_fin} \\
 & + \beta_{21} \text{equity_to_claims} + \beta_{22} \text{average_sales_to_claims} \\
 & + \beta_{23} \text{average_cf_to_claims} \\
 & + \beta_{24} \text{signif_deprec_increase} \\
 & + \beta_{25} \text{signif_pers_cost_increase} + u
 \end{aligned}
 \tag{3.2}$$

3.3.3 Methodology

As we have commented, our data are in a form of cross section. While we have data from insolvency proceedings closed in three consecutive years, there is always only one entry for each company and the conditions for insolvency resolution were stable in the period we cover. As a result, we use OLS method to estimate coefficients in our models.

Multicollinearity

The bankruptcy prediction models often deal with multicollinearity, since financial ratios have a common set of underlying financial information. We have already commented, that our main advantage is that we have relatively large datasets. Nevertheless, we check inter-correlations using correlation matrices (full results can be found in Appendix A).

We find that there are only a few cases in which the correlation exceeded the value of 0.31 (or -0.31) of Edmister (1972). The highest correlation is between *cash* and *receivables*, 0.55 for the full dataset and 0.64 for both datasets with financial data. There are three more correlations on above the level, *entrepreneur* to *financial_report* (-0.40), *entrepreneur* to *secured_to_total_claims* (0.33) and *prop_real_estate* to *secured_to_total_claims* (0.36). These correlations may have been expected; however, we know that these correlations are in reality far from perfect. Due to this fact and due to the sufficient size of our dataset, we may be relatively sure that multicollinearity is not a problem in our model.

Treatment of Industry Differences

We are aware that there are differences among industries such as typical capital structure, business operations, ownership of assets or usage of securitization of debt. Since these differences may have an effect on the satisfaction of claims as well as on our explanatory variables, they are potentially problematic.

In order to address this problem, we use a set of 100 industry categories according to NACE to build 100 dummy variables, each indicating presence of a company in particular industry. The key decision is to set a minimal number of companies in the industry needed to include such variable. The industries with a small number of companies can have a biased influence on claims satisfaction. We examined the influence using minimal count of 5, 10, 20 and 30 companies, respectively. For each selection of variables, we perform OLS regression on claims satisfaction. For all cases, most of the significant coefficients were for industries with the minimal count of companies in a given category, as it can be seen in the tables 3.6 and 3.7. However, agriculture (more precisely *crop and animal production, hunting and related service activities*, NACE category 1) with 45 insolvency cases was significant in all regressions.

As a result, we may assume that agriculture has structural differences and thus we employ dummy variable *nace_1* in our *Base model* to correct for it. We

Table 3.6: Influence of Industry on Claims Satisfaction (> 20 companies)

NACE	Industry	# companies	Effect
1	Crop and animal production, hunting and related service activities	45	Positive
62	Computer programming, consultancy and related activities	20	Negative
79	Travel agency, tour operator and other reservation service and related activities	25	Negative
96	Other personal service activities	21	Positive

Table 3.7: Influence of Industry on Claims Satisfaction (> 30 companies)

NACE	Industry	# companies	Effect
1	Crop and animal production, hunting and related service activities	45	Positive
55	Accommodation	30	Positive

do not employ the variable in the *Financial data model* since there are only 7 agriculture cases in the subsample containing financials.

Heteroskedasticity

We use Breusch-Pagan test to check for heteroskedasticity. Since the heteroskedasticity present, we use heteroskedasticity-robust standard errors.

Chapter 4

Results

In this chapter, we show and discuss the results of our models. Within the text, we report estimated coefficients, p values and significance levels, denoted as * for 90% level, ** for 95 level, and *** for 99% level of confidence. Full results can be found in Appendix B.

4.1 Base Model Results

The results of the *Base model* are presented in the table 4.1. Since we have shown that entrepreneurs have a higher satisfaction of claims, we also performed the same regression on the subsample containing only companies, to check whether the inclusion of the entrepreneurs into our full dataset does not create significant structural differences in the results of the model.

We see that companies that submitted their financial statements have a higher satisfaction of claims, approximately by 1.7 percentage points. While such figure may seem low, considering the fact that average satisfaction of claims in our dataset is 6.55%, it represents relatively important effect. Such relativity should be considered for all results. It is worth pointing out that these findings suggest that the state should be more active in the enforcement of the obligation of companies to submit their financial reports. Quite surprisingly, the results do not show that an audited company would have higher claims satisfaction.

Dummy variable for entrepreneurs has a positive and significant coefficient, as expected. In the regression for companies only, the variable is constant, thus it is omitted.

In the *Data & Methodology* we have commented that we tried to capture

age of the company as number of years in operation and also square root of this number, since we expect the impact of additional year of company's age to decrease with the company's age. Employing each of the variables in the model, either is not significant. As the age of the company in years has lower p-value, we keep this one in the model. Potential explanation is that old companies may benefit from the trust of their creditors they gained in the time and may get more over-indebted, which offsets effect of young companies that may be designed to end up in insolvency.

The ratio of secured to total claims has a positive effect on claims satisfaction, which is another evidence for creditors to secure their claims. The coefficient can be explained as a theoretical difference of satisfaction between the cases with only unsecured and only secured claims. In the section *Descriptive Statistic* we showed that entrepreneurs have higher satisfaction of claims, but also higher satisfaction of secured claims relatively to unsecured claims. It is thus not surprising, that results for companies only show lower coefficient. The consequence is that securing receivables from entrepreneurs has higher return than from companies; however, is it beneficial in both cases.

Considering company's property, the results show that only cash and real estate have significant positive effect on the satisfaction of claims. On the contrary, intangibles have a negative effect on the satisfaction of claims. It is also not completely surprising since intangibles are assets on the balance sheet that have usually zero value in case of bankruptcy and asset sales.

Interestingly, the receivables are not significant, which suggest that (1) there may be cases of secondary insolvency or (2) some of the receivables may not be real (may be made up by the debtor) or (3) the bankruptcy is inefficient process when it comes to collecting or selling receivables. It is less surprising that inventory and other property (including movable property) are not significant.

Selling at least a part of the business as a whole increases the satisfaction of claims by approximately 17 percentage points, which is almost triple to the average satisfaction. On the one hand, realization of such sale implicitly assumes that there is some property or some functional unit, which may be reason for high satisfaction instead the method of sale. On the other hand, the assets are captured by separate variables and the sale of assets that form a functional business unit is generally more valuable than selling assets apart. Consequently, the insolvency administrators should always consider this option

Table 4.1: Results of the Base Model

	Full Dataset			Companies only		
Observations	2 604			2 164		
R-squared	0.4064			0.3498		
	coef	p-val	sign	coef	p-val	sign
financial_report	.0169	0.002	***	.0176	0.001	***
audit	-.0031	0.793		-.0031	0.794	
entrepreneur	.0472	0.000	***	(om)		
years_in_operation	.0008	0.199		.0008	0.222	
secured_to_tot~s	.2311	0.000	***	.1368	0.000	***
prop_real_estate	.2322	0.000	***	.3334	0.000	***
prop_inventory	.0476	0.427		.0437	0.464	
prop_receivables	.0019	0.129		.0017	0.196	
prop_cash	.0899	0.010	***	.0886	0.010	***
prop_intangibles	-.0016	0.000	***	-.0016	0.000	***
prop_other	.0321	0.373		.0418	0.291	
business_sale	.1647	0.003	***	.1717	0.004	***
anonymous_shares	-.0021	0.832		.0002	0.986	
offshore_subject	-.0035	0.695		-.0026	0.775	
no_employees	.0090	0.339		.0083	0.376	
homeless_person	-.0196	0.129		-.0212	0.000	***
firm_nest	-.0293	0.001	***	-.0274	0.001	***
unreliable_vat	-.0242	0.000	***	-.0251	0.001	***
insolvency_record	-.0468	0.003	***	-.0431	0.002	***
nace1	.1073	0.006	***	.1118	0.011	**
_const	.0087	0.209		.0091	0.194	

whenever it is possible¹.

Out of our *red flags*, we find 4 significant effects, all of them negative, as expected.

- Homeless person is significant only on subsample with companies only. The difference between the results can be explained easily. The motivation for employing this variable is the idea of using homeless person in the statutory body of the company to bear responsibility for potential loss with his own property (which a homeless person does not have, thus have nothing to lose), instead of the owners. The entrepreneurs do not have the possibility of limited liability, thus their data may represent a disturbance in the full dataset. The consequence of these findings is that having a homeless person in the statutory body of a company is indeed a suspicious sign of a company and statistically results in lower satisfaction of claims.
- Companies with registered office at a firm nest have statistically lower satisfaction of claims. It is thus another sign that may serve as an indicator of potential problems.
- Companies listed as unreliable VAT payers have lower satisfaction of claims. Considering that such information is available to the state prior to the insolvency proceedings and considering the fact that state has relatively low satisfaction of claims among the creditors (Insolcentrum, 2016), this finding suggests that the state is may not be using information about VAT payments to check for insolvency sufficiently. Insolvency administrators and law professionals agree that entering insolvency too late is a common problem in the Czech Republic. This finding shows, that the state has information that could be used to active approaching of the company or considering filing insolvency petition in order to prevent late insolvency entries. Moreover, the information about other *red flags* is also held by the state, this one is just most straightforward and obvious.
- We have examined record in insolvency registry in various ways. We have combined minimal number of persons with insolvency record, number of entries for such persons and the distance of the persons in the ownership

¹We do not argue that this is not happening in reality, we just providing evidence for such option.

structure (i.e. persons in mother companies). Employing created variables into the model one after another, we have found that this sign is significant under the condition that there must be at least two persons with record, out of which at least one has at least two records. This suggest that there are groups of people who have multiple companies in insolvency, with a low satisfaction of claims. These insolvencies may be intentional or they may be just very cases of unsuccessful business owners. The first case is basically a criminal activity and should be investigated. The second case rises a question whether people with numerous insolvencies should be disallowed to start new companies (which would help also the first case). In the Czech Republic, such prohibition may arise from criminal proceedings but not from the multiple insolvency proceedings.

- Having anonymous shares, a presence of offshore legal entity in the ownership structure or having no employees did not prove to have a significant effect on claims satisfaction.

Our dummy variable *nace1*, added to control industry specifics of agriculture, is significant and positive, as expected.

To summarize, we have confirmed several hypotheses. Most importantly, we have showed that there are indicators based on publicly available data, that statistically result in a lower satisfaction of claims. Besides that, we have also found evidence that support hypotheses such as secondary insolvency or existence of people that have multiple insolvencies with statistically lower claims satisfaction.

4.2 Financial Data Model Results

The results of the *Financial data model* are presented in the table 4.2. We present results for the sample of all 1037 companies that have submitted their financial statements at least twice and for the subsample of 758 companies that have submitted the last financial statements in the last three years of operation before insolvency declaration (*current financials*). For the latter subsample we also reach highest R-squared of almost 48%.

For the variables that remained from the *Base model*, we can see quite similar results. Either the audit or the age of the company is not significant; the ratio of secured to total claims has a positive effect on the satisfaction of claims. Out of the property, only real estate and cash have a significant positive

Table 4.2: Results of the Financial Data Model

	Financial Dataset			Current Financials		
Observations	1 037			758		
R-squared	0.4574			0.4791		
	coef	p-val	sign	coef	p-val	sign
audit	.0101	0.426		-.0204	0.339	
years_in_operation	.0000	0.988		-.0001	0.943	
secured_to_total_claims	.1046	0.004	***	.1326	0.003	***
prop_real_estate	.4427	0.000	***	.4198	0.000	***
prop_inventory	-.0384	0.596		-.0271	0.834	
prop_receivables	.0016	0.158		.0016	0.147	
prop_cash	.0932	0.012	**	.0916	0.011	**
prop_intangibles	-.0026	0.000	***	-.0026	0.000	***
prop_other	.0825	0.130		.0770	0.176	
business_sale	.1932	0.012	**	.2134	0.008	***
anonymous_shares	-.0021	0.857		.0075	0.638	
offshore_subject	.0152	0.279		.0138	0.363	
no_employees	.0243	0.128		.0245	0.202	
homeless_person	-.0196	0.032	**	-.0287	0.017	**
firm_nest	-.0195	0.109		-.0192	0.270	
unreliable_vat	-.0499	0.003	***	-.0389	0.061	*
insolvency_record	-.0320	0.087	*	-.0332	0.164	
years_from_last_fin	-.0047	0.078	*	-.0051	0.252	
equity_to_claims	-.0004	0.000	***	-.0004	0.000	***
average_sales_to_claims	.0018	0.006	***	.0022	0.000	***
average_cf_to_claims	.0025	0.018	**	.0025	0.028	**
signif_deprec_increase	-.0218	0.006	***	-.0190	0.054	*
signif_pers_cost_increase	-.0017	0.844		-.0129	0.267	
_const	.0335	0.000	***	.0346	0.001	***

effect, while intangibles have a negative effect. Selling business or business unit as a whole has also a positive effect.

There are some differences in the *red flags*. For the full *Financial dataset*, we see significant negative effects of a homeless person, unreliable VAT payer, and insolvency record (though only on 90% confidence level). It is worth pointing out, that company's office at a firm nest is relatively close to the 90% confidence level as well. For the companies with current financials, we lose the significance of insolvency record and the unreliable VAT payer is significant only on 90% confidence level.

The time between submission of the last financials and insolvency declaration is significant only on 90% confidence level and on the full financial data sample. The difference between samples is that for the subsample with current financials, we have excluded companies with $years_from_last_fin > 3$. That suggests that no submission of financial statements in the last couple years is similar to no submission at all (zero value of *financial_report* variable in the *Base model*) and has the same effect: lower satisfaction of creditors' claims.

The results show that the ratio of company's equity to registered claims has a negative effect on claims satisfaction. Equity should serve as a buffer for creditors; however, the results suggest that the larger the buffer, the lower the payoff to creditors. If we assume that a company has the same amount of equity as claims, the results suggest that it would result in the satisfaction of claims lower by 0.4 percentage points. Although the coefficient and the effect is relatively small, this finding is counterintuitive and it is hard to find out a reasonable explanation; therefore, we will check for potential problems in the data in the next subsection.

We have examined the effect of sales in various ways. First, we have worked separately with sales of goods, sales of services and sales combined. For all of them, we have used the last sales to claims and we also used methods suggested by Edmister (1972) - a dummy variable to capture a trend and using an average. After examination of these possibilities, we have found that average sales of goods from last two submitted financial statements with respect to registered claims has the best explanatory value in our model. The coefficient is positive and significant, which is in correspondence with the expectation and the literature. It is interesting, that sales of services do not have a similar effect. This may be caused by the fact that sales of services can be easily manipulated (in order to improve the performance of the company).

In the case of cash flow, we have also used methods suggested by Edmis-

ter (1972). Again, we have found that average cash flow from the last two submitted financial statements works best in the model.

We have tried to capture significant depreciation increase in several ways. Using dummy variable denoting the trend if the depreciation increased by at least 50% or 100% (between last two submitted financials) did not have notable additional value for the model; however, when we combined this condition with a certain minimal increase of depreciation, we have reached the results. Such condition is intuitive - if we want to capture dishonest activities, we should look for amounts that provide potential return high enough for the owner so that it is worth the action. In the model, we use dummy variable based on a condition that depreciation must rise by at least 100% and at least 100 ths. CZK between last two financials.

We have done a similar search for the significant changes in personal costs; however, we have not found a condition under which we would get a significant result. Even if the reality was different, we may assume that capturing such behaviour statistically is at least very difficult, if not impossible.

Outlier Treatment

Looking in the data, we see that outliers in variables such as equity arise in the cases with very low amounts of registered claims. In such cases, often only thousands or tens of thousands CZK are claimed, which means that such numbers may be exceeded in the financial figures easily even by several digits, especially in the case of a longer period between the financials and insolvency declaration. To check how much our results are influenced by the outliers, we use two methods to deal with them and we observe changes in the results.

First, we use winsorization method on 1% and 99% level. In practice, it means that for the data below 1st percentile, we set their values to the value of 1st percentile and for the data above 99th percentile, we set their values to the value of 99th percentile.

Second, we remove extreme outliers using interquartile range. While the econometrics commonly uses quartile method, it would lead to the removal of a large share of the companies in our case (around 10%). The reason is that our data are relatively dense around median (which leads to a small interquartile range) and then spread relatively far from it, which results in removing a significant portion of cases. Instead, we use deciles and the range between 1st and 9th decile. In particular, we remove the cases outside the

Table 4.3: Outliers Treatments of Financial Data

	Financial Dataset			Winsorization			Outliers Removal		
Observations	1 037			1 037			965		
R-squared	0.4574			0.4144			0.4435		
	coef	p-val	sign	coef	p-val	sign	coef	p-val	sign
audit	.0101	0.426		.0046	0.720		-.0026	0.820	
years_in_operation	.0000	0.988		.0000	0.980		-.0006	0.427	
secured_to_total_claims	.1046	0.004	***	.1148	0.002	***	.1189	0.007	***
prop_real_estate	.4427	0.000	***	.4332	0.000	***	.4177	0.000	***
prop_inventory	-.0384	0.596		-.0402	0.607		-.0257	0.763	
prop_receivables	.0016	0.158		.0015	0.155		.0332	0.001	***
prop_cash	.0932	0.012	**	.0985	0.005	***	.3970	0.031	**
prop_intangibles	-.0026	0.000	***	-.0054	0.066	*	.3186	0.001	***
prop_other	.0825	0.130		.0777	0.139		.1330	0.050	**
business_sale	.1932	0.012	**	.2007	0.009	***	.1595	0.040	**
anonymous_shares	-.0021	0.857		-.0050	0.662		-.0082	0.378	
offshore_subject	.0152	0.279		.0115	0.430		.0060	0.644	
no_employees	.0243	0.128		.0305	0.076	*	.0216	0.138	
homeless_person	-.0196	0.032	**	-.0165	0.063	*	-.0201	0.076	*
firm_nest	-.0195	0.109		-.0203	0.102		-.0264	0.039	**
unreliable_vat	-.0499	0.003	***	-.0588	0.001	***	-.0458	0.001	***
insolvency_record	-.0320	0.087	*	-.0285	0.138		-.0359	0.071	*
years_from_last_fin	-.0047	0.078	*	-.0033	0.245		-.0014	0.574	
equity_to_claims	-.0004	0.000	***	-.0039	0.132		.0051	0.341	
average_sales_to_claims	.0018	0.006	***	.0025	0.137		-.0008	0.591	
average_cf_to_claims	.0025	0.018	**	-.0007	0.949		.0093	0.627	
signif_deprec_increase	-.0218	0.006	***	-.0199	0.011	**	-.0178	0.027	**
signif_pers_cost_increase	-.0017	0.844		-.0025	0.774		.0017	0.831	
_const	.0335	0.000	***	.0277	0.008	***	.0286	0.002	***

range: $[D_1 - 3 * (D_9 - D_1), D_9 + 3 * (D_9 - D_1)]$, which removes 37 cases out of 1,037.

The results² after treating outliers of equity show that for both methods the significance of equity decreases. In the case of winsorizing, the variable remains significant on 90% confidence level, in the case of outliers removal, it became insignificant. That suggests that the results for financial data are sensitive to the presence of outliers among financial figures. Consequently, we use the same treatment of outliers also for sales and cash flow and we provide the results in the table 4.3.

We find that using methods of extreme value treatments for financial data,

²The results can be found in the Appendix B.

these data (equity, sales, and cash flow) become insignificant. The consequence is that these financial data are not reliable when it comes to the estimation of the results of insolvency proceedings. These findings are in contradiction with bankruptcy prediction literature and we see two potential explanations for that. The first is the time gap between financial statements submission and the insolvency proceedings, during which a lot of things can happen and financial figures can change considerably. The second reason is that even if the data were actual, they may not represent the reality of companies that face serious financial troubles. While we do not question bankruptcy prediction literature, we provide an evidence that shows that the financial data are unreliable for estimating results of insolvency proceedings.

In the case of outlier removal, the result show that all categories of property become significant. Interestingly, intangibles gain positive coefficient. We can also see that we get significant coefficients for the same red flags that we got in the case of our *Base model*: a presence of a homeless person in statutory body, registered office at a firm nest, being listed as unreliable VAT payer, and a connection to persons with multiple insolvency records.

In the case of winsorization, we get a positive effect of having no employees, which is a counterintuitive finding. However, it is significant only on 90% confidence level and considering that in all other models it is insignificant, we may expect no (or minimal) effect of this variable.

It is worth pointing out that depreciation increase remained negative and significant in all cases. This is a potential evidence for intentional removal of assets from the balance sheet, which can be used as an instrument to help the asset stripping.

To summarize, the results show that the financial data submitted financial statements are relatively unreliable for determination of insolvency proceedings results. However, we have found a link between a significant increase in depreciation and claims satisfaction, suggesting misbehaviour of some company owners. The important takeaway is that the results for the variables used in both *Base model* and *Financial data model* remain consistent in all results including results after treatment of outliers and thus we can consider them valid.

4.3 Areas for Further Research

The research field around insolvency and insolvency proceedings is very large and there are numerous unexplored areas. In this section, we describe only a few research areas that are close to the research of this thesis. We believe that these areas deserve to be examined; however, they are beyond the scope of this text. It is important to realize, that while we have addressed a number of questions, there are considerably more questions that arose or remained unanswered.

In this thesis, we focus on claims satisfaction in the view of creditor's loss and thus society welfare. Any creditor, but especially institutional creditors may appreciate deeper search of the structural differences between the recovery of secured and unsecured claims.

While we check for industry specifics regarding satisfaction of claims, we did not rule out possibilities of structural differences in specific industries. The major problem for proper analysis is the number of cases for the specific industry since there are only a few industries that contain more than 50 cases in our dataset. However, the number of cases will rise in time and search for structural specifics could bring interesting results.

In this thesis, we focus on the examination of satisfaction of claims in insolvency proceedings and we have found significant effects for a number of variables. As a result, our findings can be used to predict returns from the proceedings for the cases when insolvency is declared and resolved through bankruptcy; however, they do not provide a prediction of such case. For reaching a proper prediction model, the research would require the involvement of control groups of companies that did not end up in insolvency; or to be more precise, companies that were able to repay the creditors.

Chapter 5

Conclusion

Insolvency and its resolution is an important part of capitalism. According to Schwartz (1999), the purpose of the insolvency proceedings is to maximize payoff to the creditors, which eventually results in minimizing cost of the capital. In this thesis, we search for determinants of claims satisfaction, i.e. creditors' payoff from insolvency proceedings in the Czech Republic.

Our unique dataset contains 2,604 business insolvency proceedings cases that were closed in the period 2011-2013 and it combines microdata from Insolvency Register, Business Register, Ministry of Finance and other sources. We have constructed two models, the *Base model*, using mainly data from Insolvency Register, and the *Financial data model*, which is an enlargement of the *Base model* by using data from financial statements submitted to Business Register. For estimation of the latter model, we use a subsample of 1,037 companies that have submitted their financial statements and further subsamples based on the old financial data removal and outlier removal.

While bankruptcy prediction literature commonly uses financial ratios to predict insolvency, our results show that financial data are unreliable for predicting the outcome of insolvency proceedings. First, the financial data are often unavailable since the companies do not submit them, even though they have the obligation. Consequently, the financial ratios could be used only on subsamples created based on data availability, which, however, creates a problem of endogeneity. Second, we show that the results for financial data variables are highly sensitive to outliers. Since the data from financial statements reach great variability and by treating outliers we obtain different results, the credibility of such results decreases. Nevertheless, we provide a number of alternative indicators for claims satisfaction.

We identify several determinants that positively affect satisfaction of claims: a higher share of secured claims, submission of financial statements, real estate and cash in the assets of a company, a sale of the business as a whole in the proceedings, and entrepreneur cases. We find no such effect for submission of audited financial statements or for the age of a company. Moreover, we search for indicators that could decrease the satisfaction of claims, out of which there are five significant indicators: a homeless person in statutory body, registered office at a firm nest, being listed as unreliable VAT payer, a connection to persons with multiple records in Insolvency Register and a substantial increase in depreciation between the last two submitted financial statements.

Our results have practical consequences for the creditors and for the state. The creditors could use indicators from our models for credit risk management of bad loans or for prediction of potential payoff when considering entering insolvency proceedings.

We show that the data from financial statements are highly unreliable for claims satisfaction estimation and that their unreliability is partially caused by their unavailability. Moreover, our results show that submitting financial statements is associated with higher claims satisfaction. It is a clear evidence that the state should increase its efforts to enforce companies to submit their financial statements. We also find indicators based on information that is available to the state, such as being listed as unreliable VAT payer. Since the state as a creditor has claims satisfaction below average and since professionals agree that companies often enter insolvency proceedings too late, the state could be more active in approaching the companies and considering filing insolvency petitions. The evidence of the cases that involve persons that have multiple records in Insolvency Register have lower claims satisfaction suggests that a new legislative that would prevent from such situations could be considered.

This thesis provides a significant contribution to the unexplored area of determinants of satisfaction of claims in insolvency proceedings. We have identified a number of determinants of claims satisfaction. Our findings and conclusions have practical consequences for the state and the creditors in the Czech Republic as well as they bring a contribution to the international academic literature.

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Appendix A

Methodology Related Results

A.1 Correlation Matrices

1) Covariance matrix for explanatory variables of the *Base model*

	financ ^t	audit	entrep ^r	years ^{on}	secure ^s	prop ^r e	prop ⁱ y	prop ^r s	prop ^c h	prop ⁱ s
financial ^t	1.0000									
audit	0.2850	1.0000								
entrepreneur	-0.4048	-0.1165	1.0000							
years ⁱⁿ o ⁿ	-0.0165	0.0822	0.2159	1.0000						
secured ^{to} s	-0.1240	-0.0172	0.3337	0.1167	1.0000					
prop ^{real} e	-0.1045	-0.0296	0.2552	0.1263	0.3607	1.0000				
prop ^{inven} y	0.0632	0.0711	-0.0452	0.0205	-0.0123	-0.0060	1.0000			
prop ^{recei} s	0.0467	-0.0050	-0.0264	0.0203	-0.0220	0.0281	-0.0039	1.0000		
prop ^{cash}	0.0351	0.0021	-0.0276	-0.0167	-0.0281	-0.0116	0.0124	0.5561	1.0000	
prop ^{intan} s	0.0205	-0.0056	-0.0069	0.0256	-0.0087	-0.0047	-0.0023	0.0041	-0.0018	1.0000
prop ^{other}	0.0369	0.0834	-0.0314	-0.0091	-0.0109	0.0263	0.0358	0.0054	0.0983	-0.0022
business ^s e	0.0381	0.0434	-0.0207	0.0290	0.0451	0.0141	0.0535	-0.0040	0.0046	-0.0003
anonymous ^s	0.0868	0.0921	-0.1265	-0.0279	-0.0094	-0.0347	0.0169	-0.0092	0.0149	-0.0043
offshore ^s t	0.1037	0.0796	-0.1417	-0.1154	-0.0443	-0.0479	-0.0163	-0.0093	0.0292	-0.0044
no ^{employees}	0.0173	-0.0262	-0.1709	-0.1730	-0.0727	-0.0494	-0.0033	-0.0088	0.0096	-0.0073
homeless ^p n	-0.0317	-0.0323	0.1103	-0.0110	0.0423	0.0128	-0.0129	-0.0065	-0.0105	-0.0028
firm ^{nest}	0.0137	-0.0174	-0.0676	-0.0801	0.0087	-0.0313	-0.0179	0.0691	0.0582	-0.0046
unreliable ^t	-0.0159	-0.0101	0.0085	-0.0175	-0.0159	-0.0087	-0.0043	-0.0025	-0.0030	-0.0009
insolvency ^d	0.0660	0.0912	-0.0435	0.0199	0.0281	-0.0023	0.0447	-0.0023	-0.0078	-0.0020

	prop ^o r	busine ^e	anonym ^s	offsho ^t	no ^{emp} s	homele ⁿ	firm ⁿ t	unreli ^t	insolv ^d
prop ^{other}	1.0000								
business ^s e	0.0777	1.0000							
anonymous ^s	-0.0032	0.0051	1.0000						
offshore ^s t	0.0162	0.0277	0.1390	1.0000					
no ^{employees}	0.0189	0.0138	0.0407	-0.0056	1.0000				
homeless ^p n	-0.0147	-0.0118	0.0250	0.0044	-0.0002	1.0000			
firm ^{nest}	-0.0267	-0.0204	0.0683	0.0493	0.1372	0.0487	1.0000		
unreliable ^t	-0.0048	-0.0037	-0.0110	-0.0123	0.0147	0.0748	-0.0085	1.0000	
insolvency ^d	0.0069	0.0338	0.2356	-0.0163	-0.0244	-0.0120	0.0181	-0.0038	1.0000

2) Covariance matrix for explanatory variables of the *Financial data model*

	audit	years_in_o~n	secured_to~s	prop_real~e	prop_inven~y	prop_recei~s	prop_cash	prop_intan~s	prop_other	business_s~e	anonymous_~s	offshore_s~t	no_employees	homeless_p~n	firm_nest	unreliable~t	insolvency~d	years_from~n	equity_to_~s	average_sa..	average_cf~s	signif_dep~e	signif_per~e	
audit	1.0000																							
years_in_o~n	0.1420	1.0000																						
secured_to~s	0.0473	0.0381	1.0000																					
prop_real~e	-0.0066	0.0880	0.3984	1.0000																				
prop_inven~y	0.1085	0.0520	0.0136	0.0393	1.0000																			
prop_recei~s	-0.0204	0.0344	-0.0224	-0.0144	-0.0079	1.0000																		
prop_cash	-0.0267	-0.0138	-0.0234	-0.0036	-0.0032	0.6411	1.0000																	
prop_intan~s	-0.0130	0.0425	-0.0109	-0.0064	-0.0047	0.0031	-0.0029	1.0000																
prop_other	0.0337	0.0511	0.0189	0.0300	0.0639	0.0021	-0.0076	-0.0074	1.0000															
business_s~e	0.0420	0.0163	0.0514	0.0786	0.0500	-0.0070	0.0072	-0.0033	0.1828	1.0000														
anonymous_~s	0.0926	0.0443	0.0518	-0.0175	0.0315	-0.0163	0.0308	-0.0087	-0.0120	-0.0132	1.0000													
offshore_s~t	0.0650	-0.0869	-0.0253	-0.0346	-0.0271	-0.0182	-0.0066	-0.0103	-0.0163	0.0507		1.0000												
no_employees	-0.0429	-0.1431	0.0107	0.0100	0.0191	-0.0133	-0.0206	-0.0122	-0.0210	-0.0223			1.0000											
homeless_p~n	-0.0445	-0.0237	-0.0017	-0.0215	-0.0162	-0.0059	-0.0100	-0.0035	-0.0172	-0.0131				1.0000										
firm_nest	-0.0254	-0.0202	0.0344	-0.0340	-0.0266	0.1121	0.0383	-0.0070	-0.0413	-0.0267					1.0000									
unreliable~t	-0.0128	-0.0428	-0.0108	-0.0066	-0.0046	-0.0025	-0.0020	-0.0010	-0.0026	-0.0038						1.0000								
insolvency~d	0.0713	0.0281	0.0883	-0.0147	0.0753	-0.0060	-0.0114	-0.0041	0.0203	0.0457							1.0000							
years_from~n	0.4269	0.1782	-0.0358	-0.0834	0.0528	-0.0624	-0.0873	0.0151	-0.0645	-0.0591								1.0000						
equity_to_~s	0.0089	-0.0321	0.0169	0.0056	0.0088	0.0424	0.0026	-0.0619	0.0002	0.0060									1.0000					
average_sa..	0.0263	-0.0227	-0.0370	-0.0126	0.0641	-0.0055	0.0597	-0.0052	0.0016	-0.0189										1.0000				
average_cf~s	0.0093	0.0135	0.0217	0.0116	0.0134	0.0414	0.0832	-0.0745	-0.0871	0.0069											1.0000			
signif_dep~e	0.0502	-0.0867	0.0405	-0.0480	-0.0213	-0.0197	-0.0226	-0.0097	-0.0207	0.0205													1.0000	
signif_per~e	0.0673	-0.1982	0.0117	-0.0196	-0.0111	0.0012	0.0376	-0.0148	-0.0142	-0.0140														1.0000

	anonym~s	offsho~t	no_emp~s	homele~n	firm_n~t	unreli~t	insolv~d	years~in	equity~s	averag..
anonym~s	1.0000									
offsho~t	0.0570	1.0000								
no_employees	0.0076	-0.0427	1.0000							
homeless_p~n	0.0545	0.0128	0.0124	1.0000						
firm_nest	0.0036	0.0260	0.1763	0.1049	1.0000					
unreliable~t	-0.0103	-0.0119	0.0810	-0.0034	-0.0068	1.0000				
insolvency~d	0.2768	-0.0286	-0.0510	-0.0144	0.0410	-0.0041	1.0000			
years_from~n	0.0125	0.0156	-0.0479	0.0072	0.0460	0.0077	0.0280	1.0000		
equity_to_~s	0.0040	0.0070	-0.0785	0.0054	0.0172	0.0012	0.0062	-0.0105	1.0000	
average_sa..	-0.0400	0.0027	-0.0072	-0.0153	-0.0266	-0.0031	-0.0208	0.0553	0.0180	1.0000
average_cf~s	0.0081	-0.0883	-0.0010	0.0092	0.0120	-0.0022	0.0026	0.0324	0.1914	-0.0641
signif_dep~e	0.0018	0.0896	0.0060	-0.0010	0.0636	-0.0095	-0.0407	0.1271	0.0141	0.0148
signif_per~e	-0.0276	0.0953	0.0106	0.0206	0.0058	0.0669	-0.0231	0.1965	0.0207	-0.0178

	a~cf_t~s	s~depr~e	s~pers~e
average_cf~s	1.0000		
signif_dep~e	0.0092	1.0000	
signif_per~e	0.0162	0.1551	1.0000

A.2 Industry Influence on Claims Satisfaction

1) Results for all industries containing > 5 companies

Linear regression Number of obs = 2604

claims_sat~n	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
nace1	.1417066	.0606605	2.34	0.020	.0227576 .2606556
nace2	-.0501087	.0364134	-1.38	0.169	-.1215116 .0212941
nace10	-.002784	.0433098	-0.06	0.949	-.0877099 .0821419
nace11	-.0159921	.0435161	-0.37	0.713	-.1013227 .0693385
nace13	.0452341	.0601109	0.75	0.452	-.072637 .1631052
nace14	.0264651	.0577324	0.46	0.647	-.086742 .1396723
nace15	-.0558026	.0364304	-1.53	0.126	-.1272388 .0156336
nace16	-.0059876	.0391343	-0.15	0.878	-.0827259 .0707506
nace17	-.0669915	.0351401	-1.91	0.057	-.1358976 .0019145
nace18	-.0272625	.0463119	-0.59	0.556	-.1180753 .0635504
nace20	-.0296792	.0457746	-0.65	0.517	-.1194384 .06008
nace22	-.0382146	.0376256	-1.02	0.310	-.1119946 .0355653
nace23	-.0318024	.03868	-0.82	0.411	-.1076498 .044045
nace24	.003213	.0534086	0.06	0.952	-.1015158 .1079418
nace25	-.0116209	.0371191	-0.31	0.754	-.0844076 .0611657
nace26	-.0397024	.0373493	-1.06	0.288	-.1129406 .0335358
nace27	.0001274	.0421113	0.00	0.998	-.0824484 .0827032
nace28	.0236509	.0460322	0.51	0.607	-.0666135 .1139152
nace29	-.0040367	.0526025	-0.08	0.939	-.1071848 .0991114
nace31	.0192578	.0533812	0.36	0.718	-.0854172 .1239329
nace32	-.0454927	.0383907	-1.18	0.236	-.1207729 .0297875
nace33	.0408976	.0598342	0.68	0.494	-.076431 .1582263
nace38	.0128842	.0466409	0.28	0.782	-.0785738 .1043423
nace41	-.0195979	.0357724	-0.55	0.584	-.0897438 .050548
nace42	.0979086	.0906064	1.08	0.280	-.079761 .2755783
nace43	.0014036	.0375247	0.04	0.970	-.0721783 .0749856
nace45	.018297	.0443543	0.41	0.680	-.0686772 .1052712
nace46	.002267	.0370301	0.06	0.951	-.0703452 .0748793
nace47	.0063547	.0359147	0.18	0.860	-.0640702 .0767797
nace49	-.0040203	.0361949	-0.11	0.912	-.0749946 .0669541
nace52	-.0150402	.0426461	-0.35	0.724	-.0986648 .0685844
nace55	.0938545	.0603197	1.56	0.120	-.0244262 .2121352
nace56	-.006575	.0364918	-0.18	0.857	-.0781316 .0649815
nace58	-.013521	.0434314	-0.31	0.756	-.0986854 .0716433
nace61	-.0608325	.0364751	-1.67	0.095	-.1323565 .0106915
nace62	-.059934	.0350733	-1.71	0.088	-.1287091 .0088412
nace63	-.0096935	.0600699	-0.16	0.872	-.1274843 .1080973
nace64	-.0288571	.0514928	-0.56	0.575	-.1298291 .0721149
nace66	.0325918	.0687442	0.47	0.635	-.1022085 .1673921
nace68	-.0002683	.0394808	-0.01	0.995	-.077686 .0771494
nace69	-.0449376	.0365233	-1.23	0.219	-.1165559 .0266807
nace70	-.0203477	.0511023	-0.40	0.691	-.120554 .0798585
nace71	.0160058	.0634329	0.25	0.801	-.1083794 .140391
nace73	.0165517	.0536693	0.31	0.758	-.0886882 .1217916
nace74	-.0295035	.0396888	-0.74	0.457	-.1073292 .0483222
nace77	-.055491	.0355416	-1.56	0.119	-.1251845 .0142025
nace78	-.0614086	.0357931	-1.72	0.086	-.1315951 .0087779
nace79	-.0519249	.0363768	-1.43	0.154	-.123256 .0194062
nace80	-.0710405	.034605	-2.05	0.040	-.1388973 -.0031838
nace82	.0862866	.1359759	0.63	0.526	-.180348 .3529212
nace85	-.0739041	.0345265	-2.14	0.032	-.141607 -.0062012
nace86	.1485043	.1802391	0.82	0.410	-.2049258 .5019343
nace90	.0106115	.0851939	0.12	0.901	-.1564448 .1776678
nace93	.027312	.0589537	0.46	0.643	-.08829 .142914
nace94	-.0739041	.0345265	-2.14	0.032	-.141607 -.0062012
nace96	.1326721	.0773452	1.72	0.086	-.0189938 .284338

 _cons | .0739041 .0345265 2.14 0.032 .0062012 .141607

2) Results for all industries containing > 10 companies

Linear regression

Number of obs = 2604

claims_sat~n	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
nace1	.1523068	.0521823	2.92	0.004	.0499829 .2546307
nace10	.0078161	.0304663	0.26	0.798	-.0519249 .0675572
nace11	-.0053919	.0307574	-0.18	0.861	-.0657038 .05492
nace13	.0558343	.0515456	1.08	0.279	-.045241 .1569097
nace14	.0370653	.0487656	0.76	0.447	-.0585588 .1326893
nace16	.0046126	.0242012	0.19	0.849	-.0428434 .0520685
nace18	-.0166623	.0345816	-0.48	0.630	-.084473 .0511484
nace22	-.0276145	.0216906	-1.27	0.203	-.0701474 .0149184
nace23	-.0212021	.0234633	-0.90	0.366	-.0672111 .0248069
nace25	-.0010208	.0208042	-0.05	0.961	-.0418155 .039774
nace26	-.0291022	.0212102	-1.37	0.170	-.0706932 .0124888
nace27	.0107275	.0287461	0.37	0.709	-.0456404 .0670954
nace28	.0342511	.034208	1.00	0.317	-.032827 .1013292
nace31	.029858	.0435554	0.69	0.493	-.0555493 .1152653
nace32	-.0348925	.0229858	-1.52	0.129	-.0799652 .0101801
nace33	.0514978	.0512244	1.01	0.315	-.0489476 .1519432
nace38	.0234844	.0350188	0.67	0.503	-.0451836 .0921524
nace41	-.0089977	.0183071	-0.49	0.623	-.0448959 .0269005
nace42	.1085087	.0850283	1.28	0.202	-.0582225 .2752398
nace43	.0120038	.0215159	0.56	0.577	-.0301865 .0541941
nace45	.0288972	.0319265	0.91	0.365	-.0337071 .0915015
nace46	.0128672	.0206459	0.62	0.533	-.0276171 .0533515
nace47	.0169549	.0185822	0.91	0.362	-.0194828 .0533926
nace49	.00658	.0191154	0.34	0.731	-.0309033 .0440632
nace52	-.00444	.0295202	-0.15	0.880	-.0623259 .0534458
nace55	.1044546	.0517878	2.02	0.044	.0029044 .2060049
nace56	.0040251	.0196691	0.20	0.838	-.0345438 .042594
nace58	-.0029208	.030638	-0.10	0.924	-.0629986 .057157
nace62	-.0493338	.0169078	-2.92	0.004	-.0824882 -.0161793
nace66	.043192	.0613495	0.70	0.481	-.0771076 .1634916
nace68	.0103319	.0247548	0.42	0.676	-.0382095 .0588733
nace69	-.0343374	.0197271	-1.74	0.082	-.0730201 .0043453
nace70	-.0097476	.0407451	-0.24	0.811	-.0896444 .0701492
nace71	.0266059	.055365	0.48	0.631	-.0819587 .1351706
nace73	.0271519	.0439062	0.62	0.536	-.0589433 .1132471
nace74	-.0189033	.0250836	-0.75	0.451	-.0680896 .030283
nace77	-.0448908	.0178543	-2.51	0.012	-.0799013 -.0098804
nace78	-.0508084	.0183473	-2.77	0.006	-.0867855 -.0148313
nace79	-.0413247	.019456	-2.12	0.034	-.0794758 -.0031736
nace80	-.0604403	.0159188	-3.80	0.000	-.0916553 -.0292254
nace85	-.0633039	.0157483	-4.02	0.000	-.0941847 -.0324232
nace93	.0379122	.0501983	0.76	0.450	-.0605212 .1363456
nace96	.1432723	.0708088	2.02	0.043	.0044239 .2821207
_cons	.0633039	.0157483	4.02	0.000	.0324232 .0941847

3) Results for all industries containing > 20 companies

Linear regression

Number of obs = 2604

claims_sat~n	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
nace1	.1565352	.05049	3.10	0.002	.05753 .2555403
nace10	.0120445	.027619	0.44	0.663	-.0421133 .0662023

nace13		.0600627	.0498347	1.21	0.228	-.0376576	.157783
nace14		.0412936	.0469674	0.88	0.379	-.0508041	.1333914
nace16		.0088409	.0205406	0.43	0.667	-.0314368	.0491186
nace22		-.0233862	.0175281	-1.33	0.182	-.0577567	.0109844
nace23		-.0169737	.0196699	-0.86	0.388	-.0555442	.0215967
nace25		.0032076	.0164238	0.20	0.845	-.0289977	.0354129
nace27		.0149559	.0257182	0.58	0.561	-.0354747	.0653864
nace28		.0384794	.0316808	1.21	0.225	-.023643	.1006019
nace31		.0340864	.0415592	0.82	0.412	-.0474064	.1155792
nace32		-.0306642	.0191005	-1.61	0.109	-.0681181	.0067897
nace38		.0277128	.0325506	0.85	0.395	-.0361152	.0915408
nace41		-.0047693	.0131351	-0.36	0.717	-.0305259	.0209872
nace43		.0162322	.0173124	0.94	0.349	-.0177156	.0501799
nace45		.0331256	.0292146	1.13	0.257	-.0241609	.090412
nace46		.0170956	.0162238	1.05	0.292	-.0147174	.0489085
nace47		.0211833	.0135142	1.57	0.117	-.0053166	.0476831
nace49		.0108083	.0142352	0.76	0.448	-.0171053	.0387219
nace55		.108683	.050084	2.17	0.030	.0104739	.2068921
nace56		.0082535	.0149671	0.55	0.581	-.0210953	.0376023
nace58		.0013076	.0278075	0.05	0.962	-.0532198	.0558349
nace62		-.0451054	.0111125	-4.06	0.000	-.0668958	-.023315
nace68		.0145602	.021187	0.69	0.492	-.026985	.0561055
nace70		-.0055192	.0386182	-0.14	0.886	-.0812452	.0702067
nace71		.0308343	.053758	0.57	0.566	-.0745791	.1362477
nace73		.0313803	.041925	0.75	0.454	-.0508299	.1135904
nace74		-.014675	.0215685	-0.68	0.496	-.0569684	.0276185
nace79		-.0370964	.0146873	-2.53	0.012	-.0658965	-.0082962
nace93		.0421405	.0484465	0.87	0.384	-.0528575	.1371386
nace96		.1475007	.0694942	2.12	0.034	.0112304	.2837709
_cons		.0590756	.0092628	6.38	0.000	.0409123	.0772389

4) Results for all industries containing > 30 companies

Linear regression Number of obs = 2604

claims_sat~n	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]		
nace1		.1487341	.0499342	2.98	0.003	.0508191	.2466491
nace10		.0042434	.0267834	0.16	0.874	-.0482757	.0567625
nace16		.0010398	.0194533	0.05	0.957	-.0371058	.0391855
nace25		-.0045935	.0150712	-0.30	0.761	-.0341464	.0249594
nace28		.0306784	.0309325	0.99	0.321	-.0299765	.0913332
nace41		-.0125704	.0114234	-1.10	0.271	-.0349704	.0098296
nace43		.0084311	.0160295	0.53	0.599	-.0230009	.0398631
nace45		.0253245	.0284166	0.89	0.373	-.0303971	.0810461
nace46		.0092945	.0148542	0.63	0.532	-.0198329	.0384218
nace47		.0133822	.0118549	1.13	0.259	-.0098639	.0366282
nace49		.0030072	.0126661	0.24	0.812	-.0218294	.0278439
nace55		.1008819	.0495261	2.04	0.042	.0037672	.1979966
nace56		.0004524	.0134788	0.03	0.973	-.025978	.0268828
nace68		.0067592	.0201308	0.34	0.737	-.0327149	.0462332
nace73		.0235792	.0413095	0.57	0.568	-.0574239	.1045822
nace74		-.022476	.0205297	-1.09	0.274	-.0627323	.0177802
_cons		.0668766	.0066532	10.05	0.000	.0538305	.0799228

Appendix B

Full Results

B.1 Results of the Base Model

1) Full dataset

Linear regression

Number of obs = 2604
F(20, 2583) = 30.35
Prob > F = 0.0000
R-squared = 0.4064
Root MSE = .13968

	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
claims_sat~n						
financial_~t	.0169124	.0054583	3.10	0.002	.0062093	.0276155
audit	-.0031146	.011869	-0.26	0.793	-.0263884	.0201591
entrepreneur	.0472253	.0100192	4.71	0.000	.0275788	.0668717
years_in_o~n	.0007938	.0006183	1.28	0.199	-.0004186	.0020061
secured_to~s	.231067	.0320343	7.21	0.000	.1682514	.2938826
prop_real_~e	.232152	.0610605	3.80	0.000	.1124194	.3518846
prop_inven~y	.0476011	.0599743	0.79	0.427	-.0700016	.1652037
prop_recei~s	.0019044	.0012537	1.52	0.129	-.0005539	.0043628
prop_cash	.0899262	.0349311	2.57	0.010	.0214304	.158422
prop_intan~s	-.0015818	.0003289	-4.81	0.000	-.0022268	-.0009368
prop_other	.0321032	.0360165	0.89	0.373	-.0385209	.1027273
business_s~e	.1646825	.0549426	3.00	0.003	.0569466	.2724185
anonymous_~s	-.0020992	.0098694	-0.21	0.832	-.0214519	.0172536
offshore_s~t	-.003548	.0090471	-0.39	0.695	-.0212884	.0141923
no_employees	.0089611	.0093786	0.96	0.339	-.0094293	.0273515
homeless_p~n	-.0195661	.0128817	-1.52	0.129	-.0448256	.0056933
firm_nest	-.0293096	.0089743	-3.27	0.001	-.0469072	-.0117119
unreliable~t	-.024181	.006915	-3.50	0.000	-.0377406	-.0106214
insolvency~d	-.0468166	.0155425	-3.01	0.003	-.0772936	-.0163397
nace1	.1073228	.0393456	2.73	0.006	.0301708	.1844749
_cons	.0086745	.0069006	1.26	0.209	-.0048567	.0222056

2) Companies only

Linear regression

Number of obs = 2164
 F(19, 2144) = 17.22
 Prob > F = 0.0000
 R-squared = 0.3498
 Root MSE = .12338

	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
claims_sat~n						
financial~t	.0176085	.0053548	3.29	0.001	.0071072	.0281097
audit	-.0031024	.0118822	-0.26	0.794	-.0264042	.0201995
entrepreneur	(omitted)					
years_in_o~n	.0007895	.0006459	1.22	0.222	-.0004771	.0020562
secured_to~s	.13676	.0257968	5.30	0.000	.0861706	.1873494
prop_real~e	.3333818	.0464308	7.18	0.000	.2423277	.424436
prop_inven~y	.043719	.0596654	0.73	0.464	-.0732891	.160727
prop_recei~s	.0016687	.0012895	1.29	0.196	-.0008601	.0041974
prop_cash	.0885658	.0341507	2.59	0.010	.021594	.1555377
prop_intan~s	-.0015949	.0003353	-4.76	0.000	-.0022524	-.0009374
prop_other	.041846	.0396474	1.06	0.291	-.0359053	.1195973
business_s~e	.171742	.0602736	2.85	0.004	.0535412	.2899427
anonymous~s	.0001628	.0094803	0.02	0.986	-.0184288	.0187544
offshore_s~t	-.0025934	.0090587	-0.29	0.775	-.0203581	.0151713
no_employees	.0083282	.0093997	0.89	0.376	-.0101053	.0267616
homeless_p~n	-.0212379	.0056777	-3.74	0.000	-.0323723	-.0101035
firm_nest	-.0273621	.0082979	-3.30	0.001	-.0436349	-.0110893
unreliable~t	-.0251172	.0078004	-3.22	0.001	-.0404144	-.00982
insolvency~d	-.0430588	.0139349	-3.09	0.002	-.0703862	-.0157314
nace1	.1117782	.0438311	2.55	0.011	.0258222	.1977341
_cons	.0091385	.0070319	1.30	0.194	-.0046514	.0229285

B.2 Results of the Financial Data Model

3) Full financial dataset

Linear regression

Number of obs = 1037
 F(22, 1013) = .
 Prob > F = .
 R-squared = 0.4574
 Root MSE = .12439

	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
claims_sat~n						
audit	.0100685	.0126393	0.80	0.426	-.0147337	.0348708
years_in_o~n	-.0000119	.0007909	-0.02	0.988	-.001564	.0015402
secured_to~s	.1045625	.0363474	2.88	0.004	.0332377	.1758873
prop_real~e	.4426652	.0605206	7.31	0.000	.3239051	.5614253
prop_inven~y	-.0383587	.0723829	-0.53	0.596	-.1803963	.1036789
prop_recei~s	.0015549	.0011004	1.41	0.158	-.0006045	.0037142
prop_cash	.0931786	.0370811	2.51	0.012	.0204141	.1659431
prop_intan~s	-.0025951	.0004437	-5.85	0.000	-.0034658	-.0017245
prop_other	.0824531	.0544518	1.51	0.130	-.0243981	.1893043
business_s~e	.1931824	.0767291	2.52	0.012	.0426163	.3437486
anonymous~s	-.0021296	.0118006	-0.18	0.857	-.025286	.0210267
offshore_s~t	.0152295	.0140563	1.08	0.279	-.0123532	.0428123
no_employees	.0243461	.0160003	1.52	0.128	-.0070515	.0557437
homeless_p~n	-.0195726	.0091067	-2.15	0.032	-.0374428	-.0017024
firm_nest	-.019538	.012174	-1.60	0.109	-.0434272	.0043511

unreliable~t		-.0499173	.0165471	-3.02	0.003	-.0823878	-.0174467
insolvency~d		-.0320453	.0186806	-1.72	0.087	-.0687024	.0046117
years_from~n		-.0046609	.0026421	-1.76	0.078	-.0098456	.0005238
equity_to~s		-.4048437	.051785	-7.82	0.000	-.5064618	-.3032256
average_sa..		1.777739	.644597	2.76	0.006	.5128408	3.042637
average_cf~s		2.514702	1.062457	2.37	0.018	.4298333	4.599571
signif_dep~e		-.0217723	.0079423	-2.74	0.006	-.0373574	-.0061871
signif_per~e		-.0016969	.008611	-0.20	0.844	-.0185944	.0152005
_cons		.03353	.0091278	3.67	0.000	.0156185	.0514415

4) Financial dataset with current financials only (last financials submitted in last 3 years before insolvency declaration)

Linear regression

Number of obs = 758
 F(22, 734) = .
 Prob > F = .
 R-squared = 0.4791
 Root MSE = .13186

		Robust				[95% Conf. Interval]	
claims_sat~n	Coef.	Std. Err.	t	P> t			
audit	-.0203602	.0212656	-0.96	0.339	-.0621089	.0213884	
years_in_o~n	-.0000638	.000898	-0.07	0.943	-.0018267	.0016992	
secured_to~s	.1326155	.0440703	3.01	0.003	.0460966	.2191344	
prop_real~e	.4197755	.0621944	6.75	0.000	.2976753	.5418757	
prop_inven~y	-.027075	.129346	-0.21	0.834	-.2810073	.2268573	
prop_recei~s	.0016011	.001104	1.45	0.147	-.0005663	.0037685	
prop_cash	.0916156	.03605	2.54	0.011	.0208423	.1623889	
prop_intan~s	-.0025649	.0005404	-4.75	0.000	-.0036259	-.0015039	
prop_other	.0769568	.0568802	1.35	0.176	-.0347105	.1886241	
business_s~e	.2133619	.0806948	2.64	0.008	.0549417	.3717821	
anonymous~s	.007486	.0158847	0.47	0.638	-.0236989	.038671	
offshore_s~t	.0137625	.0151314	0.91	0.363	-.0159435	.0434686	
no_employees	.0245169	.0191924	1.28	0.202	-.0131616	.0621955	
homeless_p~n	-.0286948	.0119483	-2.40	0.017	-.0521517	-.005238	
firm_nest	-.0192473	.0174252	-1.10	0.270	-.0534566	.0149619	
unreliable~t	-.0388914	.0207302	-1.88	0.061	-.0795889	.0018061	
insolvency~d	-.0332153	.0238272	-1.39	0.164	-.0799928	.0135623	
years_from~n	-.0050589	.0044156	-1.15	0.252	-.0137276	.0036098	
equity_to~s	-.4054261	.0525085	-7.72	0.000	-.5085109	-.3023413	
average_sa..	2.166925	.4883343	4.44	0.000	1.208227	3.125623	
average_cf~s	2.518266	1.142745	2.20	0.028	.2748274	4.761705	
signif_dep~e	-.0190157	.0098379	-1.93	0.054	-.0383295	.000298	
signif_per~e	-.0129432	.0116504	-1.11	0.267	-.0358154	.009929	
_cons	.0345703	.0103172	3.35	0.001	.0143155	.054825	

5) Results after winsorization of equity

Linear regression

Number of obs = 1037
 F(22, 1013) = .
 Prob > F = .
 R-squared = 0.4308
 Root MSE = .12741

	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
audit	.0049354	.0130761	0.38	0.706	-.0207239	.0305946
years_in_o~n	.0001781	.0008049	0.22	0.825	-.0014015	.0017576
secured_to~s	.1174559	.0378164	3.11	0.002	.0432484	.1916634
prop_real_~e	.4311451	.0618798	6.97	0.000	.3097178	.5525725
prop_inven~y	-.0309382	.0705456	-0.44	0.661	-.1693705	.1074941
prop_recei~s	.00174	.0010002	1.74	0.082	-.0002226	.0037027
prop_cash	.0910458	.032655	2.79	0.005	.0269666	.155125
prop_intan~s	-.0054763	.0026357	-2.08	0.038	-.0106483	-.0003043
prop_other	.0821515	.0541049	1.52	0.129	-.024019	.1883219
business_s~e	.1995493	.0762781	2.62	0.009	.0498681	.3492305
anonymous_~s	-.0050706	.0116128	-0.44	0.662	-.0278584	.0177173
offshore_s~t	.0155167	.0141547	1.10	0.273	-.0122591	.0432925
no_employees	.0305661	.0171555	1.78	0.075	-.0030982	.0642304
homeless_p~n	-.0164523	.008688	-1.89	0.059	-.0335008	.0005962
firm_nest	-.0193392	.0124373	-1.55	0.120	-.0437451	.0050666
unreliable~t	-.057366	.0172184	-3.33	0.001	-.0911538	-.0235781
insolvency~d	-.028762	.0191145	-1.50	0.133	-.0662705	.0087465
years_from~n	-.0033185	.002738	-1.21	0.226	-.0086914	.0020544
w_equity_t~s	-.004906	.0026379	-1.86	0.063	-.0100823	.0002703
average_sa~s	.0018125	.000637	2.85	0.005	.0005626	.0030625
average_cf~s	.0022079	.0013327	1.66	0.098	-.0004073	.0048231
signif_dep~e	-.0232834	.0084272	-2.76	0.006	-.0398203	-.0067466
signif_per~e	-.0003312	.0086865	-0.04	0.970	-.0173768	.0167143
_cons	.0248034	.0101216	2.45	0.014	.0049417	.0446651

6) Results after removal of outliers in equity

Linear regression

Number of obs = 1000
 F(22, 976) = .
 Prob > F = .
 R-squared = 0.4837
 Root MSE = .10849

	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
audit	.0057126	.0121964	0.47	0.640	-.0182217	.0296468
years_in_o~n	-.0005988	.0007364	-0.81	0.416	-.002044	.0008463
secured_to~s	.1084363	.0416366	2.60	0.009	.0267288	.1901438
prop_real_~e	.4515037	.0786972	5.74	0.000	.2970686	.6059389
prop_inven~y	-.0411643	.0638132	-0.65	0.519	-.1663912	.0840625
prop_recei~s	.032856	.0049043	6.70	0.000	.0232318	.0424802
prop_cash	.4100544	.1704896	2.41	0.016	.0754861	.7446228
prop_intan~s	.3238009	.0986229	3.28	0.001	.1302636	.5173381
prop_other	.0615305	.0403391	1.53	0.128	-.0176309	.1406918
business_s~e	.1806563	.0810101	2.23	0.026	.0216822	.3396304
anonymous_~s	-.0085209	.0094363	-0.90	0.367	-.0270387	.0099968
offshore_s~t	.005464	.0128664	0.42	0.671	-.019785	.0307131
no_employees	.0259965	.0161133	1.61	0.107	-.0056243	.0576173
homeless_p~n	-.0163412	.0107391	-1.52	0.128	-.0374155	.0047332
firm_nest	-.0273183	.0128211	-2.13	0.033	-.0524785	-.0021582

unreliable~t		-.0512335	.0149751	-3.42	0.001	-.0806206	-.0218465
insolvency~d		-.0259293	.01771	-1.46	0.143	-.0606834	.0088248
years_from~n		-.0018922	.0024108	-0.78	0.433	-.0066232	.0028388
equity_to~s		.0033622	.0039619	0.85	0.396	-.0044126	.0111369
average_sa~s		.0009391	.0006827	1.38	0.169	-.0004006	.0022788
average_cf~s		.0038065	.007873	0.48	0.629	-.0116435	.0192565
signif_dep~e		-.0150017	.0078408	-1.91	0.056	-.0303884	.000385
signif_per~e		.0009001	.0078225	0.12	0.908	-.0144508	.016251
_cons		.0276087	.0098771	2.80	0.005	.0082259	.0469916

7) Results after winsorization of financial data (equity, average sales, average cash flow)

Linear regression						Number of obs =	1037
						F(22, 1013) =	.
						Prob > F =	.
						R-squared =	0.4144
						Root MSE =	.12922

		Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
claims_sat~n							
audit		.0046064	.0128339	0.36	0.720	-.0205777	.0297905
years_in_o~n		.0000211	.000821	0.03	0.980	-.00159	.0016321
secured_to~s		.1148118	.0374841	3.06	0.002	.0412565	.1883671
prop_real~e		.433241	.0608166	7.12	0.000	.3139002	.5525819
prop_inven~y		-.0402166	.0781243	-0.51	0.607	-.1935206	.1130875
prop_recei~s		.0014634	.001029	1.42	0.155	-.0005559	.0034827
prop_cash		.0985227	.0353209	2.79	0.005	.0292122	.1678332
prop_intan~s		-.0053889	.002928	-1.84	0.066	-.0111345	.0003567
prop_other		.0777025	.0525272	1.48	0.139	-.0253722	.1807772
business_s~e		.2007117	.0762026	2.63	0.009	.0511787	.3502447
anonymous~s		-.0050244	.0114754	-0.44	0.662	-.0275427	.017494
offshore_s~t		.0114998	.0145736	0.79	0.430	-.0170982	.0400978
no_employees		.0304619	.0171596	1.78	0.076	-.0032105	.0641342
homeless_p~n		-.0165146	.008866	-1.86	0.063	-.0339125	.0008832
firm_nest		-.0202918	.0123988	-1.64	0.102	-.0446219	.0040384
unreliable~t		-.0587686	.0171777	-3.42	0.001	-.0924765	-.0250607
insolvency~d		-.028462	.0191763	-1.48	0.138	-.0660918	.0091677
years_from~n		-.0032647	.0028085	-1.16	0.245	-.0087759	.0022465
w_equity_t~s		-.0039028	.0025862	-1.51	0.132	-.0089777	.001172
w_average_s~		.0025395	.0017055	1.49	0.137	-.0008072	.0058862
w~f_to_cla~s		-.0006928	.0107547	-0.06	0.949	-.0217968	.0204112
signif_dep~e		-.0199143	.0078076	-2.55	0.011	-.0352351	-.0045934
signif_per~e		-.0025162	.0087424	-0.29	0.774	-.0196715	.0146391
_cons		.0277308	.0103752	2.67	0.008	.0073714	.0480901

8) Results after removal of outliers in financial data (equity, average sales, average cash flow)

Linear regression						Number of obs =	965
						F(22, 941) =	.
						Prob > F =	.
						R-squared =	0.4435
						Root MSE =	.1053

		Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
claims_sat~n							

audit		-.0026063	.0114573	-0.23	0.820	-.0250911	.0198785
years_in_o~n		-.0005668	.0007125	-0.80	0.427	-.001965	.0008315
secured_to~s		.1188883	.0436453	2.72	0.007	.0332349	.2045417
prop_real~e		.4176771	.0883159	4.73	0.000	.2443582	.590996
prop_inven~y		-.0257293	.0852102	-0.30	0.763	-.1929533	.1414947
prop_recei~s		.0331838	.0095449	3.48	0.001	.0144521	.0519155
prop_cash		.3970052	.1833438	2.17	0.031	.0371952	.7568153
prop_intan~s		.3186174	.0960327	3.32	0.001	.1301544	.5070805
prop_other		.1329657	.067657	1.97	0.050	.0001897	.2657417
business_s~e		.1595138	.07741	2.06	0.040	.0075976	.3114299
anonymous~s		-.0081904	.0092918	-0.88	0.378	-.0264255	.0100446
offshore_s~t		.0060035	.0130007	0.46	0.644	-.0195103	.0315172
no_employees		.0215762	.0145359	1.48	0.138	-.0069504	.0501027
homeless_p~n		-.0201007	.0113068	-1.78	0.076	-.0422901	.0020887
firm_nest		-.0263953	.0128019	-2.06	0.039	-.0515188	-.0012718
unreliable~t		-.0457693	.0141656	-3.23	0.001	-.0735691	-.0179696
insolvency~d		-.0358586	.0198352	-1.81	0.071	-.0747849	.0030678
years_from~n		-.0013538	.0024085	-0.56	0.574	-.0060804	.0033727
equity_to~s		.0051425	.0054005	0.95	0.341	-.0054559	.015741
average_sa~s		-.0007509	.0013985	-0.54	0.591	-.0034954	.0019936
average_cf~s		.0093057	.0191592	0.49	0.627	-.028294	.0469054
signif_dep~e		-.0177592	.0080366	-2.21	0.027	-.033531	-.0019874
signif_per~e		.0017418	.0081783	0.21	0.831	-.0143081	.0177917
_cons		.0286491	.0094434	3.03	0.002	.0101165	.0471817
