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Drivers of Success of Insolvency Proceedings in the Czech Republic

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Abstract

This thesis focuses on the insolvency proceedings of natural persons in the Czech Republic with the aim to examine the impact of the debt structure on the probability of being relieved of debts. For this purpose, the linear probability model and the logit model are used. The analyzed dataset consists of 269 insolvency proceedings for which the insolvency petition was filled between 2008 and 2017. We found that the debtor with a higher share of nonbank debt has a higher probability of being relieved of debts than the debtor with a higher share of bank debt. Moreover, the number of kids and the number of creditors negatively affect the probability of being relieved of debts.

Keywords

insolvency, debt relief, logit, Czech Republic

Abstrakt

Tato bakalářská práce se zabývá insolvenčním řízením fyzických osob v České republice s cílem prozkoumat vliv struktury dluhů na pravděpodobnost oddlužení jedince. Pro tento účel byl použit lineární pravděpodobnostní model a logit model. Analyzovaný dataset obsahuje 269 insolvenčních řízení, ke kterým byl insolvenční návrh podán mezi lety 2008 a 2017. Zjistili jsme, že dlužník s větším podílem nebankovních dluhů má větší šanci být oddlužen než dlužník s větším podílem bankovních dluhů. Dále jsme zjistili, že počet dětí a počet věřitelů má významný negativní vliv na pravděpodobnost oddlužení.

Klíčová slova

insolvence, oddlužení, logit, Česká republika

Declaration of Authorship

I hereby proclaim that I wrote my bachelor thesis on my own under the leadership of my supervisor and that the references include all resources and literature I have used.

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Prague, 6th May 2020

Signature

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Bachelor Thesis Proposal

Author	Bezuchová Anna
Supervisor	Mgr. Petr Polák MSc.
Proposed topic	Drivers of Success of Insolvency Proceedings in the Czech Republic

Research question and motivation

In 2008 came into force The Act No. 192/2006, Coll. on Insolvency and Methods of Its Resolution (Insolvency act). It brought a new restructuring option for debtors. There are two ways of dealing with debts: bankruptcy, reorganization and debt relief.

This thesis will concentrate mainly on debt relief which has two forms. The first form is repayment debts by monetizing assets and thereafter using the proceeds to satisfy creditors. The second form is repayment debts through a repayment plan which usually persists up to five years. In the second form of debt relief, which is commonly used in the Czech Republic, debtor should pay off the debt at least by 30 %. After repaying debts, debtor has no debts and creditors are not allowed to demand their claims.

Submission of a proposal on debt relief and initiating insolvency proceeding has become quite popular. According to Insolcentrum, 200 000 people submitted a proposal on debt relief between 2008 and 2017, and out of that around 35 000 people were successfully relieved of debts.

The aim of this thesis is to evaluate the development of insolvency proceeding, describe the process itself and investigate potential important factors in insolvency proceeding which have an effect on the satisfaction of claims. I will focus on the liabilities structure and how does the liabilities structure influence the satisfaction level. I would like to find out whether there is evidence that having liabilities from the banking sector implies a higher satisfaction level.

Contribution

Even though the insolvency proceeding is used on a daily basis, the

research focused on the development of insolvency proceeding results and deeper analysis of insolvency proceeding is scarce.

This thesis should create a comprehensive overview behind insolvency proceeding in the Czech Republic that can reveal the efficiency of the insolvency proceeding.

There are only a few studies analysing the determinants of claim satisfaction (Pařízek, 2017). However, to my knowledge, a study examining the influence of liabilities structure on the satisfaction level has not been done.

Methodology

Data from Insolvency Register and statistical portal infoData which are being administered by the Ministry of Justice of the Czech Republic and other data will be used. Data will be evaluated using the OLS method. The dependent variable will be the satisfaction level. The liabilities structure will be included in the independent variables. I will also use some control variables as gender, age etc.

Outline

Introduction

Theory and Literature Overview

Data and Methodology

Results

Conclusion

Bibliography

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1 Introduction

Debt relief can be a solution to a complicated financial situation for many people. Nowadays, the insolvency proceeding is a part of lives of thousands of people. At the beginning of 2019, there were 114 000 debtors who were in the process of debt relief in the Czech Republic (Insolcentrum, 2020).

The Czech insolvency law has been evolving since 1781. Since then, many adjustments have been made. These amendments also responded to changes in the political situation in the Czech Republic. The latest legislation of the insolvency law, the Act No. 182/2006 Coll. (the Insolvency Act), brought significant changes. One of the biggest changes is the establishment of debt relief as a method of resolving personal bankruptcy.

Since 2008, when the Insolvency Act came to force, the interest of debtors in the insolvency proceeding of natural persons has been growing. The number of proposals to allow debt relief has been increasing by 30 % each year (Hospodka et al., 2017a). Despite this fact, the existing literature focuses mainly on the insolvency proceedings of companies (e.g. Smrčka, 2014). Only a few papers focusing on personal bankruptcy exist (e.g. Hospodka et al., 2017; Paseková, 2015). Moreover, the academic research examining the determinants affecting the probability of allowing debt relief is very scarce (Malíčková, 2014). To our knowledge, a study examining the effect of the debt structure on the probability of being relieved of debts has not been done.

This thesis aims to remedy this lack in academic research and investigate whether the debt structure influences the debtor's chance of being relieved of debts. More specifically, we want to examine if the debtor with a higher share of bank debt has a higher probability of being relieved of debts because banks are said to be stricter in providing loans, especially in assessing the creditworthiness of the borrower. Therefore, these people should not be over-indebted too extensively.

For the purpose of our research, we analyzed the data provided to us by InsolCentrum. This dataset contains 269 insolvency proceedings for which

the insolvency petition was filled in the years from 2008 to 2017. All of these proceedings are already finished - successfully and unsuccessfully.

This thesis is structured into five chapters. The following chapter provides the theory and literature overview. The term insolvency is adequately defined, the history and statistics is introduced. Moreover, the flow of the insolvency proceeding is explained. Furthermore, the creditor perspective is presented. Chapter 3 explains the empirical part of the thesis. The dataset is described as well as the further processing of the data. Consequently, the methodology is described. Finally, the model is developed. Chapter 5 provides an interpretation of the regression results. The last chapter 6 summarizes our findings.

2 Theory and Literature Overview

The aim of this chapter is to explain the theory important for understanding the practical part of the thesis.

In the beginning, it is necessary to define the term insolvency properly. After that, the history of the insolvency in the Czech Republic will be described. Moreover, the current legislation with the most important amendments will be introduced. To see how insolvency works in practice, some statistics of the evolution of insolvency proceedings in the Czech Republic will be shown. To get a wider perspective of this topic, it is crucial to know how the insolvency proceeding works in other countries. After that, the whole process of the insolvency proceeding in the Czech Republic will be explained step-by-step. In the end, the creditor perspective of the proceeding will be presented.

2.1 Insolvency in General

According to Richter (2008), it is important for lawyers to understand economic methodology. The same applies to people focusing on economics about law, especially when doing research about the law-related topic.

The general definition of insolvency says that insolvency is a situation when the debtor does not have enough money to pay his or her debts. However, there are many other definitions of insolvency, depending on which field is examined.¹

Richter (2008) defines insolvency from three different points of view - the financial capital structure perspective, the law perspective and the financial theory. Richter (2009) focuses more on the insolvency of corporations. However, his definitions can be more or less transformed for individuals.

The type of insolvency from the financial capital structure perspective is called over-indebtedness. This state occurs when the corporation's capital is negative. Regarding the balance sheet of a corporation, this implies that liabilities are higher than assets. Thus, there is no shareholders' entitlement

¹<https://www.oxfordlearnersdictionaries.com/definition/english/insolvency>

to a corporation's property.

According to the law perspective, the essence of insolvency is having not enough property for paying debtor's debts. This state can be tested with a balance sheet test or a cash flow test. Balance sheet test compares the debtor's asset and liabilities. The test examines whether the debtor's asset was not consumed or whether liabilities are not too high compared to the asset. Cash flow test captures the ability of the debtor to pay his or her debts.

The insolvency from the financial theory perspective can be caused by three types of crises in the company. The first one is economic distress which occurs when the net present value of assets is negative. In this case, it is better to sell the corporation's assets. Insolvency resulting from the financial distress as the second type of crises in the company can happen when the net present value of future cash flow is positive, but the size of debtor's liabilities is larger than the size of these cash flow. The last type of crises causing insolvency is liquidity constraints. Within this crisis, the company is not able to pay its liabilities even if the net present value of cash flow is higher than its liabilities.

Insolvency definition from the Czech law perspective is appropriately specified in the Insolvency Act. According to the law, the debtor is insolvent if the debtor has

- several creditors and
- outstanding financial liabilities which are more than 30 days overdue and
- the debtor is not able to fulfil those liabilities.

Not only denitions but also the aim and purpose of insolvency proceedings are essential to understand. According to Kislingerová (2013), the main aim of the insolvency proceeding is maximum and quick satisfaction of creditors which should be proportionally satisfied depending on the nature of their claims.

The proportional satisfaction is crucial for insolvency proceeding. Smrčka (2016) describes this situation with a common pool problem. The common pool problem is a situation which does not lead to an effective solution.

This concept is relatively simple. Smrčka (2016) illustrates this approach through an understandable example. If there is a pond with fish, the first fisherman assumes that even if he or she will be careful and catches only as many fishes as he or she needs, the next fisherman will not behave the same way or there will be so many fishermen who catch all fish in the pond. This situation forces the first fisherman to catch as many fish as he or she can catch as soon as possible. The result of this situation is the maximization of every catch and hence the quick destruction of the pool.

Applying this concept to the insolvency proceedings, the first creditor who can dispose of debtor's property or can force the debtor to the fulfilment of obligations obtain 100 % of obligations, and the second or further creditor will not obtain anything because it is highly probable that the property will not be enough to cover all liabilities.

This situation is inappropriate economically and also socially. Thus, proportional satisfaction is needed.

2.1.1 Insolvency and Economy

The aim of insolvency proceedings is a resolution of the debtor's debt and a chance for the debtor to start with a so-called clean slate. The insolvency of individuals can have an impact on the economy of the whole country.

The debt relief can help the debtor to get out of the debt spiral. The financial crisis in combination with unreasonable financial planning can result in a debt trap. When the debtor is in a debt trap, more loans are taken as a possible solution of lack of funds. Subsequently, the debtors are not able to take a loan at the bank institution. Thus, they usually contact nonbanking institutions that provide credit at much higher interest rates and fees (Paseková, 2015b).

Furthermore, the unusually high indebtedness can affect the debtor's con-

sumption. When the debtor is overwhelmed by debts, the incentive to invest is lower. Moreover, consumption is held back (Dyban et al., 2012).

Moreover, debtors might feel disincentives to work if they are over-indebted. Therefore, they may leave the labor market and reduce the welfare of the whole society. Being out of active labour force means they only live out of support from government for the rest of their lives. Thus, society is paying it all. If they are relieved of debts, they could rejoin the productive life and contribute to society. Therefore, there is a public interest in insolvency possibility.

From the creditor's perspective, the debtor's insolvency affects the creditor's situation because of unpaid debts. The solutions of creditor's costs due to unpaid debts can influence interest rates or profit. The unpaid debts cause a loss in the income of creditor. Consequently, the creditor can spread out the costs among the consumers. This leads to higher prices and interest rates. On the other hand, if the loss of the creditor is absorbed, the profit is lower. Therefore, the tax is influenced too (Frumkin, 2006).

2.2 History of Insolvency in the Czech Republic

The Insolvency in the Czech Republic was regulated by many laws in the past. Since the history of insolvency is extensive, the terminology can be different. However, the main characteristics of insolvency should be the same. Among these specific features are included a multiplicity of creditors, proportional satisfaction of the claims and others.

The insolvency proceedings in the Czech Republic have undergone many changes since its first legal regulation from 1781, which was established during the reign of Joseph II, Holy Roman Emperor. The bankruptcy was the only resolution of debtor's insolvency. This legislation was not sufficient since the proceedings were costly and time-consuming.

In 1869 this regulation was replaced by the new bankruptcy law which was also criticized. Since then, much property was not subject to bankruptcy, and the proceedings were costly. The law did not work in practice well

(Fiedlerová, 2015). Moreover, the law neglected the issue of big creditors, which was a current affair with the development of banking and lending.

In the early 20th century, the new legislation based on the Austrian Bankruptcy Act from 1914 should unify the insolvency law in the whole Czechoslovakia. The fact that this legislation was successful also proves its use as a basis for the new legislation adopted in the Czech Republic in 1991.

A fundamental change in the insolvency law was in 1951 when this legislation was replaced by the Act No. 142/1950 Coll. One of the reasons for replacing was the impossibility to apply the legislation under the condition of the socialist economic system. The new law allowed only execution liquidation, which took the form of the sale of debtor's assets and the subsequent distribution of gain among the creditors. This new law also meant interrupting in the development of insolvency law.

The year 1989 was undoubtedly crucial for the subsequent development of the insolvency law as a result of the return to market economy.

In 1991, the Act No. 328/1991 Coll. on Bankruptcy and Compensation came into force. The aims of this law were unfeasible. Its primary goal was the solution to paying problems which occurred after the fall of the communist regime. One of the causes of paying crisis was the transformation from planned economy to market economy (Smrčka et al., 2016). Even though the Act on Bankruptcy and Composition contained resolution of insolvency as bankruptcy and compensation, most cases were resolved by bankruptcy.

One of the main shortcomings of this law was not preferring the remedial methods over the liquidation methods. The law was not suitable for individuals and debtors with many claims. Moreover, the creditors did not have such a power in the insolvency proceeding. There has been an effort to fix these shortcomings. Since the validity of the Act, there were made 29 amendments. On average, there were two amendments every year. Nevertheless, many of these amendments were just formal or legislative-technical type. However, due to frequent amendments, it was decided to establish a

new law instead of amendments (Fiedlerová, 2015).

2.3 Insolvency in the Czech Republic

The Act No. 328/1991 Coll., on Bankruptcy and Compensation, the previous legislation of insolvency law, was criticized by lawyers, economists, politicians and also by media. The subject of criticism was corruption. It was supposed that the Act on Bankruptcy and Composition was the origin of corruption, and the problem was hidden in the law itself (Kislingerová et al., 2013). Therefore, major changes were expected in the environment of insolvency law by the new insolvency act.

The Act No. 182/2006 Coll. (the Insolvency Act), on Insolvency and Methods of Its Resolution replacing the Act No. 328/1991 Coll., on Bankruptcy and Settlement, which was adopted in 2006 and effective as of 2008, brought the significant changes into the Czech Insolvency law. The inspiration for this new law came mainly from Germany and the USA (Hospodka et al., 2017a).

According to Government of the Czech Republic (2007), in contrast with the previous law, a public register (Insolvency Register) was established with an informative character as well as a media through which documents specified by Insolvency act are published.

Smrčka (2012) points out that it was intended to bring more transparency so that the third party can very easily apprise itself of all important details about proceeding.

The main objectives of the Insolvency Act are summarized by Kislingerová et al. (2013):

- The Insolvency Act was intended to enable bankruptcy of business entity more often by a remedial method. Therefore, the operation and activity of the debtor's corporation should be preserved as well as employment. Thus, the debtor's insolvency will not have a significant social and economical impact.
- For the first time, the Insolvency Act solves individual's insolvency by

remedial method - debt clearance.

- The Insolvency Act aims to accelerate the insolvency proceeding and increase its efficiency. Thus, the cost of creditors should decrease, and at the same time, their revenues from the insolvency proceedings should increase.
- Creditors should have greater surveillance of the proceeding.
- The unjust enrichment, which occurs before the Insolvency Act, should disappear by the relocation of some power to creditors.

The amendments of the Insolvency Act

The adoption of the Insolvency Act might seem like an ambitious attempt to replace the 1930s regulation straightforward with the 21st-century's regulation (Smrčka et al., 2016). This may be the reason for extensive amendments, whereas one the last amendment No. 31/2019 Coll. was one of the most important.

Even after the implementation of the Insolvency Act, criticism of the proceedings appeared. Smrčka et al. (2012) point out that under this legislation, the duration of proceeding is significantly longer than in other OECD countries (compared to Germany, the proceeding is three times as long). In 2011, the duration of the insolvency proceeding in the Czech Republic was 3.2 years in comparison with the OECD average where the duration of the insolvency proceeding was 1.8 years.

Smrčka et al. (2012) also claim that the efficacy of the proceeding in the Czech Republic is lower than in other developed countries. They assert that the law efficacy is the result of a slower solution of the settlement of lawsuits in the Czech Republic than in the most developed countries.

Not only Smrčka et al. (2012) highlight the shortcomings of the Insolvency Act. Kislingerová et al. (2013) think that the improvement of the quality of the Insolvency Act is needed as well. They suggest improvement in the definition of overindebtedness and writing-off bad debt from the tax perspective.

After 11 years of validity of the Insolvency Act, the biggest amendment of this law was adopted. The amendment of the Insolvency Act No. 31/2009 Coll., which was adopted in June 2019, brought significant changes not only to declaration of insolvency. This amendment belongs to the most extensive ones since there are 141 changes of the Insolvency Act.

The main aim of these changes is relaxation of the condition of the declaration of insolvency and better access to this proceeding for a wider range of debtors.

One of the main changes is relaxing the condition of proving that repayment of 30 % of debt by the debtor is achievable. Even if this condition is crucial for accessibility of debtors into the proceeding, it can result in immorally debt clearance. New conditions allow people who made debt under good economic conditions to enter insolvency easily. As a consequence of this, the insolvency is more accessible to people who cannot prove repayment of more than 30 % of their debts (Veselá, 2019).

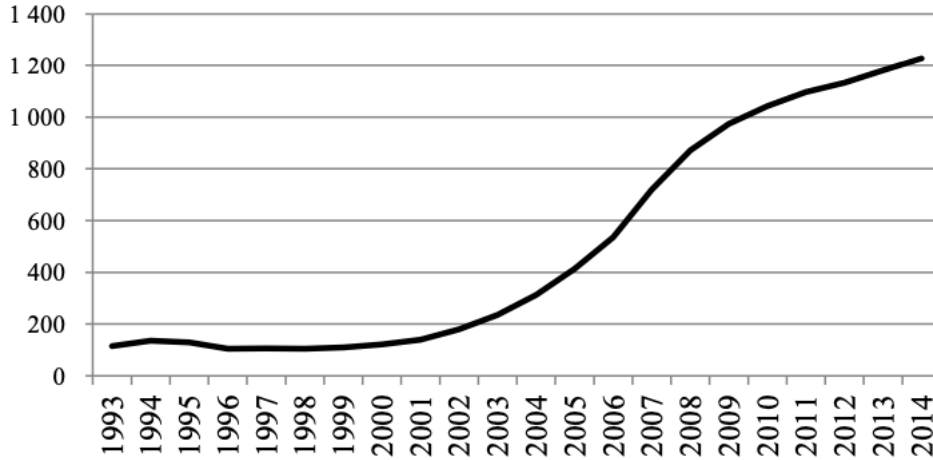
2.4 Insolvency Proceedings after the Insolvency Act Statistics

The insolvency proceeding in the Czech Republic has changed significantly over the last 12 years. Together with the changes in legislation, the number of people interested in this issue is still growing despite the fact that insolvency petitions and proposals to allow debt relief are rejected due to unsatisfactory property or other reasons (Svobodová, 2013).

According to Svobodová (2013), households and legal entities are more often indebted. As a consequence of their indebtedness, paying debts is becoming problematic. Therefore, the interest in entering into the insolvency proceeding is rising. After the Insolvency Act entered into force, the number of insolvency petition submitted to the court dramatically jumped off by 77 % in 2009. This change could stem from the substantial legislation change or also from the economic crisis.

The number of proposals to allow debt relief has been growing by 30 % each year (Hospodka et al., 2017a). The reason for this growth can be low

Figure 1: Development of loans in the Czech Republic



Source: Hospodka et al., 2015

Note: The vertical axis depicts the amount of loans to households in billions CZK.

financial literacy of the population. Many households are taking loans which are not able to repay in the future. Another reason can be irresponsibility to the debtors' future (Hospodka et al., 2015).

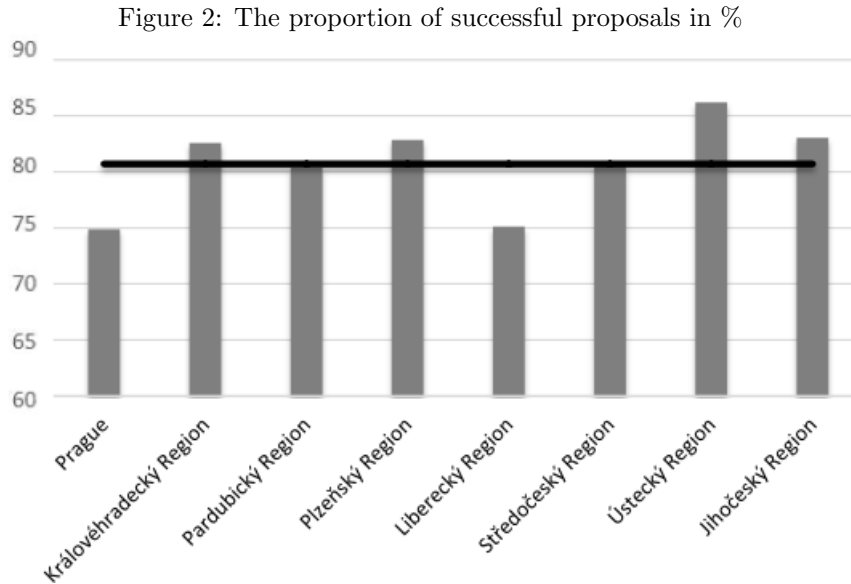
According to Louda et al. (2015) and Paseková et al. (2016), most of the proposals to allow debt relief are submitted to the Regional Court in Ostrava, Ústí nad Labem and Brno. The abundant number of proposals in Ostrava and Ústí nad Labem can be explained by a low level of education as well as a low economic level (Louda et al., 2015). On the other hand, the low number of submitted proposals occurs in Prague and Central Bohemian Region as a consequence of higher income and higher level of education.

The number of submitted petitions is growing as well as the ratio of submitted and approved petitions. Svobodová (2013) demonstrates the difference between the number of filed insolvency petitions and the number of approved insolvency petitions. In 2009, there was a substantial difference between those numbers, probably owing to the new legislation. However, this difference has decreased considerably after the efficiency of the Insolvency Act.

The decision of the court whether the petition will be approved is not issued immediately. The court proceeding, from submitting the petition

to the approval of the method of resolution or the petition rejection, lasts from 2 months to almost 6 months. The longest proceedings on average took place in the Regional Court in Prague (5.8 months). On the other hand, among the courts with the shortest duration of the proceeding is the Regional Court in Ostrava, which is one of the busiest courts in terms of the number of insolvency proceedings (Paseková et al., 2016).

According to Hospodka et al. (2017a), the success rate of approved proposals is between 75 % and 86 %. The lowest success rate of 75 % appears in Prague and Liberec Region. On the other hand, Ústí nad Labem Region has a higher success rate of 86 %. Figure 2 depicts the results examined by Hospodka et al. (2017a).



Source: Hospodka et al., 2017a

Note: The graph depicts the proportion of successful proposals in selected regions in the Czech Republic. These proposals were submitted from 2012 to 2013. The black horizontal line depicts the average success rate of accepted proposals in these regions of 81 %.

Moreover, the characteristics of debtors are essential. Hospodka et al. (2015) found out that the percentage of debtors with a university degree is low (for debtors from Prague only 3%). In terms of age, most debtors are between 34 and 44 years old. InsolCentrum (2020) presents similar results of characteristics of debtors in terms of age. Most debtors are in the age

between 30 and 56. Thus, they are of working age. Hospodka et al. (2015) detected that more debtors are women than men. However, the difference is not significant (53 % of woman, 47 % of men in Prague). Almost the same split of debtors' gender is shown by Insolcentrum (2020). According to InsolCentrum (2020), 51 % of debtors in insolvency are men.

Hospodka et al. (2017b) examined the average income of debtors. The average income of debtors does not exceed the average income in regions. Moreover, the average income of debtors is less than two thirds of the average income in regions. The highest average income of debtors, as well as the average income according to the Czech Statistical Office, is in Prague. Besides that, men earn on average 2 500 CZK more than women. Hence, there is evidence for the gender pay gap.

2.5 Insolvency Proceedings Abroad

2.5.1 European Insolvency Law

European legislation is for the Czech Republic substantial. Since the Czech Republic is a Member state of the European Union, certain obligations in legislation have to be fulfilled. The Czech legislation must be consistent with the European legislation. More precisely, European law is a priority.

However, the European Union is not strict in the field of insolvency law. Thus, the law is essentially the responsibility of national governments and parliaments. Hence, different approaches towards the insolvency law are used across Europe (Kislingerová et al., 2013)

European law affects only international insolvency proceedings. The insolvency proceeding with the European international element is governed by the applicable law of the European Community. The European international element means that the main interests of the debtor are concerned in any of the European Union member states except for Denmark (Smrčka et al., 2016).

The purpose of this law is not harmonization of the legislation in Member states. The European law regulates rather the condition of using insolvency

law of the involved member states than the conditions themselves.

The European regulation contains rules for jurisdiction or law applicable when the international element in the proceeding has occurred. Usually, the proceeding is held in the country of major interests of the debtor. Moreover, all court decisions in one Member state should be valid also in other Member states (Smrčka et al., 2016).

2.5.2 Slovak Insolvency Law

In the past, the Czech Republic and the Slovak Republic formed one sovereign state. Thus, the history of the Slovak insolvency law is almost the same.

Today, the Slovak insolvency law is regulated by the Act No. 7/2005 Coll., on Bankruptcy and Restructuring (the Bankruptcy Act). The Slovak insolvency law is significantly shorter than the Czech Insolvency Act. In the Slovak Republic, the Bankruptcy Act is not the only regulation affecting the insolvency proceeding. Also the Act No. 8/2005 Coll., on Insolvency Trustees, and other regulations are crucial for the insolvency law.

The Slovak insolvency law has recently undergone major changes. The extensive amendment of the Bankruptcy Act came into force in 2017. Before this amendment, the debt relief was not possible without bankruptcy which includes the sale of the debtor's property. Thus, conditions for allowing debt relief have been alleviated.

The Czech and Slovak insolvency regulation is becoming more comparable. Similarly to the Insolvency Act, the Bankruptcy Act distinguishes two types of insolvency: financial insolvency and overindebtedness.

The Slovak Bankruptcy Act regulates three methods of resolution of insolvency: bankruptcy, debt relief and restructuring. Before the amendment in 2017, bankruptcy and debt relief were formed only by bankruptcy. Thus, debt relief has become a much more affordable option to get rid of debts for people.

The conditions for personal bankruptcy are stricter than in the Czech

Republic. Execution proceedings or similar proceeding must be conducted against the debtor, at least one claim has to be more than 180 days overdue, and honest intention has to be proved.

As in the Czech Republic, the insolvency of individuals can be resolved by bankruptcy or debt relief through a repayment schedule. If the repayment schedule is used as a method of resolution, at least 30 % of debtor's claims must be satisfied.

The Slovak insolvency proceeding is not as popular as in the Czech Republic. In 2018, only 13 848 personal bankruptcy were allowed. Even though this number may not seem high, there is an annual increase of 164 % compared to 2017.²

2.6 Insolvency Proceeding Step-by-step

Although the insolvency proceeding can be seen as extremely complicated, every step is important. Since every debtor who wants to finish the proceeding successfully must pass all steps of the proceeding, being acquainted with the whole proceeding is necessary.

Richter (2008) defines the insolvency proceeding as three-phase: in the first phase, the decision about insolvency is made. In the second phase, the method of the resolution of insolvency is determined. In the last phase, the resolution of insolvency is made in the way determined in the second phase.

2.6.1 Types of Insolvency

The Insolvency Act distinguishes two types of insolvency: financial insolvency, related to all debtors (no matter whether the debtor is a legal entity, entrepreneur or individual), and over-indebtedness which is related to legal entities and entrepreneurs.

On order to classify the debtor as insolvent, all three criteria mentioned previously have to be fulfilled at the same time.

²<https://www.ceska-justice.cz/2019/01/zmirneni-podminek-oddluzeni-slovensku-zbankrotovalonejvice-obyvatel-historii/>

The debtor is obliged to prove disability to fulfil financial liabilities by fulfilling at least one of those criteria:

- the debtor stopped the payments for the substantial part of financial liabilities, or
- liabilities are not fulfilled for more than 3 months overdue, or
- the satisfaction of any outstanding financial receivables may not be achieved by the enforcement of a decision or the execution, or
- the debtor failed to comply with the obligation imposed by the insolvency court to submit the lists referred to in the Insolvency Act.

The second type of insolvency, over-indebtedness, is related only to the legal entities or entrepreneurs. The debtor is in over-indebtedness if

- there are several creditors, or
- the size of liabilities is larger than the property of the debtor.

For the entrepreneur and legal entity, both types of insolvency can be detected. However, the unveiling of one of those two types is sufficient.

2.6.2 Insolvency Petition

The insolvency proceeding as a court proceeding can be started only by insolvency petition. Thus, the opening of the proceeding ex officio is not possible. The insolvency proceeding starts when the petition is delivered to the insolvency court.

Debtor or creditor can fill the insolvency petition. However, the proposal to allow debt relief can be filled only by the debtor. Therefore, if creditor delivers the insolvency petition to the insolvency court before debtor, the debtor still has a possibility to deliver the proposal to allow debt relief within 30 days after the debtor receives insolvency petition officially by the court.

In the insolvency petition, the debtor has to be properly identified. The petitioner must state the decisive circumstances under which the bankruptcy of debtor will subsequently be decided.

The condition of several creditors is ensuring that the creditor does not abuse insolvency proceeding for collection claims. Thus, for verification of this condition, there must be at least two creditors specified in the insolvency petition. Moreover, if the petitioner is creditor, this condition must be fulfilled and another creditor must be specified in the petition (Ferešová, 2016).

Annexes of the petition, such as the list of property and liabilities and other documents proving insolvency, should be attached as well.

2.6.3 Method of the Resolution of Insolvency

The insolvency court shall issue a decision on the insolvency if there is an evidence that the debtor is insolvent or under imminent insolvency.

The method of the resolution of the insolvency means

- bankruptcy,
- restructuring,
- debt relief,
- special methods of resolution which are set by the Insolvency Act for specific cases of bodies.

2.6.4 Bankruptcy

The main aim of the bankruptcy is selling the debtor's property and the subsequent satisfaction of creditors. Claims are satisfied using the schedule of bankruptcy.

Claims against the estate are the exception. Those claims arise after the decision on insolvency, and according to §305 of the Insolvency Act, they are satisfied before the schedule of bankruptcy. Those claims are defined as incurred during proceedings, for example, cash expenses and remuneration of the insolvency administrator.

2.6.5 Restructuring

Restructuring as a method of the resolution of insolvency is related only to legal entities and entrepreneurs. The aim of this method is the satisfaction of the claims by revenues from the business of the debtor. Selling of property does not occur during restructuring. Only the capital structure of the legal entity is changed.

Restructuring makes up only 1 % of the total number proclaimed insolvency. From 2009 to 2012, only 73 restructurings were allowed. However, many of these restructurings were transformed into bankruptcy (Kislingerová, 2013).

2.6.6 Proposal to Allow Debt Relief

The insolvency proceeding cannot begin if the insolvency petition without the proposal to allow debt relief is submitted. The proposal is allowed to be submitted only by the debtor. If the debtor also submits the insolvency petition, both must be submitted at the same time. In the situation, when the insolvency petition is submitted by the creditor, the debtor has 30 days for submitting the proposal to allow debt relief after an announcement from the court is delivered. When the proposal is not submitted, the court can declare bankruptcy.

In the proposal, awaited income in the next 12 months has to be specified. Furthermore, income from the last 12 months must be enclosed and proved.

As attachments must be enclosed the list of property and liabilities, and documents proving debtor's income in the last three years. If a gift contract is part of the awaited income, it has to be also enclosed.

2.6.7 Debt Relief

The debt relief as a form of the method of the insolvency resolution provides to the debtors a chance to forgive a part of their debts after meeting certain conditions.

There are two different ways of debt relief: a monetization of assets and

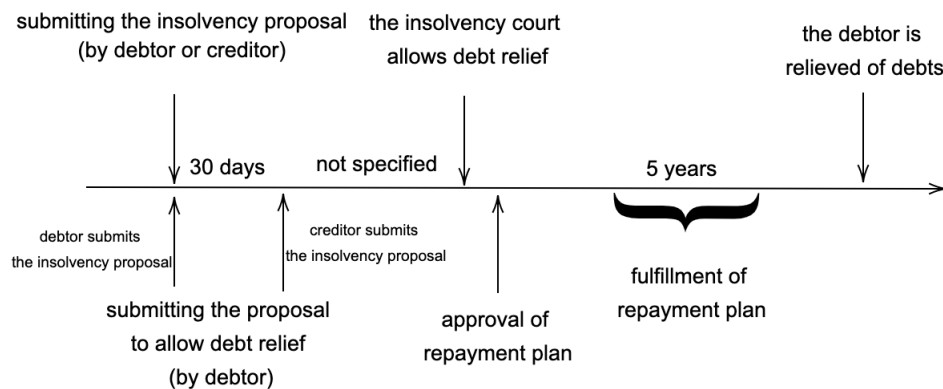
a repayment plan. However, the monetization of assets as debt relief is not popular. (Hospodka, 2017b)

Selecting the monetization of assets as the debt relief can be reasonable when the debtor owns valuable property that is threatened with execution. There is a threat that only one of many creditors will be satisfied from selling the property. However, filling the insolvency petition and proposal to allow debt relief and choosing the monetization of the asset can cause satisfaction of more creditors. Ideally, the debtor's insolvency may be resolved.

The second instrument for debt relief is the repayment plan. The repayment plan consists of 60 instalment payments within 5 years. The minimal satisfaction limit is 30 % for successful debt relief. However, if the debtor satisfies 60 % of unsecured creditors' claims within 3 years, the debt relief can be successfully ended. Another way to end debt relief earlier is repayment of 100 % of debts.

Within the 5 years of the repayment plan, the debtor is left only with subsistence minimum, which should be enough for living. The rest of the income is divided among insolvency trustee and unsecured creditors. The debtor is under the surveillance of the court for the whole time.

Figure 3: The timeline of the insolvency proceeding



Notes: The timeline of the insolvency proceedings shows the flow of proceedings. As the method of the resolution of insolvency, debt relief is chosen. Occasions depicted belong to the essential ones in the proceedings.

2.7 Creditors

The creditor is a person, company or government that is owed money.³ In the insolvency proceeding, the creditor always does not have to be the original. It often happens that the debt is assigned to a new creditor. This debt assignment may take place without the agreement of the debtor. Moreover, some creditors have the privilege of getting the gain from selling debtor's property first.

2.7.1 Creditor Categories

The Insolvency Act distinguishes between secured and unsecured creditors. After the amendment of the insolvency law, the position of creditors is significantly changed. Notably, the position of the secured creditors has strengthened. According to the previous insolvency law, 70 % of proceeds from the sale of debtor's assets got secured creditors and 30 % of proceeds got unsecured creditors. After the amendment, secured creditors obtain all proceeds from the sale of assets decreased by costs. Hence, the position is better for secured creditors when enforcing risky receivables (Paseková, 2016).

2.7.2 Creditor Bodies

During the insolvency proceeding, the list of creditors does not have to be always the same. There may be a change of the creditors - e.g. denial of claims, debt assignment. The number of creditors can vary considerably in the proceedings. In some of them, there can be even a thousand of creditors. As we have already mentioned, the main aim of the insolvency proceeding is the maximum proportional satisfaction of the creditors. Thus, they should be involved into the insolvency proceeding. For this reason, creditor bodies were created (Fiedlerová, 2015).

According to the Insolvency Act, there are two creditor bodies: the creditors' meeting and the creditors' committee (or the creditors' representative).

³<https://dictionary.cambridge.org/dictionary/english/creditor>

The creditors' meeting decides, for example, on election members of the creditors' committee, dismissal of the insolvency trustee and appointing of the new insolvency trustee, the election of the method of the resolution of insolvency (if not decided by the court yet).

The creditors' committee is set up if the number of creditors exceeds 50. Otherwise, the creditors' representative is elected. The creditors' committee has 3 to 7 members and is not obligatory if the elected method of the resolution is debt relief or minor bankruptcy.

The creditors' committee (or creditors' representative), for example, is monitoring the insolvency trustee, approves the amount and correctness of the expenses of the insolvency trustee, provides support to the insolvency trustee.

2.7.3 Types of Creditors

The creditors can be divided into 3 categories: banking institutions, non-banking institutions and others.

The banking institutions are regulated by the state. In the Czech Republic, they are licensed by the Czech National Bank. Banks, as the biggest providers of funds, are the most frequent creditors. Furthermore, they usually fall into the category of secured creditors. Their behaviour during the proceeding is professional and transparent. The reputation of the bank is for them crucial. Clients and the public expect responsible behaviour (Kislingerová et al., 2014).

The nonbanking institutions are sometimes the last chance of getting money for the debtor who was declined by the banks. For some of those creditors, the only priority is the economic result of the insolvency proceeding instead of an interest in the process itself (Kislingerová et al., 2014).

The category of other creditors includes all debts which do not belong to previous categories. This category includes, for example, fines for riding without a ticket, execution fee, debts to the mobile operator.

2.7.4 Satisfaction of Creditors

The minimal satisfaction limit is 30 % during the debt relief. However, the satisfaction of the creditors' claims may be higher. Paseková et al. (2015b) claim that the relative rate of creditors' satisfaction decreases with the aggregate level of debt.

Creditors can reduce their risk through securing of loans. According to Paseková et al. (2015a), the secured receivables by a certain form of collateral are 19.62 % of total receivables in the insolvency proceeding. Paseková et al. (2016) found that the most frequent subject of collateral was a detached house (47.67 %). Other subjects of collateral were plot (37.37 %), flat (4.50 %) and cottage (0.30 %).

According to Paseková et al. (2015a), the most debtors owe 200 - 500 thousand CZK. Those debtors are able to satisfy 70 % of creditors' claims. Debtors with higher amount of debt manage to satisfy less of creditor's claims. However, debtors owing 500 - 1 000 thousand CZK are able to repay more than 50 % of their debts. Only debtors with more than 1.5 million CZK satisfy around 30 % of the creditors' claims, which is around the minimal satisfaction limit.

3 Data and Methodology

This chapter provides information about the data sources and the subsequent data processing. Consequently, some descriptive statistics will be introduced. Finally, the development of the model with the theoretical background will be described.

3.1 Data

For this analysis, the dataset was provided by InsolCentrum⁴. InsolCentrum is a company focusing on the analysis of the insolvency proceedings in the Czech Republic. Those data were collected manually by them. Upon agreement, the data were provided to us for research purposes.

All provided data were collected from the Insolvency Register, which is accessible to the public. The Insolvency Register contains all information about the insolvency proceeding, such as documents submitted to the court, the court decisions. Moreover, the Insolvency Register also includes information about the debtor. However, the collection of them is demanding and must be done manually.

The dataset is of the pooled cross-sectional nature with each observation representing one debtor. All these debtors filled in the insolvency petition in the years from 2008 to 2017. The data represents a sample of insolvency proceedings that were finished successfully and unsuccessfully. Moreover, the debt relief as a method of the resolution was chosen or required (in case of denied proceedings).

The original dataset contains general information about the proceedings, such as a proceedings reference, a link to the proceeding in the Insolvency Register, the publication date of the insolvency proposal. Moreover, some personal information about the debtor is captured in the data (e.g. name, gender, year of birth, marital status, number of children, average monthly income). The amount of the debtor's debt is captured by the types of creditors and classified by principal, ancillary and denied part of the claim. The

⁴<https://www.insolcentrum.cz/>

claims are divided into secured and unsecured claim. Moreover, the number of creditors is included in the dataset.

3.1.1 Data Preparation

Firstly, the three files mentioned above were merged for the purpose of our analysis. Since some variables in each file differ, not all variables were included in our dataset. However, all the essential variables for our analysis are included.

Secondly, the manual data check and identification of obvious error observations were necessary. We identified 24 error observations. Out of those 24 observations, 23 debtors were deemed to be the error observations since the average monthly income or the sum of their debts was 0. The last observation identified as an error has debts of 590 773 465 CZK. Such an unusually high amount of debt could destroy the results of the analysis. Thus, this observation is also not included in the analysis.

Next, modifying some variables was necessary. Some of the insolvency proceedings in our dataset were applied for spouses. Thus, the average monthly income and the amount of debt were expressed for two people. Those variables were divided in half to express the part attributable to one of the spouses. The option of browsing individual proceeding via the public register, examining the part attributable to one of the spouses was rejected. Since there are 48 insolvency proceedings related to the debt relief of spouses, the process would be time-consuming. Moreover, access to some old proceedings is not possible.

Finally, debts were divided into 6 groups according to the type of the creditor: bank, nonbank, assignment of debt, other debts and execution. The first category, bank debts, includes debts that have its origin at banking institutions regulated by the state. Nonbank debt, as the next category, comes from the nonbanking institutions. The third category, assignment of debt, includes debts with the changed creditor. These debts cannot be classified as bank debt or nonbank debt since the origin of the debt is not

known. The next category, other debts, includes, for example, debts from non-payment insurance, debts to the mobile operator. The last category, execution, includes, for example, execution fees.

In each of these categories, denied part of the debt or denied debt was not included. The debt can be denied for several reasons, such as the wrong amount of the debt, or even because of the non-existence of the debt. Thus, it would not be relevant to put non-existing debts into our analysis.

Our final dataset contains 269 observations out of which 100 observations finished the insolvency proceeding successfully, 71 observations represents denied petitions to allow debt relief and 98 observations express cancelled insolvency proceedings.

3.2 Descriptive Statistics

In this section, an overview of our data and descriptive statistics will be provided.

Table 1 and Table 2 below contain the descriptive statistics of selected variables from the dataset. In Table 1, we can see that the amount of unsecured debts is significantly higher than the amount of secured debts. Moreover, we can see that more than 50 % of observations do not have any secured debt. Furthermore, the amount of unsecured debt is almost the same for bank debt and nonbank debt.

Table 1 shows that the amount of secured debt is higher for bank debts than for nonbank debts. This follows from the fact that banking institutions usually fall into the category of secured creditors.

As shown in Table 1, the standard deviation of all variables depicting the amount of debt is high. This indicates that the range of values is very wide. Thus, our dataset captures the debtors with both small debts and with large debts.

Table 2 provides the descriptive statistics of selected explanatory variables that are not of financial nature. In Table 2, the required minimum of creditors has also been confirmed in practice. The table shows that the

Table 1: Descriptive statistics of financial variables from dataset

Statistic	Mean	St. Dev.	Min	Median	Max
Average net monthly income	13 703	5 289	2 621	12 947	32 394
Total debt	1 738 578	6 075 848	48 799	624 694	85 425 580
Unsecured debt	1 404 502	5 049 394	48 799	512 874	68 017 731
Secured debt	334 076	1 358 328	0	0	17 407 849
Bank debt - unsecured	291 190	631 205	0	115 489	6 027 685
Nonbank debt - unsecured	260 902	411 679	0	145 553	4 914 422
Assignment of debt - unsecured	43 161	90 506	0	0	490 876
Other debt - unsecured	803 900	4 989 270	0	47 541	68 004 535
Execution - unsecured	8 211	36 335	0	0	559 034
Bank - secured	135 522	534 235	0	0	6 196 458
Nonbank - secured	60 762	386 539	0	0	5 331 488
Assignment of deb - secured	995	16 310	0	0	267 510
Other debt - secured	136 544	1 043 784	0	0	15 761 993
Execution - secured	254	2 382	0	0	30 008

maximum number of creditors is 47. According to Figure 4, this high number occurs in the dataset only once. However, not all of these creditors need to belong to the category of banking and nonbanking institutions. Some of these creditors may be, for example, internet providers, mobile network operators and insurance companies. Figure 4 also shows that the number of creditors above 30 is rare. Mostly, the number of creditors is up to 12.

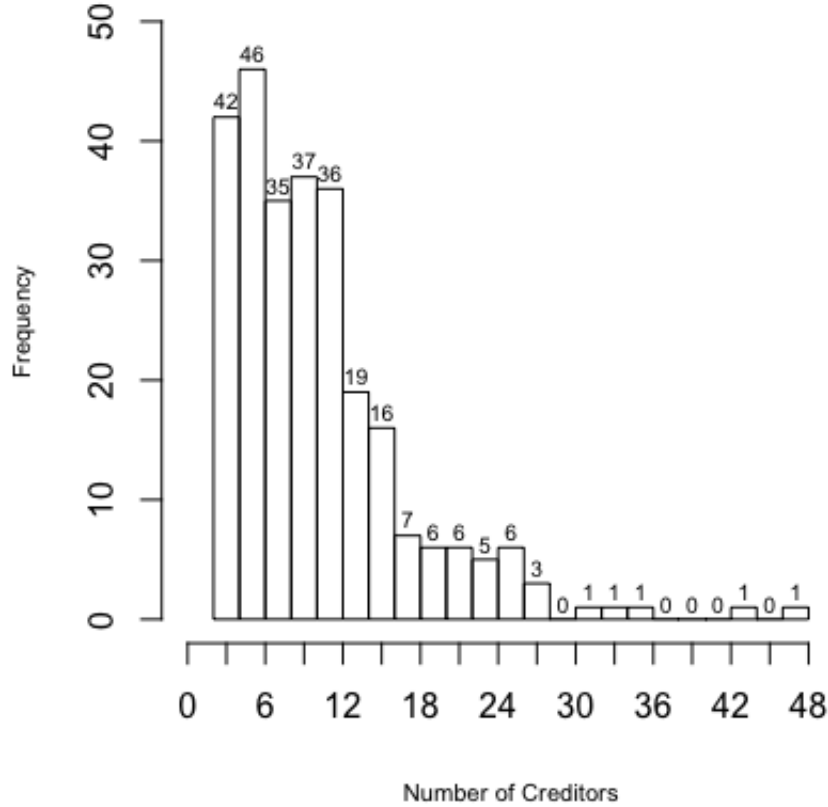
Table 3 shows the average value of debt by the type of termination of the proceeding. At the first sigh, the amount of the debt in the denied proceedings is significantly higher than in other proceedings. The most frequent reason for denied insolvency proposal is that the estimated value of creditors' satisfaction is less than 30 % according to the provided data. More precisely, 49 out of 95 debtors were not able to satisfy this condition. The Insolvency Act previously required that the debtor has to prove that the satisfaction of creditors' claims will be higher or at least 30 % during the debt relief. Thus, if the debtor's debt was too high, repayment of at least

Table 2: Descriptive statistics of selected variables from dataset

Statistic	Mean	St. Dev.	Min	Median	Max
Creditors	10.502	7.004	2	9	47
Kids	0.970	1.051	0	1	4
Female (D)	0.416	0.494	0	0	1
Spouses (D)	0.171	0.377	0	0	1
region MS (D)	0.037	0.190	0	0	1
region C (D)	0.037	0.190	0	0	1
region P (D)	0.086	0.280	0	0	1

D = dummy variable.

Figure 4: Number of creditors in the insolvency proceedings



30 % of the debt was unreachable. However, this condition was cancelled by the latest amendment of the Insolvency Act.

In Table 4, the average debt by gender is shown. The average debt owed

Table 3: Average debt by the type of the termination of the proceeding (in CZK)

Status	Average of debts	Average of unsecured debts	Average of secured debts
Successful	629 012	512 021	116 990
Denied	4 361 007	3 472 396	888 611
Cancelled	970 865	817 028	153,836
All	1 738 578	1 404 502	334 075

by women is higher than the debt owed by men. However, the difference is not significant. Whereas, the significant difference in average debt in denied proceedings occurs. The average debt of woman is 5 064 979 CZK, and the average debt of man is 3 929 024 CZK.

Table 4: Average debt by gender (in CZK)

Status	Average Debt	
	Female	Male
Total	1 797 621	1 696 458
Successful	641 005	621 018
Denied	5 064 979	3 929 024
Cancelled	865 310	1 060 487

Table 5 reports the average net income by gender. On average, men have a higher average income than women. This result corresponds to the results of Hospodka et al. (2017) mentioned above.

There is one interesting observation in Table 5. At the first sight, the average income of debtor who was successfully relieved of debts is higher than the average income of debtor whose proceeding was cancelled or the proposal was denied. This could also be a consequence of the cancelled condition in the Insolvency Act mentioned previously. Since the debtor had to prove the ability to repay at least 30 % of debts, the higher income indicated higher monthly instalment.

Table 5: Average net income by gender (in CZK)

Status	Income	
	Female	Male
Total	13 189	14 069
Successful	14 143	15 664
Denied	12 409	11 945
Cancelled	12 810	14 028

Note: Average net monthly income reported at the time of submitting the proposal to allow debt relief.

3.3 Methodology and Model

In this part, the development of the model will be appropriately described. Firstly, the type of our data needs to be specified. Afterwards, the appropriate methodology will be used. Finally, our models will be developed.

3.3.1 Pooled Cross-Section Data

The obtained data capture the insolvency proceedings for which the proposal was filled in different years, and some variables may be strongly affected by inflation (e.g. average monthly income). Thus, our data are referred to as cross-sectional data collected within several years.

Wooldridge (2012) defines the pooled cross-section data as data collected randomly from a large population at different point of time. Our dataset satisfies this definition.

Pooled cross-section data consist of cross-section samples that differ each period (each year in our case). The reason for pooling the random samples is obtaining a larger sample. Since some variables tend to change over time (e.g. wages), the observations are not identically distributed. The observations are independent (Wooldridge, 2002).

The similarity of pooled cross-section data with the cross-section data causes the possibility to apply cross-section analysis to pooled cross-sections.

However, the change over time should be expressed by including year dummies when using the pooled cross-sections.

3.3.2 Variables Description

Our primary interest is to examine if the probability of being successfully relieved of debts is affected by the debt structure. Moreover, examining other determinants that have an impact on this probability will be included in our analysis.

At first, the dependent variable needs to be specified. We want to examine the factors influencing the probability of being relieved of debts. Thus, the variable *status* was chosen as a proper dependent variable. However, this variable needs to be modified to the dummy variable showing 1 for being relieved of debts and 0 for cancelled or denied proceedings.

For our model, the dependent variable is a dummy variable. Thus, the range of the dependent variable is restricted. So, we can use the linear probability model (LPM) to predict the fitted value within the range of the dummy variable. Furthermore, the use of the logit model is possible. When estimating the logit model, the LPM can be used as a robustness check.

We included several independent variables in our model, which are describing the debtor's characteristics and the debt structure are a part of our analysis. As the independent variables describing the debtor's characteristics are included average monthly income, the number of kids, gender dummy variable, spouses dummy variable and the Czech lands dummy variables.

Dummy variables are specified as follows. The gender dummy variable *female* is equal to 1 if the debtor is a woman. The dummy variable *spouses* is equal to 1 if the proceeding was applied for spouses or 0 otherwise. The Czech lands dummy variable *region MS* is equal to 1 if the debtor is from Moravia or Silesia. The dummy variable *region P* is taking 1 for the debtors from Prague. The *region C* is equal to 1 if the debtor is from Czechia.

We expect that the debtor with higher average monthly income has a higher chance to be relieved of debts as there is a possibility of paying

higher monthly instalment. Thus, the expected effect of the average monthly income on the probability of being satisfied is positive.

Independent variables indicating the debt structure were transformed. Since we are examining the impact of debt structure, all debts were converted to a percentage share instead of the nominal amount of debt.

We expect that the debtor with a higher share of debts from the banking institutions has a higher probability of being relieved of debts. As we mentioned previously, the behaviour of banking institutions during the insolvency proceeding is professional. Thus, the main aim of these institutions is not the economic result of the proceeding. Moreover, lower interest and fees are more typical for banking institutions than for nonbanking institutions.

As another explanatory variable, the number of creditors was chosen. The higher number of creditors may cause an enormous difference in behaviour, and the creditors' priorities can be distinct. We expect that with a higher number of creditors, the chance of being relieved of debts is lower.

Due to the nature of our data, year dummy variables have to be included in our models. Since our dataset contains the insolvency proceeding for which the insolvency petition was filed in the years from 2008 to 2017, there should be ten year dummies. Thus, we decided to separate this long period into two periods instead of making ten year dummies. The first period, from 2008 to 2012, indicates the period after the Great Recession and the Eurozone crisis. The second period, from 2013 to 2017, demonstrates the period of economic growth.

All variables included in our models and their description are presented in Table 6.

Table 6: Description of variables

Variable	Description
Status	Dummy variable indicating whether the debtor is relieved of debts (1), or the insolvency proceeding was denied or cancelled (0)
Kids	The number of kids that the debtor has
Average income	Average net income of the debtor reported in the insolvency proposal
Creditors	The number of creditors registered in the insolvency proceeding
Female	Gender dummy variable equal to 1 for woman and 0 for man
Spouses	Dummy variable indicating whether the proceeding was applied for spouses (1) or not (0)
Bank	Percentage of debt type in total debts. Each debt type represent the sum of secured and unsecured debts.
Nonbank	
Assignment	
Execution	
Others	
Region dummies	Set of dummy variables indicating whether the debtor lives in Moravia or Silesia, Czechia or Prague
Year dummies	Set of dummy variables capturing the time trend in the regression

3.3.3 Logit Model

For our analysis, the logit model was chosen. The reason behind this is that the LPM has some limitations, such as that the fitted probabilities may take the values outside of the binary variable range. Thus, the logit model will be estimated.

Firstly, it is crucial to understand the theory behind the logit model. As mentioned above, some drawbacks of the LPM exist. One of the main limitations of the LPM is that fitted probabilities may take values below 0 or

above 1. The second drawback is the constant marginal effect of the explanatory variables due to the linearity. In order to overcome these limitations, the binary response model is defined as follows:

$$P(y = 1|x) = G(\beta_0 + x\beta),$$

where $x\beta = \beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k$ and $0 < G(z) < 1$ for all $z \in \mathbb{R}$.

The binary response model can be derived from the latent variable model:

$$y^* = \beta_0 + x\beta + e, y = 1[y^* > 0].$$

The indicator function $1[\cdot]$ in the binary response model takes the value 1 if the expression in the bracket is true, and 0 otherwise.

There are two main types of the binary response model - logit and probit model. In our analysis, the logit model will be used.

In the logit model, the logistic function of G has the following form:

$$G(z) = \frac{\exp(z)}{1 + \exp(z)} = \Lambda(z).$$

For the estimation of the logit model, the maximum likelihood estimate (MLE) is used, and the OLS is no longer applicable because of nonlinearity. However, under general conditions, the MLE is consistent, asymptotically normal and asymptotically efficient (Wooldridge, 2012).

The important part of the analysis is the interpretation of coefficients. For the logit model, the partial effect on $p(x) = P(y = 1|x)$ is expressed as

$$\frac{\partial p(x)}{\partial x_j} = g(\beta_0 + x\beta)\beta_j, \text{ where } g(z) = \frac{dG}{dz}(z).$$

As function G is increasing, the partial effect will have the same sign as β_j . Therefore, the determination of a positive or a negative effect of the explanatory variable x_1 is not complicated. For the binary variables partial effect from changing the predictor variable from 0 to 1 is defined as

$$G(\beta_0 + \beta_1 + \beta_2x_2 + \dots + \beta_kx_k) - G(\beta_0 + \beta_2x_2 + \dots + \beta_kx_k).$$

However, this approach is useful only for examining the effect, reporting the partial effect with this approach is not possible.

Two approaches exist for interpretation of the partial effect - the partial effect at the average (PAE) and the average partial effect (APE). To express the partial effect for an average person, the PEA should be applied. However, for interpretation of the binary variable, the application of APE is more preferred.

For testing exclusion restrictions in our model, the likelihood ratio (LR) test will be used. The LR test uses the difference in the log-likelihood functions for the restricted and unrestricted model. For the evaluation of the results of the LR test, the critical values and LR statistics are needed.

The LR statistic is calculated as

$$LR = 2(L_{ur} - L_r) \sim \chi_q^2.$$

Before constructing and testing our models, we have to be aware of the dummy variable trap. To avoid the dummy variable trap in our analysis, the dummy variables *region P* and *y2008_12* were not included in our models. If we do not take into consideration the dummy variable trap problem, the multicollinearity may occur (Gujarati, 2004).

Considering the transformation of the variables indicating the debt structure, one explanatory variable has to be omitted. Since the sum of those variables for each observation is 100, the multicollinearity may appear. Thus, the variable indicating debts owed to other creditors (neither to bank institutions nor nonbank institutions) was omitted in our analysis.

Based on the LR test described above, two logit models were selected. The first logit model has the following form:

$$P(success_d = 1|x) = G(\beta_0 + \beta_1kids + \beta_2avr_inc + \beta_3bankp + \beta_4nonbankp + \beta_5assignmentp + \beta_6exep + \delta_1y2013_17 + u).$$

The second model is constructed as follows:

$$P(success_d = 1|x) = G(\beta_0 + \beta_1 kids + \beta_2 avr_inc + \beta_3 creditors + \beta_4 female_d + \beta_5 spouses_d + \beta_6 bankp + \beta_7 nonbankp + \beta_8 assignmentp + \beta_9 exep + \delta_1 y_{2013_17} + u).$$

Full results of the LR test can be found in Appendix A. The results of the LR test indicate that explanatory variables *region_MS* and *region_C* do not improve our model. Thus, we did not include them in our models. Moreover, this result is also confirmed by the Akaike Information Criterion (AIC). The AIC is defined as follows

$$AIC = e^{2k/n} \frac{\sum \hat{u}_i^2}{n}.$$

According to Gujarati (2004), when we compare two models, the model with the lowest AIC is preferred. For our models, the model without region dummies has a lower AIC. Thus, according to AIC, this model should be preferred.

3.3.4 Linear Probability Model

The Ordinary Least Squares (OLS) method was chosen as a robustness check for our analysis. This method allows us to examine the effect of the independent variable on the dependent variable.

For estimating this model, we use the same dependent variable *status* as in the logit model. Furthermore, the same explanatory variables will be included in our models. The omission of some dummy variables specified for the logit model due to the occurrence of the dummy variable trap also holds for the LPM.

Due to the binary dependent variable, regressions were run as LPM. The LPM is specified as

$$P(y = 1|x) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k.$$

As a functional form of our models, the level-level model was chosen. The level-level model was implemented for the rest of the explanatory variables in our models. The β_1 coefficient for the level-level model is interpreted as $\Delta y = \beta_1 \Delta x$. For the LPM, β_1 is a change in the probability of success due to the increase in x_1 by one unit (Wooldridge, 2002).

For our linear probability models, two models are estimated as for logit models.

As a result, the first model is constructed as follows

$$\begin{aligned} success_d = & \beta_0 + \beta_1 kids + \beta_2 avr_inc + \beta_3 bankp + \beta_4 nonbankp \\ & + \beta_5 assignmenttp + \beta_6 exep + \delta_1 y2013_17 + u. \end{aligned}$$

The second model has the following form:

$$\begin{aligned} success_d = & \beta_0 + \beta_1 kids + \beta_2 avr_inc + \beta_3 creditors + \beta_4 female_d \\ & + \beta_5 spouses_d + \beta_6 bankp + \beta_7 nonbankp + \beta_8 assignmenttp + \beta_9 exep \\ & + \delta_1 y2013_17 + u. \end{aligned}$$

3.3.5 OLS Assumptions

The check and fulfilment of the OLS assumptions are necessary for the validity of the selected models.

Firstly, the relationship between the predicted variable and predictors variable is assumed to be linear.

Secondly, the random sampling assumption may be problematic. Since we obtained the dataset by InsolCentrum, the decision about random sampling is difficult. However, we believed that this assumption is satisfied.

Next, the multicollinearity check is crucial for the satisfaction of the assumptions of OLS. The correlation analysis helps to identify predictors that can be correlated among themselves. The multicollinearity among variables could have caused instability in our model. The correlation matrix among explanatory variables can be found in Appendix A. At first glance, the multicollinearity is not the issue in our analysis.

The conditional mean assumption is satisfied if the error term has an expected value of zero given any value of the control variable. This assumption is also called as an exogeneity assumption. If the exogeneity assumption does not hold, the endogeneity arises, and the OLS estimator is biased and inconsistent. The possible cause of endogeneity is omitted variable bias, measurement error or simultaneity. To avoid violation of this assumption in our analysis because of the omitted variable bias, several variables were included in our models (e.g. region_ID).

Due to the fulfilment of these four assumptions, our estimates would be unbiased and consistent.

To have the best linear unbiased estimators, the satisfaction of the homoskedasticity assumption is needed. According to the homoskedasticity assumption, the variance of the error term has stay the same given any value of the explanatory variables. For testing this assumption, Breusch Pagan test was used. The null hypothesis is assigned to homoskedasticity. The p-value was lower than 0.05 for all our models. Therefore, there is an evidence to reject the null hypotheses. Thus, heteroskedasticity occurs in our models. However, the presence of heteroskedasticity is not rare when using the LPM model (Wooldridge, 2012).

Despite the fact that our data are of pooled cross-section nature, some characteristics of the time-series still occur in our dataset. Moreover, our assumption of random sampling is not surely fulfilled. The random sampling assumption ensures that the errors for different observations are independent conditional on the regressors. Therefore, the possibility of occurrence of serial correlation exists (Wooldridge, 2012). Thus, we decided to test whether the errors in our analysis suffer from serial correlation. The autocorrelation occurs if the error terms are correlated across time. We used the Breusch-Godfrey test for testing autocorrelation. The null hypothesis states that serial correlation does not occur. For our model, the small p-value indicates rejecting the null hypothesis. Thus, the presence of serial correlation is confirmed.

After detecting the presence of autocorrelation and heteroskedasticity in our models, the appropriate steps need to be done to have accurate estimations.

For our analysis, we decided to use heteroskedasticity and autocorrelation consistent (HAC) estimators. The Newey-West HAC procedure can be used to deal with autocorrelation. However, this procedure is valid only in large samples (Gujarati, 2004). According to Long and Ervin (2003), for data samples with less than 250 observations, the HC3 method should be used. Since our dataset contains 269 observations, we decided to use the method HC3. For this purpose, we used the `vcovHAC` function in RStudio for correction autocorrelation and heteroskedasticity.

4 Results

In this chapter, the results of our models that were specified in the previous chapter will be shown and discussed. Firstly, we introduce regression results. Then, we identify the method of our interpretation. After that, we interpret our results. In the last part, we compare our results with the results of regression on the subsample.

4.1 Regression Results

Table 7 presents the regression results of our models. As mentioned above, we estimated two logit models that were selected using the LR test.

When comparing our two logit models, we can see that the coefficients for explanatory variables did not change significantly. After adding two more explanatory variables in model 2, the regression results for the explanatory variables indicating debt structure changed marginally. Two explanatory variables *bank debt* and *assignment* became nonsignificant. Moreover, the coefficient for them lowered. The significance level for variables *nonbank debt*, *execution* did not change in model 2. The change in their size of coefficients is only marginal.

Thus, we decided to continue in interpreting our results only with logit model 2. According to LR test, three explanatory variables added in model 2 improve it. The final model 2 has 269 observations. The Mc Faden's pseudo R^2 is equal to 0.2237.

Table 7: Results of logit models

	Logit model 1	Logit model 2
Kids	−0.515*** (0.149)	−0.577*** (0.158)
Average income	0.0001*** (0.00003)	0.0001*** (0.00003)
Creditors		−0.131*** (0.032)
Female (D)		0.099 (0.307)
Spouses (D)		1.019** (0.427)
Bank debt	0.021*** (0.007)	0.010 (0.007)
Nonbank deb	0.029*** (0.007)	0.022*** (0.007)
Assignment	0.024** (0.011)	0.013 (0.011)
Execution	0.172** (0.078)	0.221** (0.086)
Year 2013-17 (D)	−1.067** (0.466)	−1.060** (0.484)
Constant	−3.581*** (0.733)	−2.356*** (0.795)
Observations	269	269
Log Likelihood	-149.242	-137.788
Pseudo R^2	0.1592	0.2237

Notes: *p<0.1; **p<0.05; ***p<0.01.

D = dummy variable.

Table 8: PEAs and APEs for logit model 2

	Model 2 - PEA	Model 2 - APE	LPM 2
Kids	-0.12607***	-0.09906**	-0.095**
Average income	0.00003***	0.00003***	0.0001**
Bank debt	0.00224	0.00176	0.001
Nonbank debt	0.00473**	0.00372**	0.003*
Assignment	0.00291	0.00229	0.002
Execution	0.04816*	0.03784*	0.020**
Year 2013-17 (D)	-0.19544**	-0.17140*	-0.193**
Creditors	-0.02856***	-0.02245***	-0.019**
Female (D)	0.02172	0.01703	0.020
Spouses (D)	0.23985*	0.17713*	0.163*
Num. obs.	269	269	269
Log Likelihood	-149.24152	-149.24152	

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

D = dummy variable. APE = Average partial effect. PEA = Partial effect at the average.

LPM = linear probability model. LPM is a robustness check for APE.

4.2 Interpretation of Results

The interpretation of coefficients of the logit model is not straightforward. Thus, the application of the APE and the PEA is needed. Table 8 provides APE and PEA for our logit model 2. As mentioned previously, we will use only model 2 for the interpretation. For full results of both models, see Appendix C.

Since our model includes some binary variables, we decided to use the APE approach for interpreting the regression results.

As a robustness check for the calculated APEs, we estimated linear probability models as already mentioned. According to Wooldridge (2012), LPM is usually comparable to APE. Table 8 shows the regression results of the LPM as a robustness check for APEs.

We can observe that the number of kids has a strong negative effect on the probability of being relieved of debts. The APE for the number of kids is -0.099. Thus, every other child decreases the likelihood of being successfully

relieved of debts by 9.9 percentage points. Moreover, the variable *kids* is significant on 99% confidence level. These findings suggest that people with more children have a lower chance of being relieved of debts. This result is not surprising. Usually, having more children means that the debtor needs more money for them. Thus, the instalments may be lower.

As we expected, the positive statistically highly significant effect of the higher income occurs. The APE for *average income* is 0.00003.

The APE for dummy gender dummy variable is 0.017, but not statistically significant.

The APE for variable *spouses* is 0.177. This result shows that the debtor who enters the insolvency proceeding with a spouse has a higher chance of being relieved of debts by 17.7 percentage points compared to the debtor who does not enter the insolvency proceeding with a spouse. This effect is statistically significant at 5 % level. The result may seem as logical as two people can support each other, and they have a vision of their better future without debts. Moreover, when spouses take a loan to buy something, the cost of the loan is split between spouses. On the contrary, when a single person takes a loan for the same thing, he or she bears all costs.

The results show that the effect of having more creditors is negative as we expected. Moreover, this effect is highly statistically significant. Thus, the debtors with more creditors have a lower chance of being relieved of debts. More precisely, with each additional creditor, the probability of being relieved of debts is decreasing by 2.2 percentage points.

We expected that the debtor with a greater share of bank debts have a higher probability of being relieved of debts than the debtor with the greater share of nonbank debts. This hypothesis was not confirmed since the APE for nonbank debts is higher. Thus, the results show the debtor has a higher probability of being relieved of debts if the share of nonbank debt is higher than the share of bank debt.

Interestingly, the APE for debt arising from execution is the largest one of APEs for all types of debt. Moreover, this effect is statistically significant

on 95% confidence level.

Overall, the results of APE are very similar to the results of the LPM. The effect of explanatory variables is the same for all explanatory variables. Moreover, the differences in coefficients are marginal.

4.3 Regression on the Subsample

We are aware of the possibility of occurrence of other outliers that may alter the results of our models. Thus, the function *outlierKD* in RStudio was used for detection of other possible outliers that have not been identified before. The function was used for the variables indicating the debt structure and the explanatory variables *average income* and *creditors*. We selected those variables because their range is wide.

The function *outlierKD* detects observations that are below $Q1 - 1.5$ interquartile range and above $Q3 + 1.5$ interquartile range. Those observations may disturb the results of the analysis.

Thus, we estimated our models also on the subsample. In this subsample, observations that were identified using the function *OutlierKD* were omitted.

The function *outlierKD* identified 44 outliers of the variable *assignment* that are not in the interval $(Q1 - 1.5 \text{ IQR}; Q3 + 1.5 \text{ IQR})$. Furthermore, 18 observations of *other debts*, 31 outliers of *execution*, 16 observations of *creditors* and 3 observations of *average income* were identified and omitted. In sum, 94 observations were omitted in our subsample.

Table 9 shows the regression results for logit model 2. For full results of these regressions, see Appendix D.

The regression results on the subsample show that the explanatory variable *kids* became less significant. Moreover, the APE for *kids* became lower. The significance of *average income* has lowered too. However, the size of the coefficient changed only marginally. The APE for *spouses* changed only a bit. On the contrary, the effect for female dummy variable changed a lot. However, the effect of female dummy variable is still nonsignificant.

The APEs for the variables indicating debt structure changed marginally

Table 9: Results of regression on the subsample

	<i>Logit model 2</i>	<i>LPM 2</i>	<i>PEA 2</i>	<i>APE 2</i>
Kids	−0.575***	−0.093***	−0.121***	−0.094**
Average income	0.0001**	0.00002***	0.00002**	0.00002*
Creditors	−0.217***	−0.029***	−0.046***	−0.035**
Female (D)	0.555	0.083	0.118	0.090
Spouses (D)	1.283**	0.175**	0.299**	0.208**
Bank debt	0.016	0.002	0.003	0.003
Nonbank debt	0.028**	0.003*	0.006**	0.004**
Assignment	0.254***	0.035***	0.053***	0.041***
Execution	0.431	0.041	0.09069	0.07008
Year 2013-17 (D)	−1.344**	−0.191**	−0.224***	−0.198**
Constant	−2.199*	0.172		
Observations	175	175	175	175
Log Likelihood	−85.234		−85.234	−85.234

Notes: *p<0.1; **p<0.05; ***p<0.01.

D = dummy variable. APE = Average partial effect. PEA = Partial effect at the average.

LPM = linear probability model. LPM is a robustness check for APE.

as well. The variable *execution* became nonsignificant. Furthermore, the coefficient became higher. On the contrary, the variable *assignment* became more significant. The coefficient for this variable has increased. The change for the variable *nonbank debt* is only marginal. However, the APE for *bank debt* became greater.

On the whole, the effect of all variables did not change on the subsample. The size of their APEs changed only marginally.

5 Conclusion

This thesis focuses on the insolvency proceedings of natural persons with the aim to examine whether the debt structure affects the probability of being debt relieved. More specifically, we aim to examine whether having a higher share of bank debt implies a higher chance of being relieved of debts.

In the Czech Republic, debt relief as a resolution of the insolvency proceedings was firstly introduced in the Insolvency Act. The Insolvency Act came into force in 2008. Since then, debt relief has popular. At the beginning of 2019, 114 000 debtors have used debt relief to solve their complicated financial situation.

The insolvency of natural persons may have a significant impact on the economy. The high indebtedness can result in holding back the consumption. Moreover, some debtors may get into a debt spiral from which they can no longer get out. For them, debt relief may be the solution to their problem.

Despite the importance of the insolvency proceedings of natural persons, the existing academic literature focuses mainly on the insolvency proceedings of companies. Academic papers focusing on the insolvency proceedings of individuals exist (e.g. Paseková, 2015; Hospodka et al., 2017), but there is a lack of them. Moreover, to our knowledge, a study examining the effect of the debt structure on the probability of being successfully relieved of debts does not exist. Thus, we want to remedy this lack.

We analyzed the dataset containing 269 insolvency proceedings. For these insolvency proceedings, the petition was filled in the years from 2008 to 2017. The probability of being relieved of debts was estimated by the logit model and the linear probability model.

The main finding is that having a higher share of nonbank debt implies the higher probability of being relieved of debts. Thus, our assumption that a debtor with a higher share of bank debt has a higher chance of being relieved of debts was rejected.

Moreover, we found that having a higher share of debt arising from execution implies the higher probability of being relieved of debts.

We also identified two important factors that have a negative effect on the probability of being relieved of debts - the number of kids and the number of creditors. On the contrary, determinants that have a positive effect were also found. One of these determinants is applying for debt relief as spouses.

We believe that our results will provide practical information for creditors and the state. Creditors can determine their debtor's chances of being relieved of debts using our results.

For further research, we would suggest examining the impact of the latest amendment that cancelled the obligation of proving that the satisfaction of creditor's claims will be higher or at least 30 % when applying for the debt relief. This amendment allows more debtors to enter into the insolvency proceedings. Moreover, we would propose to use a dataset with more observations.

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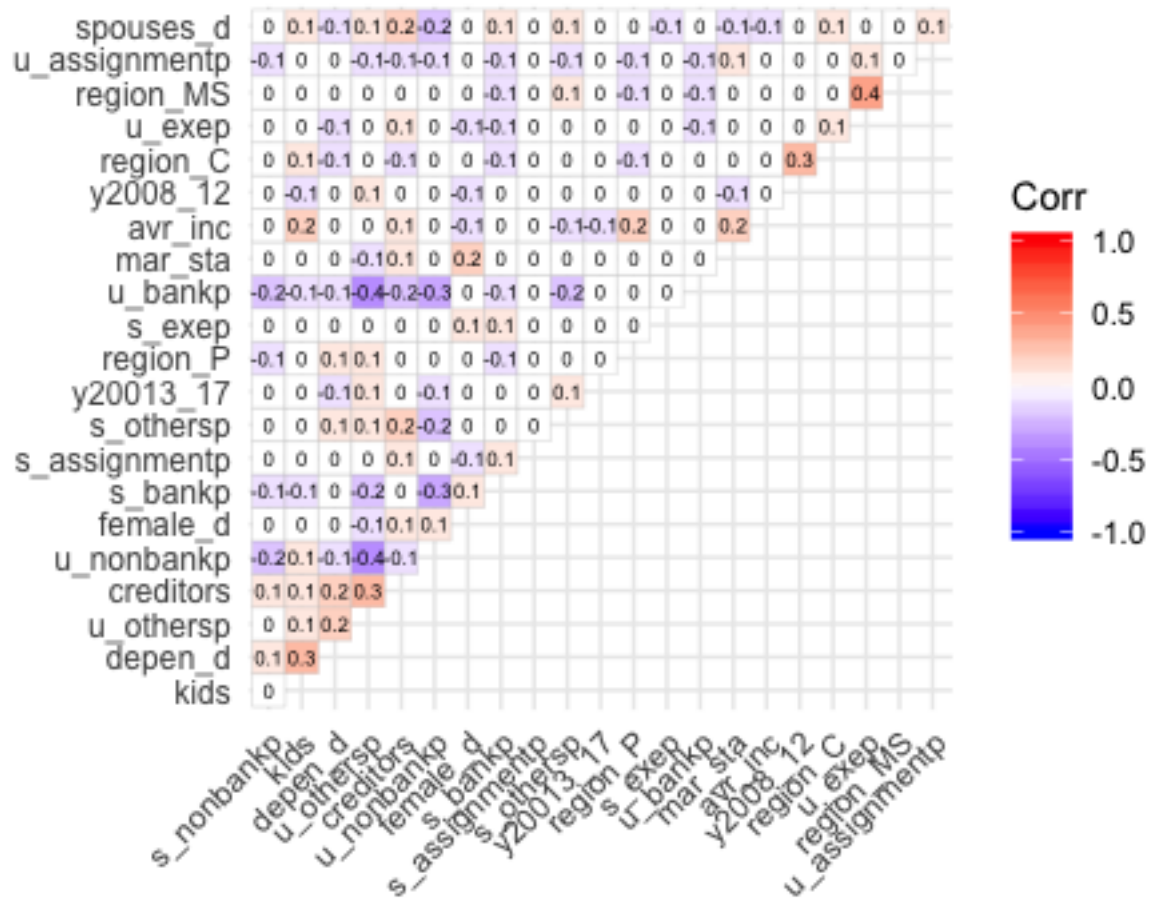
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Appendix A - The Correlation matrix

Figure A1: Correlation matrix among explanatory variables



Appendix B - The results of LR test

- M1: $\text{success_d} \sim \text{bankp} + \text{nonbankp} + \text{assignmentp} + \text{exep}$
- M2: $\text{success_d} \sim \text{kids} + \text{avr_inc} + \text{creditors} + \text{female_d} + \text{spouses_d} + \text{bankp} + \text{nonbankp} + \text{assignmentp} + \text{exep}$
- M3: $\text{success_d} \sim \text{kids} + \text{avr_inc} + \text{creditors} + \text{female_d} + \text{spouses_d} + \text{bankp} + \text{nonbankp} + \text{assignmentp} + \text{exep} + \text{region_MS} + \text{region_C} + \text{y2013_17}$
- M4: $\text{success_d} \sim \text{kids} + \text{avr_inc} + \text{creditors} + \text{female_d} + \text{spouses_d} + \text{bankp} + \text{nonbankp} + \text{assignmentp} + \text{exep} + \text{y2013_17}$
- M5: $\text{success_d} \sim \text{kids} + \text{avr_inc} + \text{bankp} + \text{nonbankp} + \text{assignmentp} + \text{exep} + \text{y2013_17}$

Table B1: LR tests results		
	LR chi2	Prob(chi2)
lrtest(M1,M2)	46.724	0.0000
lrtest(M2,M3)	6.1822	0.1031
lrtest(M3,M4)	0.7574	0.6847
lrtest(M2,M4)	5.4248	0.01985
lrtest(M4,M5)	22.906	0.00004224
lrtest(M5,M3)	23.664	0.0002519

Appendix C - Regression results

Table C1: Full results of regressions

	<i>Logit model 1</i>	<i>LPM 1</i>	<i>Logit model 2</i>	<i>LPM 2</i>
Kids	−0.515*** (0.149)	−0.095*** (0.023)	−0.577*** (0.158)	−0.095*** (0.023)
Average income	0.0001*** (0.00003)	0.00002*** (0.00000)	0.0001*** (0.00003)	0.00002*** (0.00000)
Creditors			−0.131*** (0.032)	−0.019*** (0.005)
Female (D)			0.099 (0.307)	0.020 (0.055)
Spouses (D)			1.019** (0.427)	0.163** (0.080)
Bank debt	0.021*** (0.007)	0.003*** (0.001)	0.010 (0.007)	0.001 (0.001)
Nonbank debt	0.029*** (0.007)	0.005*** (0.001)	0.022*** (0.007)	0.003** (0.001)
Assignment	0.024** (0.011)	0.004* (0.002)	0.013 (0.011)	0.002 (0.002)
Execution	0.172** (0.078)	0.018*** (0.005)	0.221** (0.086)	0.020*** (0.006)
Year 2013-17 (D)	−1.067** (0.466)	−0.181** (0.077)	−1.060** (0.484)	−0.193*** (0.067)
Constant	−3.581*** (0.733)	−0.100 (0.097)	−2.356*** (0.795)	0.121 (0.122)
Observations	269	269	269	269
Log Likelihood	−149.242		−137.788	
R^2		0.1784		0.2385
Pseudo R^2	0.1592		0.2237	

Notes: *p<0.1; **p<0.05; ***p<0.01

D = dummy variable. LPM = linear probability model.

Table C2: APEs and PEAs for logit models

	Model 1 - PEA	Model 1 - APE	Model 2 - PEA	Model 2 - APE
Kids	-0.11538***	-0.09720**	-0.12607***	-0.09906**
Average income	0.00002***	0.00002**	0.00003***	0.00003***
Bank debt	0.00471**	0.00397**	0.00224	0.00176
Nonbank debt	0.00645***	0.00544***	0.00473**	0.00372**
Assignment	0.00537*	0.00452*	0.00291	0.00229
Execution	0.03849*	0.03243*	0.04816*	0.03784*
Year 2013-17 (D)	-0.20356**	-0.18585**	-0.19544**	-0.17140*
Creditors			-0.02856***	-0.02245***
Female (D)			0.02172	0.01703
Spouses (D)			0.23985*	0.17713*
Num. obs.	269	269	269	269
Log Likelihood	-149.24152	-149.24152	-137.78843	-137.78843

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

D = dummy variable. APE = Average partial effect. PEA = Partial effect at the average.

Appendix D - The regression results on the subsample

Table D1: Full results of regressions - subsample

	<i>Logit model 1</i>	<i>LPM 1</i>	<i>Logit model 2</i>	<i>LPM 2</i>
Kids	−0.562*** (0.193)	−0.110*** (0.029)	−0.575*** (0.207)	−0.093*** (0.030)
Average income	0.0001* (0.00004)	0.00001** (0.00001)	0.0001** (0.00004)	0.00002*** (0.00001)
Creditors			−0.217*** (0.058)	−0.029*** (0.008)
Female (D)			0.555 (0.403)	0.083 (0.068)
Spouses (D)			1.283** (0.580)	0.175** (0.083)
Bank debt	0.031*** (0.012)	0.004*** (0.001)	0.016 (0.012)	0.002 (0.002)
Nonbank debt	0.039*** (0.012)	0.006*** (0.002)	0.028** (0.012)	0.003* (0.002)
Assignment	0.182** (0.071)	0.033*** (0.008)	0.254*** (0.085)	0.035*** (0.007)
Execution	0.108 (0.281)	0.008 (0.065)	0.431 (0.313)	0.041 (0.056)
Year 2013-17 (D)	−1.225** (0.595)	−0.195** (0.097)	−1.344** (0.676)	−0.191** (0.087)
Constant	−4.154*** (1.216)	−0.154 (0.125)	−2.199* (1.317)	0.172 (0.181)
Observations	175		175	
Log Likelihood	−94.896		−85.234	
R^2		0.2033		0.2740
Pseudo R^2	0.1780		0.2617	

Notes: *p<0.1; **p<0.05; ***p<0.01

D = dummy variable. LPM = linear probability model.

Table D2: APEs and PEAs for logit models - subsample

	Model 1 - PEA	Model 1 - APE	Model 2 - PEA	Model 2 - APE
Kids	-0.12449**	-0.10299**	-0.12110**	-0.09357*
Average income	0.00002	0.00001	0.00002*	0.00002*
Bank debt	0.00681**	0.00563*	0.00335	0.00259
Nonbank debt	0.00854***	0.00707**	0.00585*	0.00452*
Assignment	0.04040*	0.03342*	0.05338**	0.04124**
Execution	0.02387	0.01975	0.09069	0.07008
Year 2013-17 (D)	-0.22429**	-0.20333*	-0.22423**	-0.19839*
Creditors			-0.04577***	-0.03537**
Female (D)			0.11848	0.09026
Spouses (D)			0.29929*	0.20757*
Num. obs.	175	175	175	175
Log Likelihood	-94.89632	-94.89632	-85.23414	-85.23414

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

D = dummy variable. APE = Average partial effect. PEA = partial effect at the average