ON THE ROLE OF BANKRUPTCY LAWS IN CREDIT MARKETS

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Chapter 1

Introduction

1.1 Bankruptcy laws and creditor rights protection

A firm's insolvency is an inevitable element of the market economy. A legal framework for enforcement of contracts in the case of a firm's insolvency is provided by bankruptcy laws.[1] Bankruptcy laws not only protect the creditor's rights and impose financial discipline on managers, but also free assets from inefficient use and provide a resolution of debtor's claims, so that its resource can be used for new projects (Buttwill and Wihlborg, 2005).

However, the design of bankruptcy regimes differs substantially across countries in many respects. These differences reflect path dependency of legal and economic systems as well as the fact that the framework for bankruptcy has developed as the result of bargaining among various interests groups. We observe that the divergence in the design of bankruptcy laws is relatively significant even among countries with relatively similar legal systems and common tradition, such

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[1] Comparison of recent theories on personal and corporate bankruptcy can be found in White (2005). In our work we focus on the problem of corporate bankruptcy.

as the U.S. and the U.K.[2]

The bankruptcy laws differ not only across countries but also over time. We observe considerable decreases in penalties for declaring bankruptcy (Begrlof et al., 2001). In Ancient Rome the penalty for bankruptcy was death or slavery. In the Middle Ages the punishment was significantly softened.[3] In the 18th century, first bankruptcy law was adopted in England, still containing imprisonment as a common punishment. The first bankruptcy law allowing for a modern reorganization procedure was not introduced until 1978, by Chapter 11 in U.S. law (Djankov et al., 2003). In recent decades most of the industrial nations amended their bankruptcy laws, implementing various kinds of reorganization procedures.[4] The general trend towards moving from regimes with strict creditor protection to a more debtor-friendly approach is also reported in Westbrook (2001).

In general, we can distinguish bankruptcy laws in the dimension of toughness (strictness) of the law on the debtor, which actually reflects the different degrees of creditor rights protection. Bankruptcy laws usually balance protection of creditor rights, which is essential for the mobilization of capital for investment, while restraining premature liquidation of viable businesses (Claessen et al., 2001). Viable enterprises can be kept in business by implementation of reorganization procedures instead of liquidation; that, however, limits the creditor's rights.

1.1.1 Why do we need bankruptcy laws?

The bankruptcy law certainly interferes with debtor's and creditor's rights. Why do we need bankruptcy laws that restrict the contract among debtor and creditor?

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[2]The differences between the American and British bankruptcy regimes are described in detail in White (1996) or Buttwill and Wihlborg (2005). Claessen et al. (2001) mention that the U.S. Bankruptcy Act of 1800 was a copy of the English law. Today, however, the U.S. law with Chapter 11 is more debtor oriented compared to creditor oriented British law.

[3]Bankrupt debtors were usually publicly humiliated, pilloried and put into prison. In England they often had one ear cut (Djankov et al., 2003)

[4]Italy 1979, France 1985, the United Kingdom 1986, New Zealand 1989, Australia and Canada 1992, Germany 1994 and 1999, Sweden 1996, Japan and Mexico 2000, to name a few.

Why can the parties not write their own specific contract dealing with the problem of a firm's insolvency? Standard justification for bankruptcy law is the argument of multiple creditors. Usually we observe that a debtor has obligations to more than one creditor. Without the state-guaranteed rule for insolvency, creditors would be motivated to "run on assets", as the firm's assets are usually not sufficient to cover all creditors' claims. This can lead to premature liquidation and socially not optimal destruction of value. Bankruptcy law thus solves the coordination problem among creditors setting rules for all creditors.

The question that follows is why does a firm have multiple creditors. There are several papers pointing to the multiple creditors setting arising endogenously from the financial contracting. Berglöf et al. (2003), for example, develop a model of an incomplete-contracts framework with imperfect renegotiation. It shows that having multiple creditors increases a firm's debt capacity while decreasing the debtor's incentives to default strategically. The need for bankruptcy laws thus arises endogenously as the inconsistency of creditors' claims is a result of optimal contract design.[5]

1.1.2 Efficient bankruptcy procedures

No agreement exists on, how the optimal bankruptcy regime should be designed. However, Claessen et al. (2001) mention that "...*badly written codes make everybody worse off*". Whether the optimal method of dealing with bankruptcy is to liquidate the firm, to sell it as a on-going concern or to start a reorganization plan is closely connected to asymmetric information about the cause of distress (Buttwill and Wihlborg, 2005). The distinction between economic and financial distress is crucial. Economic distress means that the net value of the firm is negative and from an economic point of view the firm should be shut down. In the case of financial distress the net present value of the firm is positive, but current

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[5]Similar conclusions are found by Bolton and Scharfstein (1996).

cash flows exceed the value of the firm's debts. The firm is insolvent as it cannot pay back its obligations, but its value from the social point of view is positive. In the case of financial distress, restructuring or other forms of debt negotiation are socially optimal, while in the case of economic distress liquidation would be optimal. If the firm is in financial distress, the liquidation is regarded as inefficient from the social point of view.[6]

The role of an inappropriate bankruptcy regime is often mentioned as a reason of a deepness for the financial crises. The East Asian financial crisis 1997-1998 have raised the question of how to deal with the resolution of financial distress and emphasized the debate on the optimal bankruptcy regime. According to many authors, an absence of the appropriate bankruptcy regime in the East Asian countries considerably complicated the process of corporate restructuring after the crises (Claessens et al. (1999), Claessens et al. (2001), Stiglitz (2001), Fagan et al. (2001)). They point out that even if the bankruptcy procedures are not used for restructuring, they determine the speed and extent of restructuring. Instead of resolving their debts through bankruptcy, most of the companies in East Asia used out-of-court negotiations.[7] An appropriate extent of reorganization versus liquidation in the bankruptcy law has been heavily discussed in the context of the U.S. Bankruptcy Act Chapter 11 (reorganization) and Chapter 7 (liquidation).[8] The topic of reorganization versus liquidation was very important in transition countries in the beginning of the transition period, when many companies become economically distressed due to the inefficient production and financially distressed because of the dramatic changes in the economy. In Chapter 2 of this thesis we

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[6]For example, Knot and Vychodil (2004) points at the case of many East Asian firms that had their debts denominated in foreign currency. These economically sound firms got in trouble as the local currency depreciated. Liquidation of these firms would be socially not optimal.

[7]Only 6 per cent of financially distressed companies in Indonesia, Malaysia, Korea, and Thailand resolved their debts through bankruptcy, the rest used out-of-court renegotiation (Claessens et al., 2001).

[8]Among advocates of the Chapter 11 belong, for example, Giammarino and Nosal (1999), Berglöf et al. (2003), Berkovitch et al. (1998) and Brown (1989). The Chapter 11 has been criticized by e.g. Baird and Rasmussen (2003), Bebchuk (1988), Hart (2000) and Aghion et al. (1992).

analyze the decision on the optimal bankruptcy procedure in transition countries in context of privatization methods.

1.1.3 Creditor-friendly vs. debtor-friendly bankruptcy laws

The debate whether the bankruptcy regime should favor liquidation or reorganization is a part of the general discussion about debtor- versus creditor-friendly bankruptcy approaches. We talk about a creditor-friendly (tough) bankruptcy law if the procedure favors the creditor, giving him substantial rights in seizing the assets of an insolvent firm. Such a procedure prefers liquidation as this equals taking possession of firm's assets. A bankruptcy law supporting reorganization procedure is considered to be debtor-friendly (soft), as this limits the creditor's rights substantially and retains some control rights by the debtor.

Considering the optimal bankruptcy procedure, we cannot focus only on the ex-post view according to which we maximize the value of the insolvent firm for all stakeholders (debtor, creditors, employees etc.). We also have to take into account ex-ante effects, so that the procedure encourages managers to induce effort in paying back the debt, and creditors from giving imprudent credits. The ex-ante effects are sometimes considered as even more important. As Stiglitz (2001) mentioned, it is crucial to consider the behavior incentives bankruptcy laws create and not only whether the codes are fair or not.

If we consider the ex-post efficiency point of view, it is not socially optimal to give all control rights to the creditor. Biais and Mariotti (2003) show that the creditor does not internalize all costs of its actions. He, for example, does not take into account the social costs of liquidation and might decide to shut down an insolvent firm, although it would be optimal to reorganize this firm and keep it in business. Another reason, stressed by Berkovitch and Israel (1999), is the informational advantage of the current firm's management. If the firm was hit by an external shock, the management, having the best information about the company,

has the best chance of reorganizing the firm and continuing operation.[9] Moreover, if the manager loses the control in the insolvent firm due to the tough bankruptcy law, he might be motivated to carry out risky actions to avoid bankruptcy (Hart, 2000).

On the other hand, keeping a lot of control in the debtor's hands distorts the debtor's ex-ante incentives and aggravates the problem of moral hazard of financial contracting. If the debtor knows that he stays in control even in the case of bankruptcy, he is less motivated to avoid it. Soft bankruptcy laws keeping strong control rights by the management can also be used by debtors to escape the lenders. Moreover, accounting for the ex-ante efficiency, we have to consider how the creditor adjusts his behavior before he gives the credit. If the creditor's rights are significantly limited and the creditor cannot easily access collateralized assets, his willingness to give credit is decreased, he increases the price of the credit possibly leading to credit rationing.[10] The effect of credit rationing due to a debtor-oriented bankruptcy law is described by Biais and Mariotti (2003). They study bankruptcy in a general equilibrium framework, taking into account the interactions between the credit and the labor markets. They find that a soft bankruptcy law worsens credit rationing but still can maximize social welfare.

Povel (1999) analyzes the tradeoff between manager's effort levels and his decision to delay bankruptcy filing. He compares two regimes of tough and soft bankruptcy laws and finds that when the law is soft managers do not inefficiently delay bankruptcy filing, however they exert lower effort in performing the project. In the case of the tough law, managers never file for bankruptcy as they would lose their jobs, but they have high incentives to exert effort.

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[9]Studying the ex-post effects of a bankruptcy law, it is also very important to consider the costs of bankruptcy. Several studies exist examining empirically direct and indirect costs of bankruptcy and find them substantial (e.g. Warner (1977), Altman (1984), Bris et al. (2005)).

[10]Cornelli and Felli (1997a) suggest a framework to analyze ex-ante and ex-post efficiency of bankruptcy procedures. They show that the definition of creditors rights over the company and the protection of the creditors' seniority are crucial to assess the ex-ante efficiency of a bankruptcy procedure.

The role of the collateral and the bankruptcy law that acts as a payment incentives for the entrepreneur is studied by Bester (1994). His model investigates how the prospect of debt renegotiation affects both the creditor's and the debtor's behavior. In chapter 3 of this dissertation we extend the the model of Bester (1994) and consider the bankruptcy law as an endogenous variable. We examine the actual effect of the toughness of the bankruptcy law on the number of liquidations.

One of the basic questions for the design of bankruptcy law concerns whether the value of an insolvent company should be divided in accordance with absolute priority rule (APR). The APR implies that all creditors must be paid in full before equity holders receive anything and also determines the priorities among creditors and requires that higher-priority creditors be repaid in full before lower-ranking creditors receive anything (White, 2005).

Bolton and Scharfstein (1996) and Bebchuk and Picker (1993) point out that the violation of the absolute priority rule may enhance ex-ante efficiency under limited liability. Bebchuk (2002) analyzes what the negative effects on ex ante decisions taken by shareholders are if we deviate from the absolute priority rule. He finds that the deviation aggravates the moral hazard problem and increases the manager's incentive to favor risky projects. Weiss (1990) presents empirical evidence of costs of APR violation on a sample of New York Stock Exchange firms filing for bankruptcy between 1979 and 1986.

Berkovitch and Israel (1999) study how the differences across economic systems in the transparency of information on fundamentals and the managers' ability to use private information influence the government's decision on the toughness of the bankruptcy law. They proposed a regime where only the creditor can file for bankruptcy for bank-oriented economies, while market-oriented economies should include chapters allowing the debtor as well as the creditor to file for bankruptcy.

1.1.4   Empirical observations

La Porta et al. (1997) and recently Djankov et al. (2005) argue in their empirical studies that the choice of the bankruptcy design is determined by the origin of the legal system, where countries with the French civil-law legal system tend to have softer bankruptcy laws compare to common-law countries. Besides the influence of the legal system, the choice of the optimal bankruptcy procedure is also heavily influenced by the political process. We observe that employment considerations have led to favor restructuring (soft bankruptcy law) over bankruptcy in many countries (Buttwill and Wihlborg, 2005). After economic downturns, countries tend to avoid the costs of liquidation by implementing softer law. Berglöf et al. (2003) mention another example from the 19th century in the U.S., where the softness of the bankruptcy law was a reaction to bankruptcies of large railroad companies. These bankruptcies were considered to be against the public interest as they could have slowed down construction of the railroad network between East and West.

There is also a list of studies showing the effect of bankruptcy laws on the extent of credit financing and the importance for capital mobilization. Gangopad-hyay and Wihlborg (2001) find that financing increases with procedures favoring creditors. Similar results can be found in Rajan and Zingales (1995), La Porta et al. (1997) and Djankov et al. (2005).

An important dimension of the bankruptcy law is not only how the actual law written in books protects the creditor's rights, but also how these rights are enforceable. The enforcement of law depends on the quality of the judiciary system and overall rule of law in the country. Ayotte and Yun (2006) find in their theoretical model that the optimal creditor protection heavily depends on the existing legal environment. Pistor et al. (2000) and Pistor (2000) stress the importance of law enforcement for the protection of creditor rights in the context of transition countries. They argue that the legal environment in the transition

countries is a much more important determinant of the credit market size than the extent of creditor rights protection written in laws.

This thesis contributes to the existing literature in several ways. We analyze different effects of bankruptcy laws on the decision making of debtors and creditors and consider how these effects influence the government's decision on the optimal bankruptcy design. In particular, we ask in Chapter 2 how the choice of the optimal bankruptcy law is affected by privatization policy in transition countries. In Chapter 3, we examine how the degree of creditor rights protection influences the number of liquidations if we take into account the debtor's incentives to default strategically. Finally, chapter 4 analyzes the influence of bankruptcy laws on the lender's decision to share information. In more detail, we study how incentives are changed in different competition environments in the credit market. The following sections give a brief introduction of all three chapters.

1.2 Bankruptcy laws and privatization decisions in transition countries

After the breakdown of communism in Central and Eastern Europe, countries in this region faced a transition from a central planned economy to a market economy. The transition did not include only the changes in the economical regime but also contained remarkable changes in legal and institutional settings. One of the most significant changes was privatization. In the contract theory point of view, privatization can be regarded as a government's commitment not to subsidize an insolvent firm. Such a commitment leads to higher productive efficiency (Schmidt, 1996a) as the manager has incentives to avoid an insolvent situation. This process of hardening of the firm's budget constraint via privatization, however, might lead to liquidation, which is inefficient ex-post and thus to allocative inefficiency.

Chapter 2 contributes to the existing law and finance literature analyzing

the government choice of the optimal bankruptcy procedure in the context of privatization decision. We argue that countries that privatized their economy to a large extent faced potentially high levels of liquidations. This threat motivated governments in these countries to implement policies to mitigate the negative effect of privatization. Bankruptcy laws offer a direct tool dictating how the number of liquidations can be limited. Adopting a soft bankruptcy law discourages the creditor from filing for bankruptcy of an insolvent firm.[11]

The chapter presents an idea why the choice of a soft bankruptcy law might be optimal from the point of view of the government that has to consider the privatization framework in the country. We argue that the transition to a market economy (heavily influenced by the degree of privatization) created a situation in which many firms become financially distressed. In such a situation, implementing a tough bankruptcy law would result in a socially inefficient high number of liquidations. However, we have to consider that the privatization was implemented to harden the budget constraint and hence to increase the productive efficiency. Adopting a soft bankruptcy law softens the budget constraint again. We take the extent of privatization as given and consider the choice of the bankruptcy law balancing the trade-off between productive and allocative efficiency. We find that if the privatization level is high, the government prefers to limit the number of liquidations directly by implementing a soft bankruptcy law. If the privatization level is low, it pays off to motivate the managers with a tough bankruptcy law and to allow for a higher level of liquidation.

We also provide empirical evidence on the relationship between the toughness of the bankruptcy law and the extent of privatization in transition countries. Empirical evidence supports our theoretical prediction that countries with a large degree of privatization incline to implement softer bankruptcy laws.

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[11] We can also observe other ways how the government might try to mitigate the negative effects of privatization. For example, in the beginning of the transition period the Czech Republic privatized state-owned enterprizes to a large extent but was reluctant to privatize state-owned banks. These politically controlled banks were giving imprudent credits to many already privatized firms.

1.3 Bankruptcy laws and debt renegotiation

The regime of bankruptcy law influences on the number of bankruptcies in the country. The actual impact is, however, not obvious. Claessens and Klapper (2005) find in their empirical analysis that the effect of the toughness of the bankruptcy law is heavily influenced by the quality of law enforcement and judicial efficiency in a country. In countries with a bad judicial system, tougher bankruptcy law, giving better creditor rights protection, leads to a higher number of liquidations. However, in countries with good law enforcement, tougher bankruptcy law leads to a lower number of liquidations.

In Chapter 3 we present a simple model of borrowing and lending with asymmetric information, where due to the possibility of renegotiation the creditor cannot credibly commit to liquidating the debtor if the default occurs. The model captures the principal-agent problem between the creditor and the debtor, where both parties have symmetric information about the ex-ante profitability of the project, but the absence of state verification creates the informational asymmetry at the time the project is realized. We analyze the effect of the bankruptcy law on the number of liquidations. Moreover, we consider different degrees of competition in the credit market and examine how the competitive environment influences the number of liquidated firms.

The model extents the model of Bester (1994) with a new modeling of the renegotiation stage according to the soft budget constraint literature. We treat the bankruptcy law as a one-dimensional variable that influences creditor's expected value of assets that can be recovered. We find that an interval of the law exists, where the toughness is negatively correlated with the number of liquidations. Tough bankruptcy law increases the payoff from liquidation for the creditor. However, if the bankruptcy law is not tough enough to encourage the creditor to always initiate the liquidation, the entrepreneur might try to avoid paying back the credit by claiming default even if the firm is not insolvent. Increasing the

toughness of the law in this case discourages the entrepreneur from such behavior and decreases the number of defaults. We also find that the number of liquidations is higher in less competitive environments as the price of the credit is higher in this case and the entrepreneur has more incentives to avoid paying it back. From the social point of view, softer bankruptcy law is more likely to be implemented in more competitive environments, as the liquidation rate in more competitive markets is lower.

The model presents an idea why a tough bankruptcy law might lead to a lower number of liquidations. Such a relationship is observed by Claessens and Klapper (2005) in countries with good judicial efficiency. Furthermore, we extend the analysis by examining the effect of bank competition. Our empirical results support the findings of the model that less competitive credit markets experience higher liquidation rates.

1.4 How does the bankruptcy law influence a lender's decision on information sharing?

Credit markets are affected by asymmetric information between lenders and borrowers. There are two basic views how lenders can reduce the problem of asymmetric information. According to the first "creditor power view", power given to the creditor by bankruptcy laws matters and can reduce the moral hazard problem. If the creditor can more easily enforce repayment, ask for the collateral or threaten with liquidation he is more willing to provide credit. According to the second "informational view", lenders can focus on the type of asymmetric information that gives rise to the problem of adverse selection. The creditor can solve the problem of information asymmetry by investing in screening, monitoring, or obtain information about the debtors from other creditors. Djankov et al. (2005) and Jappelli and Pagano (2002) provide some empirical evidence that the

informational and creditor power approaches might be substitutes.

In chapter 4, we focus on the determinants of institutions to share information studying the banks' decisions to establish a private institution for information sharing in a two-period model with moral hazard and adverse selection problem. We analyze how the banks' decisions are influenced by the degree of bank competition in the credit market. The possibility that bankruptcy laws providing the creditor rights protection might be substitutes to information sharing is taken into account. We study the government's decision on the optimal level of bankruptcy law in different competition environment and how this decision influences the banks' decision to share information.

We find that there exists a parameter space, where a higher degree of competition in the banking market is associated with a higher degree of information sharing. In this interval, the government has incentives to implement a tough bankruptcy law to reduce the moral hazard problem in a monopoly banking environment in the first period. The side-effect of the bankruptcy law solves the adverse selection problem in the second period as bankruptcy law works as a substitute to information sharing. In a more competitive environment, the government does not have such incentives to implement tough bankruptcy law. In the second period, banks have to solve the adverse selection problem by information sharing.

The literature on information sharing predicts an opposite relationship (Jappelli and Pagano, 1993), i.e. banks in less competitive market are more likely to share information. We present empirical evidence on the extend of private information sharing in 104 countries around the world. Using the instrumental variable approach that solves the problem of endogeneity we find that countries with more competitive banking environment have larger share of population covered by private information sharing institution.

Chapter 2

Bankruptcy Laws and Privatization Decision in Transition Countries

2.1   Introduction

Bankruptcy law design differs substantially across countries. On the one hand, UK and Germany are typical examples of countries, where the main objective of bankruptcy law is the protection of creditors. Such a system is seen as *tough* on debtors. On the other hand, countries like France or the U.S. have bankruptcy systems that are *soft* on debtors (or debtor oriented), limiting creditor's rights, emphasizing the firm's reorganization and taking into account social interest. The tough bankruptcy law supports the rights of creditors and makes it easier for them to seize assets of the insolvent firm. As seizing of the assets leads to liquidation of the firm, tougher bankruptcy law might lead to a higher number of liquidations. The debtor oriented legislative is supported by a view that creditor's behavior can lead to extensive liquidations, hence it may not be socially optimal. The soft bankruptcy law makes the liquidation less attractive for the creditor and allows for reorganization that keeps the company in business.

The optimal bankruptcy procedure has been considered an important component of transition from centrally planned economy (Aghion et al., 1992). Transition countries in Eastern Europe had to set their company law system from scratch. Although they all faced similar starting positions and a similar level of central planning, they have chosen significantly different levels of bankruptcy law. Some countries, e.g. the Czech Republic, adopted a soft bankruptcy law, while other countries like Hungary or Slovenia adopted relatively tough bankruptcy laws (EBRD, 2004).

The contribution of this chapter is an examination of a relationship between the privatization decision and the bankruptcy law. We argue that the decision about the level of bankruptcy law in transition economies was influenced by the different level of privatization in these countries. Privatization was one of the main tasks for the governments in the transition from the central planned economy to the market based economy, however countries differ in the extent of reforms. Some governments privatized many companies in a short period of time and others opted for a gradual process, giving the government more control over the transition. The bankruptcy law is an important factor influencing the credit market and respectively the entire economy. Tough bankruptcy law, giving more rights to the creditor, decreases the price of a credit and improves the incentives of managers. However, it might lead to a high number of liquidations and thus high unemployment costs (Berkovitch and Israel, 1999). The high level of liquidation might not be socially optimal, especially in times when the economy is very fragile. We argue that if the government has decided for privatization of a large number of firms, it might be afraid of a high level of liquidation of many privatized companies, and this gives politicians an incentive to soften the bankruptcy law. On the contrary, in countries that opted for a gradual way of privatization and privatized a limited number of firms, the share of public companies is large. As the government can help these companies if they get in economic troubles, they are not threatened by liquidation. The public firms are then never insolvent and

therefore they are not threatened by the bankruptcy law. When the number of private firms is smaller, the costs of liquidation are smaller and the government chooses a tougher bankruptcy law improving the incentives of managers in private companies.

2.1.1 Bankruptcy laws

As we mentioned in the introduction, it is important to distinguish between ex-ante and ex-post effects of bankruptcy law. A soft law allows for restructuring a company, taking into account social costs of liquidation of a bankrupt firm. Softness of the law can be seen, for example, in a discretion space that is given to a judge deciding about the liquidation of the company. The softer the law, the more discretion the judge can use and the more firms will be reorganized and kept in business and not shut down.

Giving creditors full control does not ensure that the socially optimal solution will be implemented. Creditors might not internalize all the effects of their decisions. The most common example are the social costs of unemployment. On the one hand, it might be optimal for creditors to liquidate the bankrupt company causing unemployment costs, while on the other hand, it would be socially optimal to keep the old management in power to reorganize the company and limit the unemployment costs. Especially in the case of transition economies the unemployment costs might be excessive and actually cancelling a part of the debt and keeping the management in power might be socially optimal. Thus, the soft law can implement the ex-post socially optimal solution.

The ex-ante efficiency point of view focuses on the influence of the bankruptcy law on the behavior of creditors and debtors before the credit is provided. If the bankruptcy law is soft, giving the creditors less rights, the creditors will rise the cost of credit to ensure the same expected payoff. This might result in credit rationing. Moreover, weak bankruptcy law influences the effort exerted by the

manager in a negative way. If the manager knows that the company will not be liquidated but rather reorganized and he keeps the job, he might exert less managerial effort and therefore worsen the economic outcome of the firm.

Why do some countries prefer a tough and some a soft bankruptcy law? One of the possible explanations is presented in La Porta et al. (1997). The authors find that the level of creditor's protection depends on the legal origin in the countries. Countries with legal system roots in German and common law legal system present a relatively better protection of creditors than a French civil law.

However, we can argue that the legal systems in transition countries are similar and we focus in our model on a more political explanation of the emergence of legal differences in the bankruptcy law. Biais and Racasens (2000) in their model show that if the society is more concerned about the social costs, it prefers the soft law over the tough one. The tough law is preferred when the credit rationing is more important and social costs are limited. Authors have built a general equilibrium model with the labor and credit market, explaining different bankruptcy law levels by the different distribution of wealth in the society. Countries where the pivotal voters are middle class citizens prefer tough law, as these citizens can benefit from enhanced entrepreneurial opportunities. In the societies where the majority of the voters are rather poor, so that they are credit rationed even under the tough law, soft law is preferred.

Biais and Mariotti (2003) have built a model based on Holmstrom and Tirole (1997) corporate finance model. The results are quite similar to Biais and Racasens (2000), however, the major contribution of this paper is incorporating corrupt judges. A paper of Lambert-Mogiliansky et al. (2000) studying the process in Russia also considers the effect of corrupt judges. Both studies come to the same conclusions. In a country where the judges are corrupted, tough bankruptcy law should be adopted. The corrupt judges use their discretionary power rather to obtain bribes than to internalize social costs of liquidation and maximize social welfare, and this leads only to more credit rationing.

2.1.2 Privatization

In our analysis, we study the decision about the optimal bankruptcy law in the context of privatization in transition countries. The problem of privatization has been much studied in the economic literature. The famous Williamson puzzle (Williamson, 1985) asks why the privatized firm should perform better than the private one as the government can always hire a manager under the same contract as the private owner. Sappington and Stiglitz (1988) argue that a privatized firm should always be at least as efficient as a public company. They suggest an auction, where the government sells the company and the owner of the privatized firm obtains the exact social value of the firm. The government can achieve efficient allocation even though it does not know the cost function. The new owner chooses the optimum production level and also internalizes the social value of the firm in its valuation.

Due to these arguments; it is not obvious why governments opt for privatization. One of the concepts that answers this problem comes from an incomplete contract approach (Schmidt (1996a), Laffont and Tirole (1991), Schmidt and Schnitzer (1993), Schmidt (1996b)). The incomplete contract approach emphasizes that it is not possible to write a complete contingent contract. The incomplete contract then creates costs due to the asymmetric information between the government and the private owner or manager. Schmidt (1996a) argues that by implementing privatization, the government commits itself to harden the budget constraint of a manager (firm) and this forces the manager to improve the productive efficiency. In case of nationalization (the opposite of privatization), the government cannot commit not to distort the production level in a public firm and this results in a soft-budget constraint for the manager in a public firm. Due to the soft-budget constraint, incentives of the manager to exert effort (to investment in cost reduction) are distorted.[1] However, implementing privatization brings some

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[1] The problem of hardening the budget constraint in transition countries is discussed in detail by Kornai (2001).

costs. The manager of a privatized company does not internalize all the costs and chooses the production level that is not socially optimal. Börner (2004) studies how the government's decision about privatization is influenced by the government concerns about unemployment. The government in our model can use the bankruptcy law to soften the hard budget constraint imposed by privatization. It cannot commit not to distort the production level. Following the bankruptcy law, only some companies will not be liquidated, because the liquidation decision is to be done by independent courts.

Another strand of literature focuses on the agency problem of politicians rather than the agency problem of managers. Shleifer and Vishny (1994) and Boycko et al. (1996) argue that it may be politically less costly to influence the employment level in a public company than to subsidize a private firm. The public (voters) may not be aware of the potential profits that the public firm is wasting on an inefficient employment level but they realized when the government would like to subsidize a private firm from tax revenues. There privatization solves the politicians agency problem and enhances efficiency.

2.2 Model

We understand bankruptcy law as a law that describes rules to liquidate a company if this company is insolvent. Bankruptcy law can be tough or soft. Under the tough bankruptcy law, all companies that are insolvent will be liquidated and the creditor will get the liquidation value. Under soft insolvency law, however, not all insolvent companies will be liquidated. Soft law is understood as a law that protects the debtor more than the creditor. In our model, we will denote the toughness (or strictness) of the law by a one-dimensional variable $\alpha, \alpha \in (0, 1)$, $\alpha = 0$ means a soft law (firms not liquidated even when they are in loss), $\alpha = 1$ indicates a tough law. The variable α then denotes the actual liquidation rate of insolvent firms. This simple approach to bankruptcy law is motivated by Biais

and Mariotti (2003).[2]

The idea of our model is the following. The government chooses the toughness of the bankruptcy law. Then, there is a continuum of firms on the interval $[0, 1]$, with share of y private companies and $(1 - y)$ public companies. We consider the privatization decision, i.e. the value of y, as exogenously given. In the private firm, there is a risk-neutral entrepreneur maximizing his profit; in the state-owned company, the government hires a manager.

The basic model of the credit market is inspired by Holmstrom and Tirole (1997). We extend the analysis by modelling the bankruptcy law and introducing the problem of privatization by adding the public firms to the model. All companies have an investment opportunity. All the projects are identical. The project yields a return R or 0, investment costs are c. The entrepreneur and the manager in the public firm respectively, exert effort and influence the probability of success of the project, suffering the disutility e. If the entrepreneur (or manager) exerts effort, then the project will yield R with a probability p_h or bring 0 with a probability $(1 - p_h)$. If the entrepreneur does not exert effort, the project yields R with probability p_l and fails with probability $1 - p_l$, where $p_l < p_h$. The entrepreneur's (manager's) effort e can be understood also as an investment in cost reduction. The crucial assumption is that the effort e is not observable and cannot be contracted upon, which results in a moral hazard problem between the bank and the entrepreneur. To undertake the project, the firm needs to raise outside funds to cover the whole investment costs c. The interest rate, for simplicity, is set to 0. The firm gets a credit of an amount c from the bank. We assume a perfectly competitive credit market.

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[2] The toughness of bankruptcy law can be understood as a discretion given to a judge. If a judge has a lot of discretion in his decision, he can decide not to liquidate a company, even if it is insolvent, for example taking into account high social costs of liquidation. Bankruptcy law giving a lot of discretion to a judge is then considered to be soft. The liquidation rate under soft bankruptcy law is lower also because soft bankruptcy law increases the costs of the liquidation procedure for creditors. If, for example, the bankruptcy procedure can start only with more than one creditor, this imposes additional costs on the creditor to search other creditors. If searching costs are high enough, it does not pay off the creditor to start the liquidation procedure.

In the first period, the government takes a decision about the toughness of the bankruptcy law maximizing the social welfare. The social welfare consists of the welfare of the entrepreneurs, managers, banks and social costs caused by firms, that have been shut down. We assume that, if the firm is liquidated, this leads to social costs corresponding to the destruction of specific human capital, firm specific investments and also the unemployment costs of the laid-off workers. Especially the unemployment costs might be substantial (Tirole, 2001).

In the second period, the entrepreneur exerts effort. In the third period, returns are realized and the firm has to pay back the price of the credit T to the bank. At the end of the game, it can pay back T only if the project is successful. If the project is not successful, the firm does not have any money and it cannot pay back the credit. Then, the creditor (bank) can start a liquidation procedure. If the firm is liquidated, the bank gets the liquidation value L. The liquidation value is assumed to be smaller than the cost of the project c.

Whenever the company is not liquidated, managers obtain a non-transferable benefit B. This B might represent the satisfaction of an entrepreneur or a manager, benefits of a manager from being a CEO in the company, or any other kind of benefits the manager (or entrepreneur) earns from staying in power.

In the private firm the entrepreneur gets with probability p_i, $i = h, l$, return R and private benefit B and has to pay back the credit price T. With probability $1 - p_i$, $i = h, l$, the project does not bring any revenue, but the company is liquidated only with probability α. Thus, the entrepreneur gets this private benefit B not only when the project is successful, but also in the case when the project is not successful but the firm is not liquidated. This happens with probability

$$\alpha(1 - p_i); i = h, l \tag{2.1}$$

In the case of the public firm, we assume that the government never liquidates a public firm, i.e. the costs of liquidation (unemployment costs) are larger than

the costs of inefficient production $p_l R - c > U$. This crucial assumption is based on the idea that the unemployment costs caused by closing down a firm are much higher than simply repaying the debt of the company. If the company suffers a loss, then the government cannot commit not to help this firm and prefers to subsidize the company rather than letting the firm go bankrupt.

The government subsidy to a private firm is considered to be more costly for the government than the subsidy to a public firm (Boycko et al., 1996). In our model we do not allow the government to subsidize the private company. The government commits not to interfere with the private firm's employment decisions (Börner, 2004). In the case of the private company, the entrepreneur does not internalize the unemployment costs caused by the liquidation of the company. These are the costs of privatization, because the government cannot subsidize the private firm. The government can nevertheless still subsidize the publicly owned company. Justification for this assumption can be found in the argument that the costs of subsidizing private companies are much higher than subsidizing a public company. It might also be difficult for politicians explaining to the voters why they help owners of the private company.

If we consider a public company, there is no entrepreneur anymore. The government hires a manager instead. The manager obtains wage w in both states of the world. And he gets the private benefit from being manager B when the firm is not liquidated. A type of contract, where the manager gets a fixed wage in both states of the world, is clearly a simplification and the government could introduce a wage scheme, where the payment depends on which state of the world is realized. Nevertheless, the manager's incentives to exert effort will always be smaller than the incentives of the entrepreneur in the private company, because in the public company the government cannot commit (in our setting) not to help the firm in the bad state of the firm. Thus, we believe this simplification does not change our qualitative results and just makes the difference between the public and the private firm more obvious.

The government also cannot threaten the manager to fire him, because it is assumed that all managers are identical. The newly hired manager would have the same incentive as the previous one. If there are just minimal searching costs for a new manager, it is never optimal to change the manager (Schmidt, 1996b).

The game is solved by backward induction. First, we determine the optimal effort condition for a public and private firm that depends on the level of the toughness of the bankruptcy law. Then, we consider the government's decision about the optimal level of the toughness of the bankruptcy law α, depending on the number of public and private firms in the economy.

The timing of the game is summarized in Figure 2.1

Date 0	Date 1	Date 2	Date 3
Government chooses the bankruptcy law	Firm asks for a credit at a bank	Firm exerts effort	Payoffs are realized
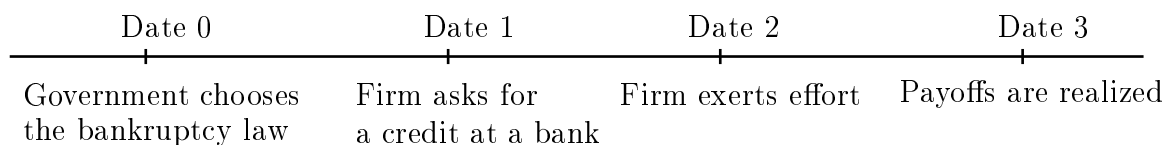
Figure 2.1: Timing

We analyze two scenarios with different specification of unemployment costs. In the first scenario, we assume the unemployment costs produced by liquidation of a single firm are increasing in the privatization level. The second scenario assumes unemployment costs independent on the privatization level but considers new and old firms in the economy. The reasoning for these two scenarios is the following. If we consider unemployment costs independent on the privatization level, the privatization level does not influence the government's decision to adopt a soft or tough bankruptcy law. An increase in the number of private firms increases the productive efficiency and the liquidation costs in the same proportion. If we consider unemployment costs increasing in the level of privatization, this is going to change. Also, if we take into account existence of old and new private firms

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in the economy, the privatization level influences the government's choice of the optimal bankruptcy law.

2.3 Scenario 1: Unemployment costs depending on the privatization level

The unemployment costs might be considered not only as direct costs of unemployment benefits, that the government has to pay to dismissed workers, but also as social costs that are produced by the shut-down of the firm. If a small firm is liquidated, it does not influence the life in a town as much as when a big plant in a small town is liquidated. If a big plant is liquidated, it does not mean only thousands of workers laid-off, but also might lead to a radical change of life in a small town. People have to move to find a job and this produces additional costs of unemployment. Such a situation, we observe in some regions, with a strong mining industry, where unemployment reached a certain level and locked these regions in an unemployment trap. The other reason can be found in the trade arrears.[3] Because of trade arrears, the bankruptcy of one firm might influence liquidation of another firm. Hence the unemployment caused by liquidation of one firm might through the trade arrears influence further increase of unemployment due to the liquidation of other firms. Some recent studies show that corporate bankruptcies are correlated (Das et al., 2006).

The higher the portion of bankrupt companies, the faster the unemployment costs grow. This assumption seems to be reasonable in transition countries, which faced system change and the unemployment costs were not just the unemployment benefits, but the threat of collapse of the entire new system. Unemployment costs occur only if the company is liquidated. The unemployment costs depend on the

---

[3]Trade arrears arise when a company become insolvent and cannot pay their suppliers. Trade arrears were common in transition countries at the beginning of transition. (Berglöf and Roland, 1998).

number of unemployed N. The higher is the number of unemployed, the higher are the unemployment costs. As the number of unemployed actually depends on the number of liquidated private firms (public firms are not liquidated and therefore do not produce any unemployment), we can write the unemployment costs as a function of number of unemployed and this as a function of y: $U[N(y)] = U[y]$, the total unemployment costs are $y(1-p)aU[y])$ and the function of unemployment costs is increasing in y, i.e. $U'[y] > 0$.

2.3.1 Optimal effort - private firm

We start our analysis determining the optimal effort condition for the private firm.

High effort case

The payoff of the entrepreneur (owner of the private firm) if he exerts effort is:

$$\Pi_{e,h} = p_h(R + B - T) + (1 - p_h)(1 - \alpha)B - e \qquad (2.2)$$

If he does not exert effort, his payoff is:

$$\Pi_{e,l} = p_l(R + B - T) + (1 - p_l)(1 - \alpha)B \qquad (2.3)$$

Obviously, the entrepreneur chooses the high effort, if his payoff is higher than in the other case, i.e. his incentive compatibility constraint is:

$$p_h(R + B - T) + (1 - p_h)(1 - \alpha)B - e \geq p_l(R + B - T) + (1 - p_l)(1 - \alpha)B \quad (2.4)$$

The choice of the entrepreneur depends on the price of the credit T. We can

rearrange the incentive compatibility constraint.

$$T \leq R + \alpha B - \frac{e}{p_h - p_l} \tag{2.5}$$

If the price of the credit is too high, it does not pay off for the entrepreneur to exert effort. The participation of the bank granting the credit is then:

$$
\begin{aligned}
p_h T + (1 - p_h)\alpha L &\geq c \\
T &\geq \frac{c - (1 - p_h)\alpha L}{p_h}
\end{aligned} \tag{2.6}
$$

It is clear that for the bank, the price has to be large enough, to generate at least zero profit. Thus, the price of the credit has to be high enough to fulfill the incentive constraint of the manager and has to be low enough to fulfill the participation constraint of the creditor. Both constraints hold if the inequality (2.7) is satisfied.

$$R + \alpha B - \frac{e}{p_h - p_l} - \frac{c - (1 - p_h)\alpha L}{p_h} \geq 0 \tag{2.7}$$

Expression (2.7) is increasing in α, i.e. the higher is α the higher is the probability that the firm gets the credit and will choose to exert effort. We can find the minimal α_H, such that for all $\alpha \geq \alpha_H$, the expression (2.7) being positive.

$$\alpha \geq \alpha_H = \frac{c(p_h - p_l) + p_h(e - R(p_h - p_l))}{(p_h - p_l)(p_h B + (1 - p_h)L)} \tag{2.8}$$

However, if the α is too small such that the expression (2.8) is negative ($\alpha < \alpha_H$), then the cheapest credit the bank can offer is too expensive for the firm taking into account its incentive constraint. We have shown that for $\alpha > \alpha_H$ the high effort is implemented, for $\alpha < \alpha_H$, no effort is exerted. This leads to the following lemma.

Lemma 2.1. *The effort chosen by the manager is non-decreasing in the toughness of the bankruptcy law α.*

Lemma 2.2. *The minimum level of the bankruptcy law α_H that implements the high effort is lower*

- *the higher is the probability of success p_h*

- *the higher is the private benefit B*

- *the higher is the liquidation value L*

- *the lower is the cost of the project c*

- *the higher is the return of the project R.*

Proof. See Appendix □

As $p_h > p_l$, the higher is the return of the project, the easier it is to encourage high effort. The same holds for the privative benefits, because in the case when the project was unsuccessful, the entrepreneur gets only $(1 - a)B$ and this is smaller or equal to B what he gets in the case of success of the project. If L is larger or c smaller, the bank will be satisfied with a lower price of the credit T and this gives additional incentives to the entrepreneur to try harder.

No effort case

In the case, where α is too small to implement high effort, low effort is still implementable. The bank's participation constraint is

$$T \geq \frac{c - (1 - p_l)\alpha L}{p_l} \tag{2.9}$$

The participation constraint of the entrepreneur is then

$$p_l(R + B - T) + (1 - p_l)(1 - \alpha)B \geq 0 \tag{2.10}$$

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If both participation constraints are fulfilled and insolvency law α is smaller than α_H, no effort is exerted and the credit is granted. If both participation constraints (2.9) and (2.10) cannot be fulfilled, no credit is granted and no project is realized.

2.3.2 Optimal effort - public firm

In the case of the public firm, the government hires a manager. A hired manager knows, that this firm will never be liquidated. He knows, he always gets the fixed wage w and the private benefit B. Manager's payoff is then:

$$
\begin{align}
\Pi_m &= p_i B + (1 - p_i)B + w - e \text{ , i=h,l} \tag{2.11}\\
&= B + w - e \tag{2.12}
\end{align}
$$

It is clear that the manager will choose the smallest effort $e = 0$. As we assume competitive markets for identical managers, the wage w offered to a manager is such that the expected utility equals the manager's reservation utility $\overline{U}$. We assume that the public firm is never liquidated, therefore it always gets a credit.

2.3.3 Optimal bankruptcy law

The government takes the decision about the toughness of the bankruptcy law maximizing the social welfare. The social welfare consists of the welfare of entrepreneurs, managers, banks and social costs caused by firms, that will be shut down. The government's objective function for high and low effort is :

$$
G_i(\alpha) = y[p_i R - (1 - p_i)\alpha(U[y] - L)] + (1 - y)p_l R - c, \ i = h, l \tag{2.13}
$$

The portion of y private companies yields R with probability p_i. Public companies get R with probability p_l. The private benefit of the manager B is not included in the social welfare and the payment of T cancels out. In the case of liquidation

the unemployment costs $U[y]$ arise and the creditor obtains the liquidation value L. The aim of our analysis is to determine the optimal choice of the bankruptcy law α, given the level of privatization y.

Proposition 2.1. *The optimal level of the toughness of the bankruptcy law α is non-increasing in the privatization level y.*

Proof. See Appendix □

The optimal bankruptcy law is non-increasing in the level of privatization. Thus, countries with higher level of privatization are more likely to opt for a softer bankruptcy law. The private company can potentially go bankrupt. The probability that the private firm is liquidated depends on the toughness of the bankruptcy law α and on the probability of success of the project p_h (p_l), which, among others, is also influenced by the toughness of bankruptcy law via the effect on the entrepreneur's effort. If privatization is not extensive, tough law positively effects high effort and, due to the low number of private firms, the potential costs caused by inefficient liquidation under tough law are limited. Therefore, the government prefers tough law when the privatization level is low. As privatization increases, the potential costs of liquidation become high under a tough law and are not outweighed by an increase in profitability of private firms via higher entrepreneur's effort. The example of the government's payoff function is illustrated in Figure 2.2. The figure depicts the government's payoff for $\alpha = 0$ and the government's payoffs in the point of the tough bankruptcy law $(\alpha = \alpha_H)$ for three different unemployment cost levels; low, medium and high. If the unemployment costs are relatively low then the government prefers the tough bankruptcy law $(\alpha = \alpha_H)$ to the soft law $(\alpha = 0)$ for all levels of privatization. If the unemployment costs are relatively high, then the government prefers the soft bankruptcy law to tough soft law for all levels of privatization. In the last case of medium unemployment costs the government prefers the tough bankruptcy law for low levels of privatization and prefers soft bankruptcy law for high levels of privatization.
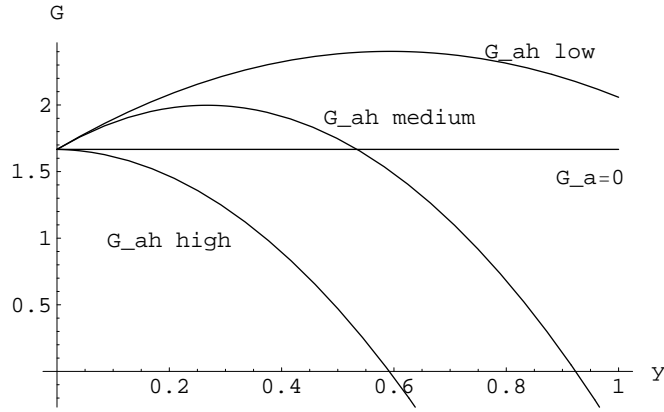
Figure 2.2: The government's payoff; $R = 5; p_h = 2/3; p_l = 1/3; B = 4; L = 3.5; c = 4; e = 1$; high: $U[y] = 20 \cdot y + 11$; low: $U[y] = 9 \cdot y$; medium $U[y] = 20 \cdot y$

In all public companies, managers know that the government will always grant a subsidy in the bad state of the world and therefore they are not investing in cost reduction (not exerting effort). Entrepreneurs in private firms know that there is no subsidy from the government in the bad state of the world and this encourages them to try hard. Nevertheless, private companies might be unsuccessful (with a smaller probability than the public ones), they will be liquidated and this would cause the unemployment costs. The impact of liquidation can be mitigated by a softer bankruptcy law. Soft bankruptcy law in this context means that not all insolvent companies will be liquidated.

On the one hand, government in a country with a large share of private property has an incentive to decrease the strictness of bankruptcy law, because a large share of privately owned firms may lead to excessively high costs of unemployment. On the other hand, a country with a high portion of state owned (controlled) property can "afford" tough bankruptcy laws, because the costs of unemployment are limited and might be outweighed by the efficiency benefits, as the tougher law creates more incentives to exert effort by the entrepreneur.

Proposition 2.2. *The tough bankruptcy law is more likely to be implemented the lower are the unemployment costs U.*

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Proof. See Appendix □

If unemployment costs U are small, the government does not have to protect the firms so much by a soft bankruptcy law as the liquidation costs are lower and it can implement a tougher bankruptcy procedure.

The result of our analysis depends on the crucial assumption about unit unemployment costs related to the the levels of unemployment. If we consider the unemployment costs unrelated to the privatization level, then the government's payoff in the point $\alpha = 0$ is either larger or smaller than the payoff in the point $\alpha = \alpha_H$ for all y. In other words, either only tough bankruptcy law or only soft bankruptcy law is preferred for all levels of privatization, and this case does not bring any interesting insight.

In the publicly held companies, the manager knows that if it is not socially optimal, the government will never liquidate a public firm and will rather subsidize the unsuccessful firm. We consider the case, when a liquidation of a publicly owned company is never socially optimal and subsidies are allowed only for publicly owned firms. We assume that the subsidy to the private firm is associated with additional prohibitive costs and is not possible. The bankruptcy law, then, does not influence manager's effort in a state owned enterprize (SOE). Private firms are more efficient in the production, because the owners are exerting more effort than the managers in SOE. Private firms, though, in contrast to public firms, might go bankrupt. If a transition country has decided to privatize a large share of its economy, then there are potential high costs of unemployment. Therefore, such a country might prefer the soft law, diminishing the effect of an inefficient liquidation. If the number of privatized firms is relatively small, then the costs of unemployment are limited and the country might prefer the tough bankruptcy law encouraging high efforts exerted by the entrepreneurs in private firms. Governments have in bankruptcy law another tool to correct for extreme costs of inefficient liquidation by private firms, i.e. to decrease the costs produced

by privatization.

2.4 Scenario 2: Old versus new firms in transition countries

In this section, we consider the second scenario of our model. The specification of the model remains the same as in the previous section, except the assumption of unemployment costs linearly increasing in the privatization level and introduction of old and new firms in the economy. We assume that the unemployment costs are linear in the level of privatization, i.e. unit unemployment costs are constant for all y and total unemployment costs increase linearly with number of unemployed workers. We also introduce a distinction between old state firms and newly established enterprizes in transition economies. The share of old firms in the economy is x, the share of new firms is $1 - x$. The old firms are at the beginning in all transition countries publicly owned and the privatization decision is made about these firms. There are also new firms in the economy. These firms are all privately owned. The new firms have the same characteristics as the old ones, the only difference is that the probability of success in these firms when the entrepreneur exerts high effort q_h is higher than probability of success in old firms (p_h). The probability of success if no effort is exerted is the same for old and new firms ($q_l = p_l$). The motivation behind this assumption is the fact that the publicly owned companies had usually very inefficient production processes, a socialistic structure of corporate governance, the production was determined by a central plan and therefore managers had less possibilities to influence the outcome with their effort. These firms also had large number of employees and were therefore very difficult to reorganize. After the privatization decision on old firms is done, the government sets the bankruptcy law. Then, the game proceeds as in the previous section; firms ask for a credit in a bank, choose their effort level and in the last period, payoffs are realized.

The optimization problem of the entrepreneurs in the new firms is the same as in the old firms. However, the probability of success is larger and therefore the level of bankruptcy law that implements high effort is smaller for new firms. As these firms are more profitable, they are ready to accept a higher price of the credit due to the softer bankruptcy law and still choose the high effort. The profit of a new firm Π_N in case of high and low effort can be written as:

$$\Pi_{NH} = q_h(R + B - T) + (1 - q_h)B(1 - \alpha) - e \qquad (2.14)$$

$$\Pi_{NL} = q_l(R + B - T) + (1 - q_l)B(1 - \alpha) \qquad (2.15)$$

The participation constraint of the bank is:

$$T \geq \frac{c - (1 - q_h)\alpha L}{q_h}$$

Again, to implement high effort, the incentive constraint and the bank's participation constraint have to be fulfilled together. The constraints are fulfilled if:

$$\alpha \geq \alpha_N = \frac{c(q_h - p_l) + q_h[e - R(q_h - q_l)]}{(q_h - q_l)(q_h B + (1 - q_h)L)} \qquad (2.16)$$

We have shown in Lemma 2.2 that minimal α_H is decreasing in p_h and therefore, α_N is clearly smaller than the minimal bankruptcy law level by old firms, α_H.

The government's payoff depends on the level of the bankruptcy law. First, the bankruptcy law directly influences the liquidation rate of firms that are unsuccessful. Second, it influences the incentives of managers and the effort they exert. It is clear that we have to consider only three levels of the bankruptcy law, i.e. $\alpha = 0$, $\alpha = \alpha_N$ and $\alpha = \alpha_H$. Any level in between is clearly not optimal, because it does not effect incentives and only increases the costs due to the larger liquidation rate. If we assume that high effort is not optimal for $\alpha = 0$, i.e. $\alpha_N > 0$,

then the payoff of the government is:

$$G_{\alpha=0} = x[yp_lR + (1-y)p_lR] + (1-x)q_lR \tag{2.17}$$

$$G_{\alpha=\alpha_N} = x[y(p_lR + (1-p_l)[-\alpha_N(U-L)] + (1-y)p_lR)]$$
$$+ (1-x)[q_hR + (1-q_h)[-\alpha_N(U-L)]] \tag{2.18}$$

$$G_{\alpha=\alpha_H} = x[y(p_hR + (1-p_h)[-\alpha_H(U-L)] + (1-y)p_lR)]$$
$$+ (1-x)[q_hR + (1-q_h)[-\alpha_H(U-L)]] \tag{2.19}$$

The payoff in the point $\alpha = 0$ is constant for all levels of privatization. The government's payoff in cases when $\alpha = \alpha_N$ and $\alpha = \alpha_H$ is decreasing in y.

So far, we have just assumed that the probability of success is larger in the new firms than in the old firms. Now, we make an additional assumption about the amount of this difference. We assume that the new firms are so profitable that the tough law for this firms is socially optimal. If the new firms have good productivity, then the possibility of liquidation is low, and government does not have to be afraid of unemployment costs even under the tough law. On the other hand, the tough law encourages managers as it decreases the payoff in the case of a failure. In this case, our assumption is that the productivity of the new firms is so high that motivating the managers to exert high effort is more profitable than the costs caused by a higher liquidation rate (2.20):

$$q_hR - (1-q_h)\alpha_N(U-L) > q_lR \tag{2.20}$$

On the other hand, we assume that the productivity in the old firms is so low, that the social value of the old firms under the tough law that encourages managers to choose high effort is smaller than the value under the soft law α (2.21).

$$p_hR - (1-p_h)\alpha_H(U-L) < p_lR - (1-p_l)\alpha_N(U-L) \tag{2.21}$$

As the left hand side is strictly increasing and continuous in p_h, there exists p_x

such that for $p_h < p_x$ assumption (2.21) holds. In other words, this assumption says that encouraging high effort in the old firms is too expensive and it is more profitable to implement softer law and accept low effort in these firms. It follows that the bankruptcy law α_H cannot be optimal. For the new firms α_N is enough to encourage high effort, any higher level of α just increases the costs of unemployment. Then we have to compare only the bankruptcy law levels $\alpha = 0$ and $\alpha = \alpha_N$.

First, we consider the point where there is no privatization ($y = 0$) and in the economy there are only publicly owned old firms and private new firms. Given our assumption (2.20), in point $y = 0$, $G(\alpha = \alpha_N) > G(\alpha = 0)$.

Now we compare the government's payoffs $G(\alpha = \alpha_N)$ and $G(\alpha = 0)$ for all levels of privatization y.

$$
\begin{aligned}
G_{\alpha = \alpha_N} - G_{\alpha = 0} &= x[p_l R - y(1 - p_l)\alpha_N(U - L)] \\
&+ (1 - x)[q_h R - (1 - q_h)\alpha_N(U - L)] - xp_l R + (1 - x)q_l R \\
&= (1 - x)[(q_h - q_l)R - (1 - q_h)\alpha_N(U - L)] \\
&- xy(1 - p_l)\alpha_N(U - L) \qquad\qquad\qquad (2.22)
\end{aligned}
$$

The payoff $G(\alpha = \alpha_N)$ is decreasing in y. Therefore, we can find y_x, such that

$$
y_x = \frac{(1 - x)((q_h - q_l)R - (1 - q_h)\alpha_N(U - L))}{(1 - p_l)\alpha_N x(U - L)} \qquad (2.23)
$$
$$
y < y_x : G(\alpha = \alpha_N) > G(\alpha = 0)
$$
$$
y > y_x : G(\alpha = \alpha_N) < G(\alpha = 0)
$$

The analysis can be summarized in the following proposition.

Proposition 2.3. *If the probability of success by old firms is smaller than p_x, then for privatization level $y > y_x$ soft bankruptcy law $\alpha = 0$ is preferred and for $y < y_x$ tougher bankruptcy law $\alpha = \alpha_N$ is preferred.*

We obtain a similar result as in the previous scenario, if the privatization level is below some threshold, the government prefers tough law, if the privatization is larger, the government opts for soft bankruptcy law. The example is shown in Figure 2.3. The figure depicts the government's payoff for tough $(\alpha = \alpha_N)$ and soft $(\alpha = 0)$ bankruptcy law. We can see that the government prefers the tough bankruptcy for low levels of privatization and the soft law for high levels of privatization. We can also show that the optimal policy depends on the share of new companies in the economy.
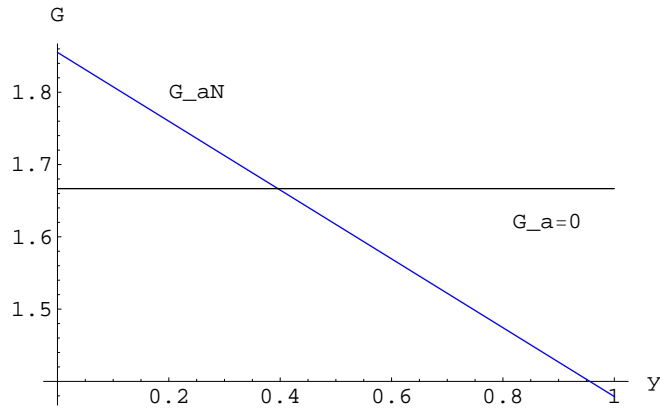
Figure 2.3: Government payoff, $x = 0.9; R = 5; U = 5; p_h = 2/3; q_h = 3/4; p_l = q_l = 1/3; B = 4; L = 3.5; c = 4; e = 1$

Proposition 2.4. *The tougher bankruptcy law is preferred:*

- *the higher is the probability of success q_h,*

- *the lower is the probability $q_l (= p_l)$,*

- *the lower are the unemployment costs U,*

- *the higher is the return of the project R,*

- *the higher is the liquidation value L,*

- *and the lower is the share of old enterprizes x.*

Proof. The higher is the y_x the more probable is, given the level of privatization, implementation of the tougher bankruptcy law α_N rather than the soft bankruptcy law $\alpha = 0$. Keeping in mind that α_N is decreasing in q_h, decreasing in R, increasing in q_l and decreasing in private benefit B and liquidation value L, we can immediately prove this proposition from partial derivation of y_x with respect to a corresponding variable. □

The tough bankruptcy law influences positively from the social point of view only the new enterprises, it encourages the entrepreneur to exert more effort and decreases the price of credit for him. As new enterprises are less likely to be unsuccessful, they produce lower costs of unemployment than the old firms. It is clear that if there are more new firms in the economy benefiting from the tough law, tougher bankruptcy law is more likely to be adopted. If the share of the privatized firms is relatively small or the share of the new enterprises is relatively large, then it is profitable to encourage high effort in the new firms because the costs by old enterprises due to the higher level of liquidation rate are outweighed by the gains in productivity by new firms. However, if the share of privatized firms is large and the share of old firms is large, then implementing tough law would cause large unemployment costs, and then soft bankruptcy law is preferred. If the profitability of old firms is low enough ($p_h < p_x$) it is never profitable to encourage high effort in old privatized firms.

If the probability of success of old firms rises sufficiently with higher effort ($p_h > p_x$), then also for old privatized firms, implementing tough bankruptcy law induces high effort which is profitable, because the gains from high effort are larger than alternative unemployment costs in case of failure. In this case, the option with tough law α_H implementing high effort in old firms dominates the option of bankruptcy law α_N only if the share of the old firms is not large enough. Implementing α_H increases the social costs by new firms (it is higher than α_N). If the share of new firms is large, then the costs of implementation α_H (unemployment costs by new firms) might be larger than the gains (higher

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profitability of old privatized firms).

2.5 Example cases: Czech Republic and Hungary

We have shown that the the optimal level of the bankruptcy law decreases with the share of private property. If we assume the privatization decision as given, then we are able to explain differences between transition countries in the toughness of their bankruptcy law. The Czech Republic is a prime example of very fast privatization using the method of mass privatization. In contrast, Hungary has chosen relatively slower way of privatization via direct sales. At the same time, the Czech Republic adopted a very soft bankruptcy law, in the early stage of transition even introducing a protection period, when firms were not in fact able to be liquidated (Diblík, 2004). On the other hand, Hungary implemented in 1991 an extremely tough bankruptcy law with an automatic trigger, when the managers of firms that held overdue debts of any size to any creditor were required to initiate bankruptcy procedure (Bonin and Schaffer (1999), Janda (2004)). This law was softened in 1993. We can observe many differences in the bankruptcy law design in Hungary and in the Czech Republic during the 1990's. According to Mitchell (1998), the bankruptcy law in the Czech Republic imposed high bankruptcy costs on creditors, resulting in a lower number of bankruptcy filings than in Hungary. Today, the privatization levels in both countries are very similar. However, the large difference in the level of creditor's protection in the bankruptcy law still remains, the Czech Republic bankruptcy law is considered to be very soft, while Hungarian one belongs to the toughest among transition countries.

The bankruptcy law is usually considered as a tool against inefficient liquidation. In this context, we can distinguish between an economic and financial distress. If the firm was unsuccessful because of the economic distress, this means, that firm's assets were not used efficiently and in this case, it is better when the firm is liquidated and firm's assets are sold. On the other hand, financial distress

is usually some kind of external shock influencing the capital structure (Knot and Vychodil, 2004). For example, during the period of financial crisis in Asia, economically sound firms might became insolvent as their debts where denominated in foreign currency and the local currency depreciated. If we look at the situation in transition countries, privatization plays a crucial role. In these countries, the situation changed dramatically and firms might have become insolvent not necessarily because of economic inefficiency but because of the transition of the economy. For example, many firms became insolvent because of trade arrears (Berglöf and Roland, 1998). These firms could not pay their suppliers, because their customers did not pay them. This led to an accumulation of arrears and many suppliers were de facto lending their clients. As the firms were privately owned, the government had less opportunity to subsidize these firms and therefore, privatization might have led to strengthening the problem of trade arrears. This makes the liquidation more likely and increases the costs of privatization. The soft bankruptcy law then reduces the problem of inefficient liquidation due to trade arrears.

2.5.1 Privatization level

Our analysis is done under the assumption that the privatization level is given. We justify it by the fact that the privatization decision is usually done by one government and it is hard to reverse the decision by the following government. The bankruptcy law can relatively easily be changed within one election period. In transition countries, the privatization program was prepared by one government and was followed also by the next governments. In the case of bankruptcy law, for example, the Czech Republic has amended the insolvency law thirteen times between 1990-2004 (Diblík, 2004).

In addition, there were limited alternatives to privatization decisions. Hungary at the beginning of the transition period faced a relatively large foreign debt

(EBRD, 1999) and the privatization decision in Hungary could have been driven by this constraint. Hungary needed cash to repay the debt and chose the privatization method of direct sales, largely to foreign investors. On the other hand, the Czech republic put a high emphasis on fast progress of the reforms and chose a method of mass privatization which does not generate income for a government's budget. The crucial difference is, that direct sales cannot be done as fast as mass privatization, as there is a need to find strategic investors. As Hungary could not privatize so fast, it chose a relatively low share of public property in the early stage.

The speed of privatization must not necessarily be determined by restriction. Another reason might lie in ideological background. Some countries have chosen gradualistic way of reforms and others have chosen the shock therapy.

2.5.2 Initial conditions of reforms

Initial conditions of reforms could also influence the decision about the bankruptcy law. We have shown in our extension with new and old enterprises that with higher share of new private firms, tougher law is more likely to be implemented. In Hungary, the reforms of the socialistic system started already in late 1980's and in time of sudden political changes, there were already *new* private firms operating to some extend. First reforms in the Czech Republic were trigged after the break up of communist power (Mejstrik, 1996). At the time of implementation of the bankruptcy law, the share of new firms was much larger in Hungary than in the Czech Republic. Our model predicts, that the Hungarian government had more incentives to implement a tough bankruptcy law than the Czech one. Furthermore, as the private sector of the new firms was already established to some extent in Hungary, it was more prepared to absorb dismissed people from state owned enterprizes closed because of tough bankruptcy law. The number of private firms might therefore influence also the level of unemployment costs.

2.5.3 Restructuring

Czech firms were relative less successful in restructuring than Hungarian firms (Mejstrik, 1996). This difference might be due to the privatization method, as they were sold (given for free) mostly to domestic owners, without any initial capital. Lack of capital and know-how makes the probability of failure higher as the firms were less stable in periods of financial distress. On the other hand, Hungary privatized their firms often to foreign owners (EBRD, 1999). These owners could help the company to invest into new technologies, brought more effective corporate governance and helped the firm in times of financial problems.

The bankruptcy law affects an entrepreneur's effort and this can be interpreted also as restructuring incentives. This might have led to very poor restructuring in the Czech Republic, the firms were privatized, but the owners had less incentives under the weak bankruptcy law to restructure the company than owners under the tough law. This could cause the increase in productivity in Hungary leading into high privatization level in Hungary in the next period. The costs of unemployment are large at the beginning and under successful privatization, the costs decrease in time - with restructuring. In the Czech Republic instead, less restructuring took place leading to a slower decrease in unemployment costs (EBRD, 1999). Therefore, the Czech Republic still opts for the soft law, while Hungary's privatization to foreign investors has improved this condition and Hungary prefers now a tough law, even with relatively high portion of private property.

2.5.4 Developed countries vs. transition countries

Developed countries have relatively tougher bankruptcy laws in comparison to transition countries (Pistor et al., 2000). This might be explained by a higher productivity of firms and quality of institutions that are usually better in mature economies. We can also understand improved institutions, for example, as a better corporate governance. Better institutions allow a manager to better influence the

performance of the firm (Börner, 2004). The institutions might also influence the liquidation value L that banks receive in case of liquidation. The better the law enforcement, the higher is L and the more likely is the high effort implemented. With higher effort implemented the probability of success is p_h and the tougher law is more likely. If the probabilities are high enough ($p_h > p_x$), encouraging effort in public firms might be profitable and the government prefers a tough bankruptcy law and this refers to the case of developed countries.

2.6   Empirical evidence

2.6.1   Privatization level in transition countries

In this section we present some empirical evidence, supporting the results of our model. The section uses cross-sectional data from EBRD Transition Report 2004, that is devoted to a problem of insolvency law in transition countries. The data set is based on a survey, where experts from all countries evaluated extensiveness and effectiveness of bankruptcy law. Extensiveness evaluates, what is the quality of the bankruptcy law according to the code of law, while the effectiveness measures, how the law is in fact implemented and enforced in reality. For our purposes we are going to use aggregate measure of the effectiveness ($Effec$) of the bankruptcy law in each country containing measures for speed, enforcement and transparency of the bankruptcy law. The effectiveness of the bankruptcy is closely connected to the toughness of the law as procedures that are faster, more transparent and less costly are considered to protect the creditor's rights better. We use the effectiveness measure as a proxy for the toughness of the law in our model.

Data about privatization are also from EBRD statistics. First, we use the EBRD index of privatization progress for large-scale and small-scale enterprizes that ranges from 1 to 4, where 1 denotes little, and 4 denotes full privatization of enterprizes (more than 75% privately-owned capital with effective management

control). The data set is from 2003. Second, we use measures of private sector share of GDP in 2003. However, this measure does not reflect exactly how much has the country privatized, because it cannot distinguish between privatized SOE firms and newly established firms. The basic empirical model might be written as:

$$Effec_i = \beta_0 + \beta_1 Privatization_i + c \cdot Controls_i + \epsilon_i \qquad (2.24)$$

Where $Effec$ denotes effectiveness of bankruptcy law, $Privatization$ is a measure of extent of privatization, $Contorls$ is a vector of control variables and ϵ is an error term. We ran a number of regressions with $Effec$ as the dependent variable, the results are reported in Table 2.1 in Appendix.

Table 2.1: Privatization and the effectiveness of the bankruptcy law

Variable	OLS 1	OLS 2	OLS 3	OLS 4
Intercept	87.323***	78.631***	95.279**	26.957**
	(14.441)	(10.218)	(33.512)	(26.124)
Privatization progress	-4.961*		-15.257***	
	(2.512)		(3.168)	
Private share		-0.415**		-0.538*
		(0.200)		(0.254)
GDP	0.001	0.001	0.0002	0.0002
	(0.001)	(0.001)	(0.0005)	(0.001)
Civil Liberties			4.475*	3.412
			(2.098)	(1.917)
Corruption			7.096***	1.203
			(2.203)	(3.508)
Rule of Law			5.329**	7.087**
			(2.227)	(2.433)
Inequality			51.485*	76.803**
			(26.553)	(29.532)
R^2	0.149	0.169	0.772	0.529
F statistics	1.95	2.17	23.87	2.14
Number of observations	24	24	18	18

Robust standard error in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

The coefficient measuring the progress of privatization is negative and signifi-

cant at the 10% significance level in the specification using only GDP as a control variable. If we use other control variables, the significance rises to the 1% level. Looking at the measure for the private sector as a proxy for privatization, we see that this is significant at the 5%, or 10% level respectively. As a control variables we have used: index of civil liberties constructed by the organization Freedom House (www.freedomhouse.org), that measures rights of the citizens to express their views from 1 (free) to 7 (not free), corruption perception index as a measure of corruption constructed by Transparency International ranging between 0 (highly corrupt) and 10 (highly clean) and a measure of rule of law according to the index of EBRD. As a last control variable we used an inequality measurement as a difference in the Gini index in the country between year 1989 and 1999, catching the effect of increase of inequality in transition countries. All the control variables are significant at least at the 10% significance level. Higher civil liberties, lower corruption and better rule of law are positively correlated with effectiveness of bankruptcy law. The inequality variable has an interesting interpretation. The higher is the increase of inequality, the more effective is the bankruptcy law. This supports the argument of Biais and Mariotti (2003), that countries with a larger share of poor people choose a tougher law, because under soft law the poor people would be credit rationed from the market.

2.6.2 Privatization method

Another possible approach is to consider not the level of privatization, but the method of privatization. The basic idea behind our model is that the government loses the power to control employment in privatized firms and therefore might be more motivated to adopt a soft bankruptcy law. We can then distinguish privatization methods according to the fact, how they allow the government to control the unemployment level. If the government uses the method of mass privatization, where all property is given to the entire society, the government can hardly influence, who will control this company at the end of the privatization

process and there is a high risk that this company might be shut down by a new owner. If the government uses the method of direct sale, it can be more sure that the company will not be liquidated, because they know to whom they are selling this company. With this argumentation, we would expect the government that implements the mass privatization method to adopt rather a soft law and the government preferring direct sales or management buy-outs should tend more to a tough law. We construct a dummy that equals 1, if the country had mass privatization as dominant method and 0 otherwise and regress this variable on the effectiveness of the bankruptcy law. The basic empirical model might be written as:

$$Effec_i = \beta_0 + \beta_1 Method_i + c \cdot Controls_i + \epsilon_i \qquad (2.25)$$

$Effec$ denotes again effectiveness of the bankruptcy law, $Method$ is a dummy for privatization method, $Contorls$ is a vector of control variables and ϵ is an error term. We ran regressions, where $Effec$ is the dependent variable, the results are reported in Table 2.2 in Appendix. Regressions were run again using robust techniques to correct for heteroscedasticity.

The coefficient of privatization method is negative and significant at the 10% and 5% significance level respectively. We used the same control variables as in the previous example; in this case, only the coefficient of inequality measurement is significant at the 1 % significance level. We have shown that in both examples that the privatization level and mass privatization, respectively are negatively correlated with the effectiveness of the bankruptcy law supporting the predictions of our model.

Table 2.2: Method of privatization and the effectiveness of the bankruptcy law

Variable	OLS 1	OLS 2
Intercept	62.152***	78.631 ***
	(4.255)	(10.218)
Method	-6.969*	-13.290**
	(3.631)	(5.857)
GDP	-0.000	0.000
	(0.001)	(0.001)
Civil Liberties		2.878
		(1.684)
Corruption		2.085
		(2.548)
Rule of Law		2.856
		(2.141)
Inequality		91.840***
		(28.813)
R^2	0.139	0.584
F statistics	1.89	2.73
Number of observations	25	18

Robust standard error in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

2.6.3   Extensiveness of the bankruptcy law

If we consider extensiveness of the bankruptcy law instead of the effectiveness, neither privatization level nor privatization method has a significant influence on the extensiveness of bankruptcy law. This result is in line with findings of Pistor et al. (2000) and Pistor (2000) that the quality of contract enforcement and law effectiveness is much more important in transition countries than the law itself.

2.7   Conclusions

The average liquidation of a company, according to the World Bank study from 2004[4], takes 9 years in the Czech Republic. In Hungary the same process takes 2 years, in Slovenia 3.6 years and in Poland 1.4 year. Explaining the decision about

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[4]www.doingbusiness.org

the bankruptcy law in context of the privatization decision may help to understand the differences among transition countries in Eastern Europe. From our analysis we can provide a following explanation. If the privatization level is high, leading to high unemployment costs, the government rather prefers to lower the number of liquidations via softening the bankruptcy law. If the privatization level is low, resulting in lower unemployment costs, it pays off to rather motivate the managers with a tough bankruptcy law and allow for higher level of liquidation.

The countries with a larger share of private new firms at the beginning of the transition are more likely to adopt a tough bankruptcy to encourage entrepreneurs in the new firms with more incentives. However, if the privatization level is high, there are many old private firms that are very likely to go bankrupt under the tough bankruptcy law producing large costs of unemployment. If the effect of new firms is not large enough, the government rather prefers a soft law avoiding a high liquidation rate among old privatized firms. Keeping the old inefficient firms under state-ownership allows the government to control the unemployment in these firms and a tough law is more likely to be implemented.

The Czech government has chosen a very fast way of privatization and then it tried to soften the negative effects of privatization by implementing a soft bankruptcy law limiting the number of liquidations. A second level of influence were state-owned banks that were granting credits without much emphasis on profitability. On the other hand, countries that proceeded slower in the privatization process could afford more market oriented policies in other sectors, as the threat of liquidation of privatized firms was not so severe. As our empirical evidence suggests, the privatization choice is negatively correlated with a toughness of bankruptcy law in transition countries.

2.A   Appendix

Proof of Lemma 2.2

Proof. The proof for B, R, L and c follows directly from the partial derivations of the expression (2.8). We consider only the case, when $a > 0$, i.e. $c(p_h - p_l) + p_h(e - R(p_h - p_l)) > 0$

Considering the influence of probability of success p_h on the minimal level of α implementing high effort, the incentive compatibility constraint of the entrepreneur and the participation constraint of the bank are fulfilled if $R + \alpha B - \frac{e}{p_h - p_l} - \frac{c - (1 - p_h)\alpha L}{p_h} \geq 0$. This expression is increasing and continuous in a and on the interval where $p_h > p_l$, it is also strictly increasing and continuous in p_h. This implies that α_H is decreasing in p_h. $\qquad\square$

Proof of Proposition 2.1

Proof. To determine the optimal bankruptcy law, we can again restrict our attention to two cases - $\alpha = 0$ and $\alpha = \alpha_H$. If $0 < \alpha < \alpha_H$ it is not high enough to implement high effort, and because higher α increases the costs of unemployment, it is optimal to choose the lowest level. The same argumentation holds for the case $\alpha > \alpha_H$. Higher α does not increase the effort exerted, it only increases the costs of unemployment.

If $\alpha = 0$ then (assuming that $\alpha_H > 0$) no effort is implemented and, in this case, the payoff of the government is constant for all levels of privatization $G(\alpha = 0) = p_l R$. As there are no costs of unemployment ($\alpha = 0$) and neither public nor private firms choose high effort, the payoff is constant in y.

In the case $\alpha = \alpha_H$, the government's payoff can be rearranged:

$$G_{\alpha_H} \quad = \quad y((p_h - p_l)R - (1 - p_h)\alpha_H(U[y] - L)) + p_l R - c \qquad (2.26)$$

Comparing $G(\alpha = 0)$ and $G(\alpha = \alpha_H)$, we can write

$$G(\alpha = \alpha_H) - G(\alpha = 0) = y((p_h - p_l)R - (1 - p_h)\alpha_H(U[y] - L)) \qquad (2.27)$$

If this expression is positive, $G(\alpha = \alpha_H)$ is larger and tougher bankruptcy law is preferred. If the expression is negative, then the soft bankruptcy law is preferred. There are three possible cases:

1. The unemployment costs are relatively high even for very low privatization levels. If $U(y = 0) > \frac{(p_h - p_l)R}{(1 - p_h)\alpha_H} + L$, then given the fact $U'[y] > 0$ expression (2.26) is negative for any y larger and $G(\alpha = 0) > G(\alpha = \alpha_H)$. In this case a soft law is preferred for all levels of privatization.

2. The unemployment costs are relatively low even for a very high privatization level. If $U(y = 1) < \frac{(p_h - p_l)R}{(1 - p_h)\alpha_H} + L$, then given the fact $U'[y] > 0$ expression (2.26) is positive for any y smaller and $G(\alpha = \alpha_H < G(\alpha = 0))$. In this case a tough law is preferred for all levels of privatization.

3. The last case is when the unemployment costs are relatively small for low levels of privatization and become relatively large in the case of large privatization level. Once the expression (2.27) becomes negative for some y, it stays negative for any larger y. In other words, once is the soft law preferred for some level of privatization, it is also preferred for any larger y.

□

Proof of Proposition 2.2

Proof. Proof follows directly from partial derivation of the expression (2.27) that compares the government's payoff for $\alpha = 0$ and the government's payoff for $\alpha = \alpha_H$.

$$\frac{\partial G(\alpha = \alpha_H) - G(\alpha = 0)}{\partial U} = -(1 - p_h)y\alpha_H < 0 \qquad (2.28)$$

$\square$

Chapter 3

Bankruptcy Laws and Debt Renegotiation

3.1 Introduction

Bankruptcy laws are recognized as fundamental institutions necessary for growth of credit markets and entrepreneurship (Aghion et al., 1992). They define the rules and procedures under which a creditor can take possession of entrepreneur's assets and hence directly influence the creditor's incentives to liquidate an insolvent company. Ideally, a bankruptcy law should protect creditors, impose financial discipline on managers, induce restructuring, and free assets from inefficient use Lambert-Mogiliansky et al. (2000). However, there is no clear agreement on the optimal bankruptcy law design. Moreover, bankruptcy laws differ across countries substantially along many dimensions such as allocation of control rights, priority rules or the role of judges and courts. Not surprisingly, it is unlikely that a single design of these bankruptcy laws fits all possible situations[1] and different

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[1]Hart (2000) notes that *It is unlikely that "one size fits all"... Which procedure a country chooses or should choose may then depend on the other factors, e.g. the country's institutional structure or legal tradition. One can also imagine a country choosing a menu of procedures and allowing firms to select among them. It is important to recognize that bankruptcy reform should not be seen in isolation: it may be necessary to combine it with legal and other reforms, e.g.*

bankruptcy law designs have different effects on the number of liquidations in the country. Claessens and Klapper (2005) observe different effects of the bankruptcy law on the number of liquidations with respect to different quality of law enforcement.

Given the role of the bankruptcy law to protect creditors, we consider a bankruptcy law to be a one-dimensional variable that influences creditor's expected value of assets that can be recovered. High values correspond to a tough bankruptcy law giving the creditor substantial rights, while low values represent low protection of creditor's rights (Biais and Mariotti, 2003). We analyze the effect of the bankruptcy law on the number of liquidations in a simple model of borrowing and lending with asymmetric information, where due to the possibility of renegotiation the creditor cannot credibly commit to liquidate the debtor if the default occurs. Our model is based on Bester (1994) and we modify the renegotiation stage according to the soft budget constraint literature (Berglöf and Roland, 1997). The environment is designed as follows: there is one entrepreneur who needs to raise capital to finance a risky project. The project is financed by a creditor, who cannot observe whether the project was successful or not. The bankruptcy law allows the creditor to liquidate the debtor's firm (take possession of debtor's assets) in case the entrepreneur defaults and does not pay back the debt. Without the possibility of liquidation, the entrepreneur does not have any incentive to pay back the debt. The model captures the principal-agent problem between the creditor and the debtor, where both parties have symmetric information about the ex-ante profitability of the project, but the absence of state verification creates the informational asymmetry at the time the project is realized. Due to the fact that the firm can make a renegotiation offer, the creditor cannot commit to liquidate an insolvent firm. If the creditor accepts the offer, the debtor avoids the liquidation and this option soften the debtor's hard budget constraint created by the bankruptcy law, as the entrepreneur knows that the

the training of judges, improvements in corporate governance and the strengthening of investors rights, and possibly even changes in the international financial system.

unsuccessful project may not be liquidated.

As in chapter 2, we focus on studying the bankruptcy law, considering ex-ante and ex-post effects. The analysis of bankruptcy law often focuses on the ex-post effects, i.e. how the bankruptcy law influences the value of an insolvent company. However, in our model we consider ex-ante effects, i.e. the effects on the behavior of the agents before the bankruptcy occurs.[2]

There is a growing literature on the optimal bankruptcy law. Our paper is related to this literature in several ways. Berkovitch et al. (1998) consider the effects of bankruptcy law on ex ante decision making taking into account debt contract renegotiating. They derive the optimal bankruptcy law that implements ex-ante efficient solution. They present two restrictions on the bargaining game between the claimants that the bankruptcy court can use to prevent strategic default by a debtor. However, their model does not consider the effect of the existence of soft budget constraint on the creditor's and debtor's decision making and the ex-post effects, namely the actual liquidation rates.

The bankruptcy law influences the value of the collateral for the creditor, therefore the role of the collateral is implicitly expressed in the bankruptcy law. In the theoretical literature it was shown that the collateral is used to solve the problems resulting from asymmetric information - state verification (Bester, 1994), moral hazard (Bester, 1985), adverse selection (Biais and Mariotti, 2003). Bester (1994) investigates how the prospect of debt renegotiation affects both the creditor's and the debtor's behavior. As in our model, the renegotiation occurs because the

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[2]The ex-post efficiency requires that the bankruptcy law maximizes the value of the insolvent firm for all stakeholder. If we consider the tough bankruptcy law giving substantial right to creditors, such a law does not necessarily maximize the social welfare. Berkovitch and Israel (1999) argue that the managers in the firm might have better information and actually cancelling a part of the debt and keeping the management in power might be socially optimal. Biais and Mariotti (2003) mentions that the creditor might not internalize all the effect of liquidation, e.g. the unemployment costs that arise due to the firm liquidation. On other hand analyzing the problem from the ex-ante point of view, soft bankruptcy laws influence the management actions and this make the contracting of debt financing in principal-agent setting even more severe. The managers profit from continuation of the project as they can extract the residual cash flow and private benefits. The tough bankruptcy law that gives the creditor substantial rights makes the liquidation more profitable for creditor thus makes the continuation less likely.

absence of precommitment precludes a credible bankruptcy threat. Bester shows that the problem can be mitigated by collateralized assets. Although the collateralization increases the total amount of liquidated assets, it may decrease the expected dead-weight loss associated with asset liquidation. This effect is larger for low-efficient firms and therefore these have more incentives to post collateral than high-efficient firms. Our setting differs from Bester's in modelling the refinancing stage and we treat the bankruptcy law as an endogenous variable. The bankruptcy law in Bester's setting does not affect the number of liquidations as the creditor has in the renegotiation stage full bargaining power and he can in the renegotiation always get the value of collateral. The toughness of bankruptcy law then does not influence the creditor's decision between liquidation or renegotiation. Janda (2004) analyzes a similar setting as Bester (1994) taking into consideration asymmetric information between the entrepreneur and the creditor about the ex-ante quality of the project. He finds that renegotiation does not preclude the use of collateral as a screening device in the presence of adverse selection problem.

Hainz (2004) studies how the is the number of bankruptcies influenced by the quality of institutions in a model of bank-firm relationship. She finds that a bank receives the payoff if a firm is liquidated, but loses the rent from incumbent customers due to its informational advantage. There exists a range where improving institutions may decrease the number of liquidations.

The soft budget constraint (SBC) problem relates to the bankruptcy law via the creditor's impossibility to precommit not to renegotiate the contract. A soft budget constraint is defined as a relationship when an organization cannot commit not to subsidize the organization with a budget constraint if the claims exceed the budget constraint, see (Kornai et al., 2003). In some sense we can regard a creditor decision not to liquidate an insolvent firm as a form of subsidy. Maskin and Xu (2001) and Berglöf and Roland (1997) treat SBC as a financial commitment problem of not imposing bankruptcy on the defaulted entrepreneur.

In our model we find that there exists an interval in the toughness of the bankruptcy law, within which the law has a negative effect on a liquidation rate, i.e. the probability the firm is liquidated decreases with the toughness of the bankruptcy law. In addition, we analyze the effect of the bankruptcy law on the liquidation rate for different levels of competition. We find a higher liquidation rate in less competitive credit markets. We also consider a government's choice of an optimal bankruptcy law maximizing the social welfare. We find that the optimal toughness of the bankruptcy law depends on the extent of liquidation costs. We further find that a possibility of renegotiation may increase the social surplus, as less firms are liquidated. Our results are supported by empirical evidence on the actual use of bankruptcy around the world. Using a dataset of 32 countries (Claessens and Klapper, 2005), we study the effect of the level of toughness of the bankruptcy law and the effect of different levels of competition in the banking market on the number of liquidations.

The chapter is organized as follows. Section 3.2 describes the specification of the model. Section 3.3 characterizes the solution of the bargaining game between the debtor (firm) and the creditor in the case with and without renegotiation. Section 3.4 analyzes the choice of socially optimal level of bankruptcy law for different degrees of competition in the credit market. Section 3.5 provides empirical evidence supporting the results of the model. In section 3.6 we summarize the main results of the chapter.

3.2   Setup

3.2.1   Bankruptcy law

Our modeling of the bankruptcy law is motivated by Biais and Mariotti (2003). We denote the toughness of the bankruptcy law in our model as a one-dimensional variable α on the space [0,1]. If the bankruptcy law is equal 1, this is a very tough

law. Whenever the firm is insolvent, it is liquidated and the creditor gets the full collateral. On the other hand, if the bankruptcy law is equal to 0, then the insolvent firm is never liquidated.

Expressing the bankruptcy law by one variable can be justified in several ways: we can see the toughness of the bankruptcy law as a level of discretion given to the judge or as a probability that the bankruptcy procedure will be started.[3] The bankruptcy law that gives little discretion power to the judge is seen as a tough law, an extreme example of no discretion is an automatic trigger on bankruptcies. This provision (e.g. in Hungary between 1991 - 1993) requires the firm which holds overdue debts of any size to any creditor to initiate bankruptcy (see Janda (2004)).

3.2.2 Model

In our model we consider an economy consisting of a risk-neutral entrepreneur (a firm), a creditor and a government that designs the bankruptcy law. The entrepreneur needs funds to finance the project. The project yields return R with probability p and yields 0 with probability $1-p$, the costs of the project are I. The outcome of the project cannot be observed by the creditor. The expected value of the project is positive, i.e. $pR - I > 0$. The firm asks for credit C to a creditor to cover the whole investment costs, i.e. $C = I$. If the project is successful, the entrepreneur is supposed to pay back the endogenously determined price of the credit T. Stages of the game are as follows:

In the first stage, the government sets up the bankruptcy law α.

In the second stage nature decides whether the firm is successful or not in

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[3] Cornelli and Felli (1997b) and Giammarino and Nosal (1999) argue that different bankruptcy law provisions might have different effects on the player's behavior. For example, the monitoring incentives of the creditor may or may not be compatible with a procedure that either always complies with or always violates absolute priority rule and therefore it might be difficult to asses the bankruptcy law in a one-dimensional manner.

performing the project. The entrepreneur obtains from the creditor a credit I to cover the costs of the project and the price T he is supposed to pay back is determined. In the analysis, we consider how different levels of competition in credit market influence the price.

In the third stage, the unsuccessful firm has to claim default. The successful firm can decide whether to claim being successful and pay back the credit or to claim default. It chooses a possibly mixed strategy so that it defaults with probability $d \in [0,1]$ and pays back the credit with probability $1 - d$ (d as a default rate). In case the firm declares default, it does not pay back the debt and the creditor has the right to seize the assets of the firm, i.e. the bank can take possession of the collateral and the return of the project.

The expected value of collateral for the creditor is determined by the toughness of the bankruptcy law. If the creditor liquidates the firm, he obtains a liquidation value αL. Taking over the project by the creditor incorporates some dead-weight loss as well, namely $\gamma \in [0,1]$. The creditor valuation of the successful and unsuccessful project is then γR and 0, respectively. We also assume that $I > L$, the creditor cannot recover the full cost of the project in case of project failure. As the project realization is not observable for the creditor, the payment obligation T cannot be conditioned on the result of the project. Whenever the firm is liquidated, the manager loses a non-transferable private benefit B. We assume that $B > L$, which results in a fact that liquidation is inefficient. This assumption is motivated by our focus on a soft bankruptcy law, which is often justified as a way to avoid inefficient liquidation (Biais and Racasens, 2000).[4] Since the entrepreneur has information about the outcome of the project, he needs some incentives to pay back T when the project is successful. These incentives are created by the creditor's right to liquidate the firm, in case he declares default. The threat of liquidation makes the debtor pay back the debt. However, there is still place for

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[4]The assumption does not seem to be unrealistic if we incorporate in the parameter B also the social costs of liquidation. However, for brevity of notation we abstain from a specific parameter.

renegotiation as the liquidation is inefficient. Renegotiation has a negative effect on the debtor's incentive to pay back the debt.

In the fourth stage, the creditor decides whether to accept the refinancing offer of the defaulted firm or liquidate the firm and obtain remaining assets of the firm. We again allow for random strategy, the creditor accepts the refinancing offer and does not liquidate the firm with probability $1 - b$ and liquidates the firm with probability b (b as a bankruptcy rate). The renegotiation offer is modelled as follows. We assume that each project generates the certain return of X if this project is refinanced with additional investment I, making the net profit R_0.[5]

Assume that the renegotiation offer from a firm is: "Refinance us with additional capital and we will pay you for sure the net profit R_0". The manager does not have to offer necessarily the whole return of the refinanced project X, however he still has a motivation to make this renegotiation offer because with refinancing the firm is not liquidated and he does not lose his private benefit B. The specification of refinancing is motivated by Berglöf and Roland (1997). We assume that the net renegotiation offer R_0 does not recover the costs of the project, i.e. $R_0 < I$. We also assume that the refinancing offer is never larger than the collateral, i.e. $R_0 < L$.[6] The refinancing option is inefficient for the creditor ex-ante (the creditor cannot recover the costs of the investment), but might be efficient in the stage, when the firm turns out to be insolvent if the value of the refinancing offer is higher than the expected liquidation value of the collateral. The creditor's choice whether to accept the refinancing offer depends on the expected liquidation value that is influenced by the toughness of the bankruptcy law. The creditor cannot observe whether the defaulted firm was successful or not. The incentives to liquidate a successful firm are higher because the creditor obtains by liquidation not only the collateral but also a part of the project.

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[5]This assumption that each project can generate certain return as part of the project can be saved if additional capital is invested

[6]We want to focus only on a relevant parameter space. If R_0 would be larger than L, the creditor would never use liquidation.

The possibility of refinancing implies that default will not always be penalized by liquidation and both parties realize this. As the creditor cannot commit to always liquidate the defaulted firm, successful firm might use strategic default. This means that the successful firm does not pay back the debt, claims default and hopes the creditor accepts its refinancing offer, and the firm keeps the return of the project. The strategic default incentives are weakened by posting collateral, because it increases the probability that the firm will be liquidated in case of default. Both players (the creditor and the entrepreneur) have symmetric information about the profitability of the project ex-ante, hence there is no adverse selection problem. Due to the presence of asymmetric information, the model is solved using the perfect Bayesian equilibrium concept.

The game tree is presented in Figure 3.1, the timing of the game in Figure 3.2.

3.3   Optimal contract

3.3.1   Case without renegotiation

First, we analyze the case if there is no renegotiation possible. This means that the creditor always liquidates the defaulted company and the entrepreneur does not have any incentives to declare strategic default as this would result in loss of the private benefit and outcome of successful project for sure. Simply all unsuccessful firms $(1 - p)$ will be liquidated. The liquidation rate does not depend on the toughness of the bankruptcy law α.

Proposition 3.1. *Assume absence of renegotiation, when the creditor commits to liquidate the firm in case of failure. The optimal bankruptcy law is $\alpha = 1$.*
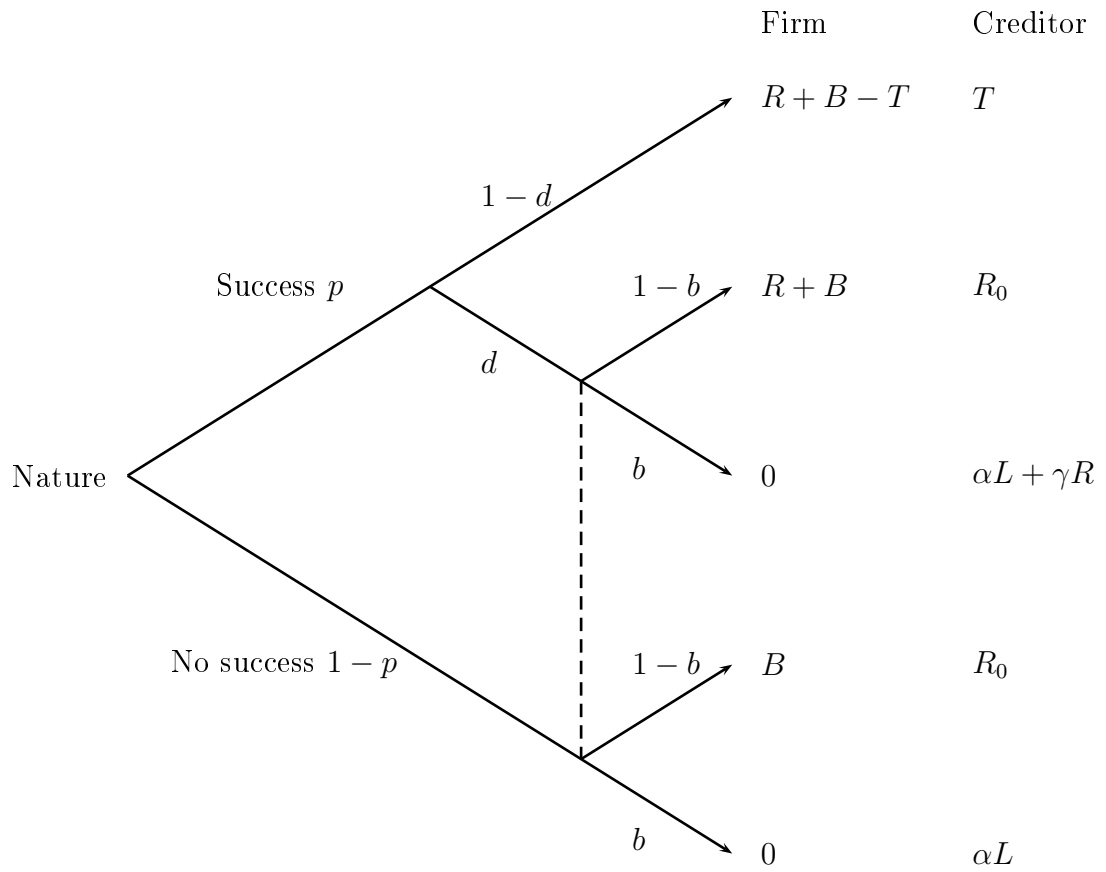
Figure 3.1: The Game-Tree
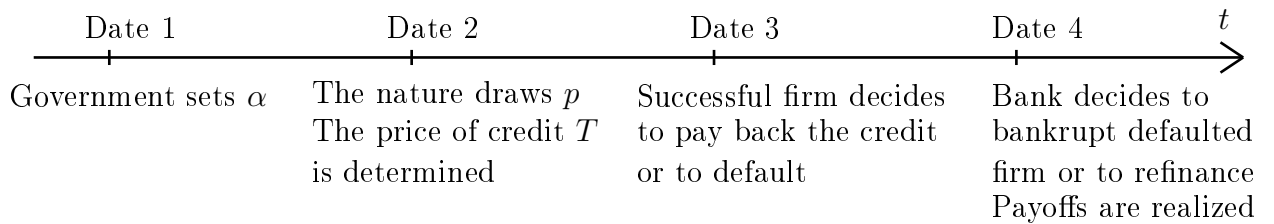
Figure 3.2: Timing

Proof. See Appendix □

The toughness of the bankruptcy law does not influences the liquidation rate, i.e. how many firms will be liquidated. As the entrepreneur knows that in the case of default the firm will be always liquidated he does not default strategically. The toughness of the bankruptcy law does not bring any additional incentives to the entrepreneur to pay back the debt. Therefore it is socially optimal to have very tough law that minimizes the cost of the liquidation.

3.3.2 Case with renegotiation

In this section we present the solution of the game between the debtor and the creditor and we characterize the optimal contract. The bankruptcy law gives the creditor the right to liquidate the firm that declared default. This device gives an incentive to the entrepreneur not to claim default in case the project was successful. If the firm could not be liquidated, the entrepreneur would not lose anything claiming default, moreover he retains the whole profit as he does not pay back the debt. However, being aware of the refinancing option, the entrepreneur might still claim default of the successful project and hope for refinancing (i.e. avoiding liquidation) even though the bankruptcy law is present. In this sense the refinancing softens the hard budget constraint created by a bankruptcy law.

Solving the game, we are looking for the perfect Bayesian equilibrium. Each agent's behavior has to be optimal given the other agent's behavior. The agent's believes about the actual project realization have to be consistent with updated prior probabilities according to the Bayes' rule.

The posterior probability $q(d)$ that the project was successful when default is observed by a creditor is:

$$q(d) = \frac{pd}{1 - p + pd} \tag{3.1}$$

The creditor updates his believes when he observes a firm's action (a firm claiming default or not). The probability of strategic default d is derived endogenously from the model. In equilibrium the creditor forms rational expectations and after observing the default he concludes that the project was successful with probability $q(d)$ and unsuccessful with $(1 - q(d))$.

Proposition 3.2. *The optimal decision of the debtor and the creditor about the default and bankruptcy is characterized as follows:*

- *If the bankruptcy law is soft, i.e. $\alpha < \alpha_1 = \frac{R_0 - p\gamma R}{L}$ then the creditor never liquidates the firm ($b = 0$) and the debtor always claims strategic default ($d = 1$). No project is financed.*

- *If the bankruptcy law is tough, i.e. $\alpha > \alpha_2 = \frac{R_0}{L}$ then the creditor always liquidates the firm ($b = 1$) and the debtor never claims strategic default ($d = 0$).*

- *If the bankruptcy law is intermediate, i.e. $\alpha_1 < \alpha < \alpha_2$ then the equilibrium is characterized by:*

$$b^* = \frac{T}{B + R} \tag{3.2}$$

$$d^* = \frac{(1 - p)(R_0 - \alpha L)}{p(\gamma R + \alpha L - R_0)} \tag{3.3}$$

Proof. See Appendix $\qquad\qquad\square$

We can split the toughness of the bankruptcy law into three intervals. We regard the bankruptcy law to be soft if $\alpha < \alpha_1 = \frac{R_0 - p\gamma R}{L}$. In this case the refinancing offer is always preferred, i.e. the creditor always accepts the refinancing offer. However, the entrepreneur is aware of the fact that the creditor will never liquidate the firm and therefore he always claims strategic default. The creditor's

expected profit is negative because refinancing is ex-ante non-profitable and he rather does not provide any funds at the first place. Hence, if the bankruptcy law is soft, i.e. $\alpha < \alpha_1$, no project is financed.

The bankruptcy law is tough, if $\alpha > \alpha_2 = \frac{R_0}{L}$. In this case, the creditor will never accept the refinancing offer because the liquidation gives him a higher payoff even liquidating the unsuccessful project. Hence, the entrepreneur never claims strategic default as this gives him clearly negative payoff. Only the unsuccessful project is liquidated.

If the toughness of the bankruptcy law lies between α_1 and α_2 we call it intermediate bankruptcy law. In this interval it is profitable for the creditor to liquidate the successful firm as the collateral value plus the value of the project is higher than the refinancing offer. Accepting the refinancing offer is profitable for the creditor in case the project failed. However, as the creditor does not observe the return of the project, he randomizes about his decision to liquidate or to accept the refinancing offer. The mixed strategy equilibrium described in the Proposition 3.2 may be viewed as the belief of the two players concerning their opponents' behavior. The equilibrium rate of b makes the successful entrepreneur indifferent between paying back the debt or facing the creditors choice of accepting the renegotiation offer or liquidation. The default rate d makes the creditor indifferent whether to liquidate the firm that claimed default or not.

The default rate d^* is negatively related to the toughness of the bankruptcy law.

$$\frac{\partial d^*}{\partial \alpha} = -\frac{(1-p)\gamma LR}{p(\gamma R + \alpha L - R_0)^2} < 0$$

As the toughness of the bankruptcy law increases, the refinancing option becomes less profitable for the creditor compared to the liquidation. The debtor is aware of this fact and that leads to less use of strategic default. The price of the credit T does not influence the probability of strategic default d^*, as this does not influence the creditor's decision about liquidation versus refinancing. However, the price of

the credit positively influences the bankruptcy rate b^*. If the price of the credit T is high, the successful debtor can gain more not paying back the debt, therefore the creditor has to use bankruptcy more often.

Optimal contract - renegotiation case

In the previous section we have found the optimal firm's decision about default and optimal creditor's decision about bankruptcy. Decisions about bankruptcy and strategic default are made in the last periods. Solving our problem by backward induction we now solve the optimum contract, given the equilibrium probabilities of strategic default d^* and the bankruptcy rate b^*. We find the optimal price of the credit for different levels of competition in the credit market. The payoff of the creditor is:

$$\pi_{creditor} = p(1 - d^*)T + (1 - p + pd^*)R_0 - I \tag{3.4}$$

The firm's payoff is:

$$\pi_{firm} = p(R + B - T) + (1 - p)(1 - b^*)B \tag{3.5}$$

First, we consider the monopolistic credit market. We model the monopoly case such as there is only one creditor and many firms that want to get a credit. This gives the creditor large bargaining power.

Lemma 3.1. *Assume a monopolistic credit market, where the creditor makes a take-it-or-leave-it offer to the firm. The equilibrium price of the credit T is equal to*

$$T^*_{mon} = R + B \tag{3.6}$$

Proof. We set the participation constraint of the firm equal to zero and solve for T. We find the highest price of the credit T^*_{mon}, the firm can still pay. $\qquad\square$

The creditor is able to extract the whole surplus from the firm and brings it to zero utility. The monopoly price is then $T_{mon} = R + B$. This leads to the bankruptcy rate $b^* = 1$. As the creditor extracts the whole surplus from the entrepreneur, he is indifferent whether to pay back the credit or always claim default. We assume that in equilibrium the firm always pays the credit back. Then, we obtain an equilibrium where the successful firm always pays back and the unsuccessful firm claims default and is always liquidated. This solves the problem of the commitment of the creditor. The monopolist does not necessarily maximizes the social surplus, as he does not internalize the dead weight loss caused by liquidation. As mentioned above, if the monopolistic creditor extracts the whole rent from the debtor, it is always profitable to liquidate the firm. However, if we assume that the monopolistic creditor does not extract the whole rent from the debtor, the liquidation from the point of the creditor will not always be optimal.

Different degrees of competition

We have shown that the maximum value the entrepreneur can pay for the credit is $T = R + B$. In order to analyze different competition environments, we denote the degree of competition in the credit market as θ. This variable expresses how much of the return of the project the creditor obtains: high θ stands for low level of competition, low θ stands for intensive competition. We express the price of the credit as

$$T^* = \theta(R + B) \tag{3.7}$$

If $\theta = 1$, the creditor has absolute monopoly power and can extract the whole surplus of the project from the entrepreneur, $T = R + B$.

In the particular case of perfect competition, where the whole surplus stays with the firm and the creditor's participation constraint is binding, the equilibrium

price of the credit T^*_{com} can be expressed as:

$$T^*_{com} = \theta_{min}(R + B) \tag{3.8}$$

We focus only on the relevant parameter space, when the participation constraint of the bank is positive. This gives us the interval of θ: $[\theta_{min}, 1]$, where

$$\theta_{min} = \frac{(\alpha L - R_0)I + \gamma R(I - (1-p)R_0)}{(\alpha L + p\gamma R - R_0)(R + B)} \tag{3.9}$$

The optimal price of the credit T^*_{com} is negatively dependent on α.

$$\frac{\partial T^*_{com}}{\partial \alpha} = -\frac{(1-p)\gamma LR(I - R_0)}{\alpha L + \gamma pR - R_0))^2}$$

A higher α leads to less strategic default d^*, and as the creditor profits from a lower default rate, he accepts lower price of the credit.

3.4   Optimal bankruptcy law

In the previous section we have determined the optimal contract. In this section we analyze the government's choice of the toughness of the bankruptcy law to maximize social welfare. Social surplus is defined as the sum of all benefits and costs in the economy. In our model there is a need for bankruptcy procedure because without the threat the entrepreneur has no incentives to declare that the project was successful and pay back the credit. To optimally set the level of the toughness of the bankruptcy law, the government has to take into account two effects of the bankruptcy law that influence social welfare. First, there is a dead-weight loss caused by liquidation $(1 - \alpha)L$; a higher level of α decreases this loss. Second, the toughness of the bankruptcy law influences the probability that the firm will be liquidated, the liquidation rate. We analyze the relationship between the toughness of the bankruptcy law and the liquidation rate in a separate section.

3.4.1 Liquidation rate

The probability that the firm will be liquidated (liquidation rate) depends not only on the bankruptcy rate, i.e. on the probability the creditor decides to liquidate, but also on the probability of strategic default, i.e. on the probability the firm will cheat. It is easy to see that the liquidation rate β is:

$$\beta = b^*(1 - p + pd^*) \tag{3.10}$$

To evaluate the effect of the toughness of bankruptcy law on the liquidation rate we study the separate effects on the bankruptcy and default rate. If the bankruptcy law is relatively tough, making the liquidation option always profitable for the creditor, the optimal bankruptcy rate is equal to zero and the optimal default rate is equal to 1. This gives us a liquidation rate of $1 - p$. This is exactly the share of unsuccessful firms. Under very soft law the optimal bankruptcy rate would be zero and the default rate equal to 1. However under these conditions no project will be financed in the formal bankruptcy procedure setting.

The last case lies in the interval of mixed strategies. The liquidation rate in this case is a function of the level of creditor's protection (toughness of bankruptcy law). Plugging in the optimal rates of bankruptcy we obtain:

$$\beta = \frac{T^*}{B + R}(1 - p + pd^*) \tag{3.11}$$

Proposition 3.3. *In the mixed strategy region ($\alpha \in (\alpha_1, \alpha_2)$) the liquidation rate β is lower in the more competitive credit market.*

Proof. As the liquidation rate differs only by the price of the credit T, it is obvious that the liquidation rate is higher for higher θ. $\qquad\square$

If the creditor operates in a less competitive market he can ask for a larger price of the credit from the entrepreneur. A higher price of the credit increases the

debtor incentives to use strategic default, because the benefit of default increases as the price the debtor has to pay increases. The creditor then has to punish the debtor more often. Therefore, higher price of the credit leads to a higher bankruptcy rate. It follows that the liquidation rate is higher for lower degrees of competition.

Proposition 3.4. *In the mixed strategy region ($\alpha \in (\alpha_1, \alpha_2)$) the liquidation rate β is negatively dependent on the toughness of the bankruptcy law α.*

Proof. See Appendix □

The effect of the bankruptcy law on the liquidation rate is twofold. First, the toughness of the bankruptcy law influences negatively the default rate d^*. As the bankruptcy law becomes tougher, the renegotiation option becomes less attractive for the creditor, therefore the debtor is using strategic default less often, d^* decreases. Second, the toughness of the bankruptcy law affects the bankruptcy rate. However, the effect is valid only in the perfect competition setting. Tougher bankruptcy law increases the creditor's payoff and therefore he accepts a lower price of the credit T. This makes the option of strategic default less attractive (the gain of not paying back is lower) and the creditor does not have to use bankruptcy so often, the bankruptcy rate b^*_{com} decreases. In a less competitive market, the bankruptcy law does not influence the bankruptcy rate. Therefore the additional effect on declining number of liquidation is lacking leading to higher liquidation rates. Now we compare the liquidation rate in the mixed strategy region ($\alpha \in (\alpha_1, \alpha_2)$) with the region of the tough bankruptcy law ($\alpha > \alpha_2$).

Proposition 3.5. *There exists α_{liq} in the interval of mixed strategy ($\alpha \in (\alpha_1, \alpha_2)$) such that the liquidation rate $\beta(\alpha_{liq} < \alpha < \alpha_2)$ is smaller than the liquidation rate under the tough bankruptcy law ($\alpha > \alpha_2$) for all degrees of competition θ, $\theta_{min} < \theta < 1$.*

Proof. See Appendix □

This proposition shows us that the probability that the firm will be liquidated (liquidation rate) in the mixed strategies region is lower than in the region of the tough bankruptcy law for certain levels of α. In other words, there exists certain levels of α such that the probability of being liquidated in the region of mixed strategies is lower than the probability of being unsuccessful.

The example of liquidation rate under limited competition ($\theta = 0.9$ and $\theta = 0.6$) is illustrated in Figure 3.3. The parameter θ expresses the distance between the two liquidation rates (between solid and dash line).
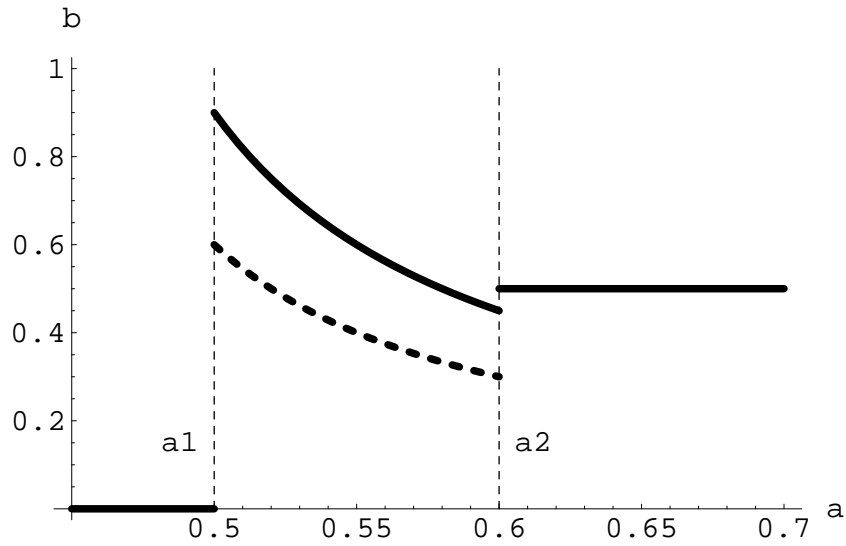
Figure 3.3: Liquidation Rate with respect to the toughness of the bankruptcy law: $R = 10; R_0 = 3; I = 5; \gamma = 0.1; p = 0.5; L = 5; B = 1$. Dashed line represents liquidation rate under $\theta = 0.6$, solid line stays for $\theta = 0.9$.

3.4.2 The government's choice of the optimal bankruptcy law

As we mentioned, there is a need for bankruptcy procedure because without this threat, the entrepreneur has no incentives to declare that the project was successful and pay back the credit. From the ex-post efficiency it would be optimal not to have any bankruptcy law, so that the creditor always accepts the renegotiation offer and never liquidates the firm. However, this would distort the entrepreneur's incentive to admit being successful and he always claims strategic default. The question is how to balance the features of the bankruptcy law such that the costs of the inefficient bankruptcy are the lowest (limitation of number of liquidations), but the entrepreneur still has incentives not to cheat the creditor.

The government's payoff in the mixed strategy interval (intermediate bankruptcy law, (α_1, α_2)) can be written:

$$
\begin{aligned}
G_{inter} &= p(1-d^*)(R+B) + pd^*b^*(\alpha L + \gamma R) + (1-p)b^*\alpha L \\
&+ pd^*(1-b^*)(R+B+R_0) + (1-p)(1-b^*)(R_0+B) - I \quad (3.12)
\end{aligned}
$$

$$
\frac{\partial G_{inter}}{\partial a} = \frac{\gamma L(1-p)R((B+R)\theta - R_0)}{(\alpha\, L + \gamma R - R_0)^2} > 0 \text{ , for } \theta \in (\theta_{min}, 1)
$$

As $\partial G_{inter}/\partial \alpha$ is positive, the highest payoff in this interval is for $\alpha = \alpha_2$, because the liquidation rate is decreasing in this interval and the lower is the liquidation rate the higher is the social welfare. Moreover, higher α leads to lower dead-weight loss of inefficient liquidation.

In the interval of tough bankruptcy law ($\alpha > \alpha_2$), $b = 1$ and $d = 0$, and the government's payoff can be written as:

$$
G_{tough} = p(R+B) + (1-p)\alpha L - I \quad (3.13)
$$

The highest payoff in this interval is clearly for $\alpha = 1$, as the liquidation rate is the same for all levels of α and the dead-weight loss associated with the liquidation of the firm decreases with higher α. It follows that in the government's choice of the optimal bankruptcy law we consider only $\alpha = \alpha_2$ and $\alpha = 1$.

There are two forces going against each other. On the one hand, tougher law (higher α) decreases the efficiency loss (αL). On the other hand, the actual loss is also influenced by the liquidation rate. If the toughness of the bankruptcy law is decreased to reach the interval (α_1, α_2), the efficiency loss is higher than for $\alpha = 1$. However, the liquidation rate is lower as we show in Proposition 3.5. The following proposition discusses the choice of the optimal bankruptcy law.

Proposition 3.6. *The government's payoff for the level of the bankruptcy law $\alpha = \alpha_2$ is larger than the government's payoff for $\alpha = 1$ if the private benefit $B > B_1$. The B_1 is defined as:*

$$B_1 = \frac{L - R_0}{1 - \theta}$$

Proof. See Appendix $\qquad\qquad\square$

We have shown that the government's payoff in the intermediate bankruptcy law interval is larger than the government's payoff in the interval of the tough bankruptcy law if the costs of liquidation (private benefits) are high enough. The social surplus depends on the extent of inefficiency of liquidation. The level of inefficiency of liquidation is influenced by the level of collateralization and the extent of private benefits. If the costs of liquidation are high enough (the private benefits are high $(B > B_1)$ then there exists an interval, where the government's payoff under the soft bankruptcy law is higher than the government's payoff under the tough law. This result comes from the fact that under the soft law there is an interval where there is less liquidation and the project is still financed. This happens if the bankruptcy law is relatively soft, so that the creditor does not always favor liquidation, but the law is still not too soft for the firms to use

strategic default extensively as they are afraid of liquidation. However, if the soft law encourages too many strategic defaults, the government's payoff maximizing social welfare is higher under tough bankruptcy law.

We can also see that the level of B_1 depends positively on θ. This means that for a given level of private benefit B, the optimal level of the toughness of the bankruptcy law under lower competition (higher θ) might be $\alpha = 1$, while the optimal law under more intensive competition would be $\alpha = \alpha_2$. This might result in tougher bankruptcy law and more liquidations under less competitive environment.

3.5 Empirical evidence

In this section we are going to discuss the results of our model in the context of empirical research on the use of bankruptcy around the world, and we also test results of our model using a sample of 32 countries. Our hypothesis are: 1) There exists an interval of the toughness of the bankruptcy law where tougher bankruptcy law results in a lower number of liquidations; 2) Countries with less competitive credit market experience higher number of liquidations.

Our results are in line with some empirical observations on the use of bankruptcy law. Claessens and Klapper (2005) found that countries with better law enforcement (judicial efficiency) have higher rates of liquidation. The toughness of the bankruptcy law seems not to have a significant influence in countries with bad judicial efficiency. However, in countries with good judicial efficiency, the creditor's protection negatively influences the liquidation rates. Djankov et al. (2003) find that countries with very bad efficiency of bankruptcy procedure do not use bankruptcy at all and prefer out-of-court negotiations. Comparing with our theoretical results we believe that the toughness of bankruptcy law depends not only on the creditor's rights protection but also on the law enforcement. In our model,

countries with good judicial efficiency can reach the region of mixed strategies, where the extent of creditor's right has a negative influence on the liquidation rate. However, in countries with bad courts, the toughness of the bankruptcy law does not play a role as firms always use strategic default and are not financed in the framework of bankruptcy procedure, i.e. use different ways of financing based on out-of-court negotiations.

There is empirical evidence in the law and finance literature that finds a positive relationship between a degree of creditor's protection and a development of credit markets (La Porta et al., 1997). A better creditor's protection together with a better judicial efficiency might introduce the use of formal bankruptcy procedure, hence increasing the number of bankruptcies. With further increase of the toughness of bankruptcy law, the liquidation rate decreases as the use of strategic default decreases. This observation is also supported by empirical research of Pistor et al. (2000) and Pistor (2000). They find that in transition countries development of credit markets is significantly influenced by quality of legal enforcement but not the toughness of creditor's protection.

For our analysis we use the dataset of Claessens and Klapper (2005). They collect the total number of commercial bankruptcy filings from government and private sources around the world in years 1990-1999. In order to compare the relative use of bankruptcy across countries, the number of bankruptcy filings is normalized by the number of firms in the country. We use this variable of normalized number of bankruptcy fillings as our dependent variable capturing the extent of liquidation in the country. The summary statistics are presented in Table 3.1. Similar as in Claessens and Klapper (2005) as explanatory variables we use measures of country economic performance (lagged GDP per capita in US$ LAGGDP, lagged growth rate of real GDP LAGGROWTH).[7] Further we use a measure of judicial efficiency (RULE OF LAW) as reported by La Porta et al. (1997) for developed countries and by Pistor et al. (2000) for transition countries.

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[7]World Economic Outlook Database http://www.imf.org/external/pubs/ft/weo/2005/02/data/

This variable assesses the efficiency of courts in the country on the scale from 0 (least efficient) to 10 (most efficient). Then we use a measure of creditor's rights protection (CREDITOR) as reported in in Djankov et al. (2005). This is a measure based on the methodology of La Porta et al. (1997) evaluating the quality of creditor protection on the scale from 0 (worst protection) to 4 (best protection). In order to capture the effect of country legal's origin we include dummies for five major legal system families as reported by La Porta et al. (1997): French civil law, English common law, German law, Scandinavian law and legal system of transition countries (FRENCH, COMMON, GERMAN, SCANDINAVIAN, and TRANSITION). As a measure of competition on the credit market we use the degree of concentration in the banking industry, calculated as the fraction of assets held by the three largest commercial banks in each country in each year in the period 1990-99 (BANKCONC).[8]

The data are set as a panel of countries. As we do not have the observation of the liquidation rates for all countries for all years we have an unbalanced panel. For estimation we use several techniques. In the first seven regression reported in Table 3.2 and in Table 3.3 in Appendix we use a simple OLS model including the time dummies for each year. In the first regression we confirm the results of Claessens and Klapper (2005). The countries with higher level of GDP have higher number of liquidations in the next period. On the other hand and as expected, GDP growth rate negatively influences the number of liquidations. RULE OF LAW has a positive effect on the bankruptcy filings, creditor's protection has a positive effect but it is significant only when also RULE OF LAW is included. In the next regressions we focus on the effect of the competition on the credit market. Regression (2) shows that the degree of concentration of the banking market positively influences the number of liquidations. The less intensive is the level of competition in the banking market the higher is the number of bankruptcy filings. In regression (3) we construct an interaction term between the RULE OF LAW

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[8]The variable is from the Fitch's BankScope database reported in Demirguc-Kunt (2004).

and CREDITOR. The effect of the interaction term is negative, suggesting that in countries with better judicial efficiency, better creditor's protection leads to lower use of bankruptcies. The bank concentration remains positive and statistically significant at 1 per cent significance level.

In the next regressions ((4) and (5)) we use our constructed dummy variables RULE5 and RULE8, where the dummy equals 1 if the RULE OF LAW in the country is larger than 8 and larger than 5, respectively, to divide the countries into two groups according to their courts efficiency. Now we can better interpret the interaction term. In counties with good judicial efficiency, a better creditor's protection leads to lower use of bankruptcy. On the other hand in countries with poor courts efficiency, a tougher bankruptcy law (better creditor's protection) leads to a higher number of bankruptcies. We see that the results are relatively robust as they do not differ for the RULE5 and RULE8 specifications.

In the next panel of regressions we include measures of legal origin. The Scandinavian and common law legal origin as well as transition legal system have a positive effect on the number of liquidations, whereas the French legal system has a negative effect on the number of liquidations. However, the coefficients for French and transition countries are not always statistically significant. The German legal origin variable is included in the constant. The effect of concentration in the banking sector remains significant for all specifications.

In the last two regressions ((8) and (9)) we use fixed effect analysis controlling for time as well as country effect including the lagged growth variable (LAG-GROWTH), lagged GDP (LAGGDP), creditor's protection (CREDITOR) and bank concentration (BANKCONC). In the second specification we also include the measure for the size of the credit market (PRIVATE CREDIT); the variable measures private credit by deposit money banks to GDP.[9] In both specifications the effect of bank concentration on the number of liquidations is positive and statistically significant at 10 and 1 per cent level respectively.

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[9]The variable is from the Fitch's BankScope database reported in Demirguc-Kunt (2004).

It is clear that the toughness of the bankruptcy law depends on the level of creditor's protection (CREDITOR) as well as on the judicial efficiency (RULE OF LAW) in the country. We believe that a certain level of the toughness of the bankruptcy law cannot be reached without a minimal level of the rule of law in the country. In the context of our model, only countries with good judicial efficiency can reach the interval of mixed strategy equilibria. In this interval, a tougher bankruptcy law results in a lower number of liquidation. In contrast, in the countries with a poor quality of courts, the level of creditor's protection leads either to no financing if the creditor's right are not protected enough or the country may eliminate the role of courts (efficiency of the courts) in the bankruptcy procedure implementing a bankruptcy law with automatic trigger or similar design, leading to a high number of bankruptcies. If the courts are not working properly and the creditor cannot rely on them, the liquidation does not threaten the debtor. However, a tougher law might allow financing and the realization of projects that were not financed before. As some of the projects are not profitable, this results in higher liquidation rates compared to the situation when no projects are financed.

We argue that as the law enforcement improved in developed countries, they did not have to rely on very tough bankruptcy law assuring the mobilization of capital for investment and soften the quality such that the creditors still prefer refinancing of defaulted firms, but successful firms are threaten by speed action of courts and do not claim strategic default so often, leading to less liquidation. Only countries with good judicial efficiency can afford the softer bankruptcy law. However, explanation is more intuitive and need to be modelled explicitly, the concept of interaction between the judicial efficiency and the creditor's protection is a topic for a further research.

3.6   Conclusions

We study a simple debtor-creditor model with state verification problem and creditor's impossibility of precommitment to no renegotiation. We found that there exists a mixed strategy equilibrium interval of the bankruptcy law where the liquidation rate is negatively dependent on the toughness of the bankruptcy law. Moreover, there is a level of bankruptcy law in the mixed strategy intermediate bankruptcy law such that the liquidation rate is lower than having a very tough bankruptcy law. We show that less competitive credit markets have higher liquidation rate in the interval of mixed strategies. If the liquidation costs are relatively small then tough bankruptcy law is socially optimal. Under high liquidation costs, softer bankruptcy law is preferred. We also find that the social welfare is lower in less competitive credit markets due to a larger number of liquidations.

The mixed strategy equilibrium appears due to the option of renegotiation. As the social welfare for the level of bankruptcy law from the mixed strategy equilibrium interval might be larger then the social welfare under tough (which actually equals to the social welfare without renegotiation), renegotiation can enhance welfare.

Empirical evidence of Claessens and Klapper (2005) supports our findings about the relationship between the number of liquidations and the toughness of the bankruptcy law and judicial efficiency. On the one hand, tougher bankruptcy law in countries with good judicial system results in lower number of liquidations. On the other hand, in countries with ineffective courts tougher law leads to higher number of liquidations. We also provide empirical evidence on the higher number of liquidations in countries with less competitive credit market.

3.A   Appendix

Proof Proposition 3.1

Proof. The payoff if the entrepreneur is given:

$$\pi_{entrepreneur} = p(R + B - T) + (1 - p) \cdot 0 \tag{3.14}$$

The payoff if the creditor is given:

$$\pi_{creditor} = pT + (1 - p)\alpha L - I \tag{3.15}$$

The social welfare is given then:

$$SW = p(R + B - T + T) + (1 - p)(\alpha L) \tag{3.16}$$

It is obvious that the bankruptcy law $\alpha = 1$ minimizes the costs of liquidation (change of property) and hence maximizes the social welfare. $\qquad\square$

Proof Proposition 3.2

Proof. Solving the perfect Bayesian equilibrium, we proceed in three following steps.

1. In the first step firm decides whether to default strategically or not. The decision of a firm about default is:

   - No strategic default if $R - T + B > (1 - b)(R + B) + b \cdot 0$
   - Strategic default if $R - T + B < (1 - b)(R + B) + b \cdot 0$

2. Then we update the creditor's believe according to the expression (3.1).

3. In the next step the bank makes a decision about bankruptcy

   - Bankruptcy declared if $\pi(d)(\gamma R + \alpha L) + (1 - \pi(d))\alpha L > R_0$

   - Bankruptcy **not** declared if $\pi(d)(\gamma R + \alpha L) + (1 - \pi(d))\alpha L < R_0$

Creditor never uses bankruptcy $(b = 0)$

Now we test whether $b = 0$ is an equilibrium. Following the three steps described above:

1. Firm claims default (as $R + B - T < R + B$) $\Rightarrow d = 1$

2. Posterior probability $\pi(d = 1) = p$

3. Creditor **does not** liquidate the firm if $p(\gamma R + \alpha L) + (1 - p)\alpha L < R_0$ i.e. if:

$$\alpha < \alpha_1 = \frac{R_0 - p\gamma R}{L} \tag{3.17}$$

   If $\alpha < \alpha_1$, there is a pure strategy equilibrium $b = 0$, $d = 1$. Outside this interval $b = 0$ cannot be an equilibrium, because our assumption would be not consistent with the bank's action.

It follows that in the interval $[\frac{R_0 - p\gamma R}{L}), \frac{R_0}{L}]$ there is no pure strategy equilibrium, only mixed strategy is possible.

Creditor always uses bankruptcy $(b = 1)$

Now we test whether $b = 1$ is an equilibrium.

1. Firm does not claim default $(R + B - T > 0)$ $\Rightarrow d = 0$

2. Posterior probability $\pi(d = 0) = 0$

3. Creditor liquidates the firm if $\alpha L > R_0 \Rightarrow$

Only if $\alpha > \alpha_2 = \frac{R_0}{L}$ our assumption $b = 1$ is consistent with the creditor's action and we have pure strategy equilibrium $b = 1$ and $d = 0$ on the interval $\alpha > R_0/L$. Outside this interval is the creditor's action not consistent with our guess of equilibrium $\Rightarrow b = 1$ cannot be an equilibrium.

Mixed strategy equilibrium $(0 < b < 1)$

Firm has to be indifferent between claiming default not claiming default.

$$R + B - T = (1 - b)(R + B) \tag{3.18}$$

Creditor has to be indifferent between claiming bankruptcy and not claiming bankruptcy.

$$\pi(d)(\gamma R + \alpha L) + (1 - \pi(d))\alpha L = R_0 \tag{3.19}$$

Solving (3.18) and (3.19) for b and d we find the mixed strategy equilibrium.

$$d^* = \frac{(1 - p)(R_0 - \alpha L)}{p(\gamma R + \alpha L - R_0)}$$

$$b^* = \frac{T}{B + R}$$

It is straightforward the b^* and $d^* \in [0, 1]$ for $\alpha \in [\frac{R_0 - p\gamma R}{L}), \frac{R_0}{L}]$ $\qquad \square$

Proof Proposition 3.4

Proof. First we consider the perfect competition case. The partial derivation of

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β_{com} with respect to α is equal:

$$\frac{\partial \beta_{com}}{\partial \alpha} = \frac{\partial d^*}{\partial \alpha} p b^*_{com} + (1 - p + p d^*)\frac{\partial b^*_{com}}{\partial \alpha} \tag{3.20}$$

$$= -\underbrace{\frac{\gamma RL(1-p)}{p(aL + \gamma R - R_0)^2}}_{<0} p \underbrace{b^*_{com}}_{>0} - \underbrace{(1 - p + p d^*)}_{>0} \underbrace{\frac{\gamma RL(1-p)(I - R_0)}{(B+R)(aL + p\gamma R - R_0)^2}}_{>0}$$

If we consider the case with less intensive competition, the only difference is in the bankruptcy rate b^*, as $\frac{\partial b^*}{\partial \alpha} = 0$. Therefore, the second part of expression (3.20) is equal to zero and it is obvious that also $\frac{\partial \beta}{\partial \alpha} < 0$. Moreover, we can say that

$$\frac{\partial \beta_{com}}{\partial \alpha} < \frac{\partial \beta}{\partial \alpha} < 0$$

$\square$

Proof Proposition 3.5

Proof. The liquidation rate in the mixed-strategy interval depends on the level of creditor rights protection Proposition 3.4. We can find the level of creditor's protection α_{liq} such that the liquidation rate in mixed strategy equilibria is equal to the liquidation rate in a very tough law, i.e. in the pure strategy region where the creditor always liquidates the defaulted firm. Then, we check whether this α_{liq} is lower or larger than the α_2 that determines the mixed strategy region. If α_{liq} is smaller than α_2, it is clear that there exists α such that the liquidation rate in mixed strategy region is smaller than the liquidation rate under a tough law.

$$\beta_{(\alpha_1,\alpha_2)} - (1 - p) < 0 \tag{3.21}$$

$$if$$
$$\alpha > \alpha_{liq} = \frac{R_0 - \gamma R(1 - \theta)}{L} \tag{3.22}$$

We can show that

$$\alpha_2 - \alpha_{liq} = \frac{\gamma R(1-\theta)}{L} \tag{3.23}$$

It follows, that the $\alpha_{liq} < \alpha_2$, for $\theta < 1$. Then, there always exists such an α, $\beta < 1 - p$. $\qquad\square$

Proof Proposition 3.6

Proof. The structure of the proof is similar to the proof of proposition 3.5. We compare the social welfare under $\alpha = 1$ and social welfare for $\alpha < R_0/L$. $G_{intermediate} - G(\alpha = 1) > 0$ if $\alpha > \alpha_{soc}$.

$$\alpha_{soc} = \frac{(B - L + (\theta - \gamma)R)R_0 - \gamma((1-\theta)B - L)R}{L(B - L + \theta R)} \tag{3.24}$$

We found that

$$R_0/L - \alpha_{soc} = \frac{\gamma R((1-\theta)B - L + R0)}{L(B - L + \theta R)}$$

This expression is larger then 0 if $B > B_1$, where

$$B_1 = \frac{L - R_0}{1 - \theta}$$

$\qquad\square$

Table 3.1: Summary Statistics

Country	GDP	YEARS	LIQ.(%)	CONC.	CREDITOR	RULE
Argentina	7081.04	92-99	0.12	0.36	1	5.35
Australia	19309.32	90-99	2.1	0.63	1	10
Austria	25058.76	90-99	1.33	0.44	3	10
Belgium	23961.26	90-99	2.59	0.75	2	10
Canada	20661.69	90-98	2.96	0.56	1	10
Chile	4261.84	90-99	0.28		2	7.02
Colombia	2157.03	96-99	0.16		0	2.08
Czech Republic	4615.02	92-96	1.49	0.72	3	8.3
Denmark	30264.4	90-99	1.53	0.71	3	10
Finland	23667.6	90-98	4.14	0.75	1	10
France	23330.94	90-99	2.62	0.33	0	8.98
Germany	25855.59	92-98	1.03	0.32	3	9.23
Greece	10310.68	90-94	0.29	0.71	1	6.18
Hong Kong	20967.57	90-98	0.55		4	8.22
Hungary	4118.63	92-96	1.99	0.53	3.75	8.7
Ireland	18113.39	90-99	2.74	0.68	1	7.8
Italy	19945.11	90-96	0.54	0.3	2	8.33
Japan	33651.12	90-99	0.22	0.27	2	8.98
Korea	9080.7	90-98	0.17	0.37	3	5.35
Netherlands	23428.67	90-99	1.3	0.81	2	10
New Zealand	14610.86	93-98	3.67	0.7	4	10
Norway	31566.23	90-98	1.83	0.61	2	10
Peru	1830.52	93-99	0.05	0.64	0	2.5
Poland	3086.95	90-96	0.23	0.57	2.25	8.7
Portugal	9898.75	91-99	0.08	0.46	1	8.68
Russia	1794.24	95-98	0.31	0.43	2.5	3.7
Singapore	19833.44	90-99	3.06	0.85	4	8.57
South Africa	3421.53	90-99	4.62	0.78	4	4.42
Spain	14318.88	90-99	0.02	0.54	1	7.8
Sweden	27737.36	90-99	7.61	0.78	2	10
Switzerland	36740.73	90-98	3.33	0.77	1	10
Thailand	2180.28	90-99	0.12	0.66	4	6.25
Turkey	2912.32	98-99	0.86	0.55	2	5.18
United Kingdom	20134.59	92-98	1.85	0.47	4	8.57
United States	27608.5	90-99	3.65	0.2	1	10

The dependent variable is the ratio of the number of bankruptcies to the number of firms (LIQ.). LAGGDP is the 1-period lagged logarithm of GDP per capita, LAGGROWTH is 1-year lagged real GDP growth, RULE OF LAW is a measure in interval from 0 to 10 (La Porta et al. (1997)), CREDITOR is measure of CREDITOR'S PROTECTION index from 1 to 4 (La Porta et al. (1997)), INTERACTION is the interaction term between CREDITOR and RULE OF LAW, BANKCONC on the banking market measured as a share of assets of three largest bank on the total sum of assets. RULE5 is the dummy variable equal to 1, if RULE OF LAW>5, RULE8 is the dummy variable equal to 1, if RULE OF LAW>8. INTER5 (INTER8) are the interaction term between RULE5 (RULE8) and CREDITOR.

Table 3.2: Estimation results : Liquidation rate

	(1)	(2)	(3)	(4)	(5)
Constant	-2.928**	-4.160***	-7.495***	-8.353***	-6.939***
	(2.40)	(4.37)	(6.62)	(10.28)	(5.89)
Lag GROWTH	-3.306**	-2.672**	-2.384**	-2.078**	-2.021*
	(2.38)	(2.42)	(2.20)	(2.25)	(1.86)
Lag GDP	0.355**	0.420***	0.579***	0.850***	0.575***
	(2.44)	(3.55)	(4.41)	(9.92)	(4.90)
Creditor	-0.136	-0.122	1.292***	1.236***	0.514***
	(1.52)	(1.39)	(3.73)	(9.43)	(3.22)
Rule of Law	0.206***	0.077	0.300***		
	(2.88)	(1.08)	(4.59)		
Bank Conc.		2.506***	2.997***	2.569***	2.939***
		(4.95)	(6.01)	(5.90)	(6.04)
Interaction			-0.182***		
			(4.30)		
Rule8					1.856***
					(4.85)
Inter8					-0.921***
					(4.76)
Rule5				0.728***	
				(2.68)	
Inter5				-1.566***	
				(10.04)	
Year effect	yes	yes	yes	yes	yes
Country effect	no	no	no	no	no
Observations	271	257	257	257	257
R^2	0.19	0.27	0.36	0.50	0.34
F statistics:	4.77	8.50	11.91	22.44	13.33

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
The results of year dummies are not reported

The dependent variable is the ratio of the number of bankruptcies to the number of firms (LIQ.) LAGGDP is the 1-period lagged logarithm of GDP per capita, LAGGROWTH is 1-year lagged real GDP growth. RULE OF LAW is a measure in interval from 0 to 10 (La Porta et al. (1997)), CREDITOR is measure of CREDITOR'S PROTECTION index from 1 to 4 (La Porta et al. (1997)), INTERACTION is the interaction term between CREDITOR and RULE OF LAW, BANKCONC on the banking market measured as a share of assets of three largest bank on the total sum of assets. FRENCH, GERMAN, TRANSITION, COMMON, SCANDINAVIAN are dummies indicating legal origin (La Porta et al. (1997)). Private Credit measures private credits by deposit money banks in ration to GDP.

Table 3.3: Estimation results : Liquidation rate

	(6)	(7)	(8)	(9)
Constant	-5.915***	-6.799***	-4.380**	-0.956
	(4.17)	(4.82)	(2.14)	(0.47)
Lag ROWTH	-2.879***	-2.287**	-1.355***	-0.615*
	(2.87)	(2.31)	(4.17)	(1.82)
Lag GDP	0.689***	0.708***	0.529**	0.029
	(4.20)	(4.31)	(2.56)	(0.13)
Bank Conc.	1.656***	2.350***	0.645*	0.925***
	(3.78)	(5.93)	(1.73)	(2.58)
Rule of Law	-0.059	0.129*		
	(0.93)	(1.93)		
French	-0.028	-0.482**		
	(0.13)	(2.36)		
Common	1.599***	1.405***		
	(7.04)	(7.20)		
Scandinavian	0.986***	0.633**		
	(2.95)	(2.07)		
Transition	1.080***	0.411		
	(3.05)	(1.07)		
Creditor		0.531*	0.333**	0.186
		(1.92)	(2.12)	(1.24)
Interaction		-0.117***		
		(3.43)		
Private Credit				1.981***
				(4.66)
Year effect	yes	yes	yes	yes
Country effect	no	no	yes	yes
Observations	257	257	257	249
R^2	0.44	0.53	0.11	0.18
F statistics:	23.84	25.77		
Number of countries			35	34

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
The results of year dummies are not reported

Chapter 4

How Does the Bankruptcy Law Influence a Lender's Decision on Information Sharing?

4.1 Introduction

The credit markets are affected by asymmetric information between lenders and borrowers. There are two basic views how lenders can reduce the problem of asymmetric information. According to the first view, power given to the creditor by bankruptcy laws matters and can reduce the moral hazard problem. If the creditor can more easily enforce repayment, ask for the collateral or threaten with liquidation he is more willing to provide credits. This "power" theory approach was studied by Townsend (1979), Aghion et al. (1992), Aghion and Bolton (1992) and Hart (2000). According to the second view, lenders can focus on the type of asymmetric information that gives rise to the problem of adverse selection. The creditor can solve the problem of information asymmetry by investing in screening, monitoring (e.g. Stiglitz and Weiss (1981), Jaffee and Russell (1976)), or obtaining the information about the debtors from other creditors (Jappelli and

Pagano, 1993). Djankov et al. (2005) and Jappelli and Pagano (2002) provide some empirical evidence that the informational and creditor power approaches might be substitutes.[1] Some countries may specialize on information institutions, others on laws giving more power to the creditors.

In this chapter, we focus on the determinants of institutions to share information. We observe the emergence of institutions for the information exchange among lenders around the world, which are called private credit bureaus. These bureaus, working on the principle of reciprocity, distribute information supplied voluntarily by bureau members (creditors). In recent models on information exchange (Jappelli and Pagano (1993), Gehrig and Stenbacka (2001)) information is more likely to be shared in less competitive banking environments. These models, however, do not take into account the effect of creditor rights protection.

We study how two different approaches of informational and power theories interact with each other. We ask how a bank's decision to share information is influenced by a government's decision on the creditor rights protection and how this is affected by different degrees of bank competition in credit markets. We present a two period model with moral hazard and adverse selection, where the decisions on information sharing and bankruptcy law arise endogenously. Considering the effect of bankruptcy law chosen by the government, we find that there exists a parameter space, where information sharing is more likely to take place in more competitive markets.

The main idea of the model is following. We compare two scenarios of monopolistic and competitive credit market. The monopolistic creditor can extract the whole rent from the firm. However, then the manager does not have any incentives to exert effort. If the bankruptcy law protects the creditor rights effectively, the creditor can easily punish the manager in the case of failure and this makes

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[1]Manove et al. (2001) analyze the problem of collateral versus screening in the adverse selection model. The collateral represents the creditor power theories and screening is an information theory approach. They find that these instruments might be substitutes and to extensive creditors right protection might lead to inefficiently low screening.

effort cheaper to implement. In the competitive market, however, the creditors compete and drive the price to the cost of capital. As the price of the credit is lower, the firm is left with a higher share of the surplus and therefore the manager has higher incentives to exert effort. In the competitive market, even without the law, high effort might be an optimal choice and the government does not have to encourage the effort by the tough law that also causes liquidation costs. If the government as a social maximizer is interested in implementation of effort, it has more incentives to introduce bankruptcy law in case of monopoly market.

Bankruptcy laws might not only reduce the moral hazard problem but also can work as a substitute to information sharing, solving the adverse selection problem. As the bankruptcy laws allow the bank to liquidate unsuccessful firms, low ability firms do not apply for the credit at the first place and leave the credit market. They know that their firms would be liquidated with certainty. Banks in a monopolistic credit market, where tough bankruptcy law was implemented then lose incentives to share information. The banks in a more competitive environment, where the government does not have such incentives to implement tough creditor protection, might be still willing to share information. Then, we might observe monopoly market without information sharing and competitive market where the banks use information sharing.

We provide also empirical evidence on the determinants of information sharing. Using a cross country database we find that information sharing is more prevalent in countries with more intensive competition in the credit market. We also find that private information sharing is less used in countries with French and countries with former socialistic legal system. However, we do not find evidence for a substitution effect between information sharing and the creditor rights protection.

The chapter proceeds as follows. Section 4.2 presents a review of the existing literature on information sharing and creditor rights protection. In Section 4.3 we introduce the model and discuss two scenarios of bank competition. The choice of the optimal bankruptcy law and bank's decision to share information are described

in section 4.4. Section 4.5 provides empirical evidence and section 4.6 summarizes our findings.

4.2   Literature review

Theory   Information sharing about borrowers' characteristics can have important effects on the credit market. Jappelli and Pagano (2000) provide an overview of theoretical studies and emphasize several important effects of information sharing. First, information sharing improves the banks' knowledge about credit applicants and might help to solve the adverse selection problem in the credit market. This effect is studied in a pure adverse selection model by Jappelli and Pagano (1993). If banks exchange information about their borrowers, they can then identify creditworthiness of credit applicants that have moved into the banks' market areas. Given the better information, the banks can lend to these new clients as safely as they lend to their long-standing clients and the default rate decreases. Jappelli and Pagano (1993) find in that setting that bank competition has a negative effect on the lenders incentives to establish a credit bureau. Bank competition discourages from information sharing as the bank that provides information about its clients to its competitors enable these competitors to compete more aggressively. If there are significant barriers that limit competition, banks are not threatened by intensive competition if they provide information and they are more likely to share.

Two other important effects of information sharing are studied by Padilla and Pagano (1997) and Padilla and Pagano (2000). They stress the information sharing effect on manager's incentives. Padilla and Pagano (1997) argue that the information advantage that banks obtain from long-relationships with firms produces a hold-up problem: borrowers anticipate that the banks will extract the whole surplus in future and they exert low effort to perform. By information sharing banks can commit to reduce their information rents and leave a larger

portion of the surplus generated by the project to the entrepreneur giving him more incentives to exert effort. Padilla and Pagano (2000) focus on the disciplinary effect of information sharing. Information about defaults shared by banks is a bad signal about the firm's quality. Firms are trying to avoid the default by exerting more effort because this signal is associated with higher interest rates.

In the recent literature we find studies that take into account bank competition before the banks acquire the information advantage and find that information sharing can be considered as a collusive device of banks. Bouckaert and Degryse (2004) study a duopoly banking market and find that the bank has an incentive to disclose some information about its clients in order to influence the rival's entry.[2] Gehrig and Stenbacka (2001) analyze a model with repeated bank competition and switching costs. The banks enhance their profits using information sharing to relax competition in the first period.[3]

Empirical studies There is a growing empirical literature on information sharing. Jappelli and Pagano (2002) study how information sharing influences lending and the number of defaults. They find that information sharing is associated with higher bank lending and lower credit risk. Djankov et al. (2005) study the determinants of the size of credit markets in 129 countries. They find that the existence of information sharing institutions is related to higher ratios of private credit to GDP. They also find that legal origin is an important determinant of the emergence of information sharing institutions. Both studies (Jappelli and Pagano (2002), Djankov et al. (2005)) suggest that information sharing institutions and creditor protection rights may be substitutes, i.e. some countries focus on the in-

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[2]The incumbent bank, by displaying information about its high ability clients, makes it unattractive for the entrant to serve other high ability borrowers as these are pooled with a large portion of bad borrowers. This reduces the extent of rival's entry.

[3]Without information sharing, banks compete intensively in first periods of competition to expand their credit portfolio to be able to extract the information rent in the next period. However, information sharing relaxes the competition in the first period and this enhances profits of banks. Therefore, information sharing can be consider as a collusive device banks use to increase their profits.

formation channel others rather rely on power theories and give substantial rights to creditors. According to Djankov et al. (2005), the existence of private registries is more prevalent in rich countries as well as in countries with common law and Scandinavian legal origin.

Bankruptcy laws   Creditor protection rights are usually expressed in the form of bankruptcy laws. The bankruptcy law can be soft or tough on the debtor. The tough bankruptcy law means that creditor rights are well protected and the creditor can easily take possession of the firm's assets and liquidate the firm. The soft bankruptcy law protects more the rights of the debtor and for the creditor it is more difficult to access the collateral. The creditor is discouraged by the soft bankruptcy law from starting a liquidation procedure and various kinds of out-of-court negotiations are more likely to be used (reorganization, debt refinancing etc.).[4]

There exist also many studies analyzing the incentives created by the tough bankruptcy law on the decisions made by debtor and creditor. Our model of bankruptcy law is based on Biais and Mariotti (2003). They analyze how bankruptcy laws influence manager's incentives to exert effort in a general equilibrium model and find that a soft bankruptcy law is favored by relatively rich agents, who are not threatened by credit rationing.

Hainz (2004) finds in her model of credit markets and quality of institutions (bankruptcy laws) that the bank's decision to liquidated bad firms has two effect. First, the bank receives a payoff in case of liquidation. Second, liquidating the unsuccessful firm reveals the information about the borrower's type and the bank loses rent from incumbent customers due to the informational advantage. She

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[4]An example of the soft bankruptcy is a law that gives a lot discretion power to the judge and the judge, considering the social costs of liquidation, is then more likely to reject the bankruptcy procedure. In contrast, an example of the tough bankruptcy law is automatic trigger provision. An automatic trigger provision does not allow for any discretion of the judge and automatically starts the liquidation procedure if the firm is insolvent. It was implemented for example in Hungary 1991-1992 (Janda, 2004).

shows that institutions must improve significantly to obtain the optimal number of liquidations.

Many studies have shown the importance of the creditor rights protection for the development of credit markets (e.g. Djankov et al. (2005), La Porta et al. (1997)). However, the quality of creditor protection does not depend only on the law itself but also on its enforcement. Pistor et al. (2000) and Pistor (2000) find that in transition countries the judicial efficiency is a better predictor for the credit market size than the quality of creditor protection.

4.3 Model

Firms

Our model is a two-period model of the credit market. We assume that only one period contracts are available as in the firms might migrate among cities in the second period (see below). The model is based on the adverse selection model of Jappelli and Pagano (1993) and on the moral hazard model of Padilla and Pagano (1997). We consider a country with N towns, $N \geq 3$. Each town consists of a continuum of firms uniformly distributed on the interval $[0, 1]$. All firms have an investment project with costs I and differ with respect to their profitability. There are q "good" (high ability) firms and $1 - q$ "bad" (low ability) firms. The project in the good firm is successful and earns R with probability p_h if the entrepreneur in the firm exerts effort and earns 0 with probability $1 - p_h$. The effort costs are e. The probability of success of a project in a good firm if the entrepreneur does not exert effort is p_l ($p_h > p_l$), the project fails with probability $1 - p_l$. All projects in bad firms are unsuccessful with certainty. The effort chosen in the first period is not observable and determines the outcome of the project in both periods, i.e. in the second period the manager does not exert any effort. The firm does not know its type in the first period, it realizes its type in the second period.

Banks and information sharing

In each town there is one bank. Firms do not have any internal funds, they have to borrow the funds from a bank to cover the costs of the project I. If the project is successful, the entrepreneur is supposed to pay back the endogenously determined price of the credit T^1 and T^2 at the end of the first and second period respectively.

The bank, like the firm, does not know the type of the firm in the first period. In the second period, the bank observes costlessly the type of the firms to which it provided a credit in the first period. In the second period, each bank faces a turnover in its customer base as a portion m of the firms in the town moves exogenously to another town and is replaced by the same portion of immigrants from other towns. The banks learn the type of their old clients that stay in the town (residents), however, the migrants from other towns are "a black box", the bank does not know the type of migrant firms.

The banks can share information about the migrants in the second period. Sharing information means that all banks in the country agree to set up a credit bureau. The bureau merges the information provided by all banks into a single database and all banks get the information about the type of the migrant firms, which solves the problem of adverse selection produced by the asymmetric information and migration in the second period.[5] We assume that in the second period as the firms realize their type, the bad type firms can apply for multiple credits in all banks costlessly. They know they are not going to pay back the credit and they just want to enjoy the utility from being in business. This implies that the adverse selection problem in the second period is so severe that a bank cannot serve clients without information on their type. This is a strong assumption, however, it emphasizes the idea of information sharing. On the one hand, in

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[5]This information sharing design is motivated by the description of credit bureaus around the world. A viable information sharing agreement has to take into account that banks ex-post have incentives to cheat by not reporting or misreporting information about its good customers. The agreement usually prevent such behavior by private enforcement mechanism. Whenever the bank behaves opportunistically it is punished by exclusion from the credit bureau (Jappelli and Pagano, 1993), (Padilla and Pagano, 1997).

case of information sharing the banks decrease their losses caused by financing of low ability firms but have to face tougher competition and hence lower profits on the high ability firms. On the other hand, without information sharing the bank can extract some rent from the firms by which the bank posses better information compare to the competitors but faces larger losses by firms without information.

Bank competition

The competition in the banking sector is analyzed in two scenarios. In section 4.3.1, we consider the case when serving clients in another town is prohibitively expensive and the local bank enjoys a monopoly power. Second, in section 4.3.2 we focus on a competitive environment that is modeled in the following way: We assume that banks can serve firms in neighboring towns at additional transportation costs c that reflect their lower efficiency in competing outside their market area. We assume that migrant firms changing their location in the second period move to distant towns, so that their former bank cannot keep them as customers (costs of extending credit to firms in distant towns are prohibitively high as in the monopoly case). There are several regions in the country and the bank can compete for the clients only within the one region, while the migrants move across the region borders. This assumption assures that the migrant's type is unknown for the local bank as well as for the potential competitor in the region (Jappelli and Pagano, 1993).

Bankruptcy laws

The government takes a decision on bankruptcy law that allows the bank to liquidate an unsuccessful firm. If the firm is liquidated the bank becomes the liquidation value L and the manager loses his private benefit B. For simplicity we assume $B = L$. Liquidation of a firm produces social costs of liquidation U.[6]

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[6]This can be justified as cost of unemployment benefits, disturbed social environment in the city etc. More detail motivation can be found in (Tirole, 2001).

The bankruptcy law is modeled in a very simple way. The bankruptcy law is considered to be a discrete variable; if $\alpha = 1$ the bank can liquidate the firm and gets the liquidation value, if $\alpha = 0$ the bank cannot liquidate the firm.

We assume, in the same way as Padilla and Pagano (1997), that each individual investment is run as a limited liability company and that the entrepreneur cannot be disqualified after the default from future investments. If the project fails, the entrepreneur cannot be held liable for the loss and his future investments are free of charge and he is not disqualified from future new investments.

Timing

The timing of the game is as follows:

Period 0   The government chooses the bankruptcy law α.

Period 1   Banks set prices and compete for clients. The entrepreneur chooses effort, the effort chosen in the period 1 determines the outcome of the project in period 1 as well as in period 2 (Padilla and Pagano, 1997). Then the returns are realized, successful firms pay back the credit, while unsuccessful do not and they are liquidated or not.

Period 2   Banks and the entrepreneur himself learn the type of the entrepreneur. The probability of success of the project is determined by the effort exerted already in period 1. A portion of m firms changes exogenously location from one town to another. Banks can decide whether to share information about the firms. Banks set prices and compete for clients. The payoffs are realized.

We solve the model by backward induction. We consider two cases, first the monopolistic case, where the bank is a monopolist in the town and then we consider the case with competition in the credit market.

4.3.1 Monopoly in the banking market

We study the case of monopoly in the credit market and we assume that the costs of serving the customers in other towns are prohibitively high. For the decisions in the banking market we have to consider the bankruptcy law as given as this was determined in period 0. We analyze in turn the cases of a soft and a tough bankruptcy law.

Soft bankruptcy law

The second period We start our analysis in the second period in which the bankruptcy law is taken as given. If the government implements the soft bankruptcy law in period 0, the bank cannot liquidate an unsuccessful firm. There is no moral hazard problem in the second period as effort has been exerted already in the first period, the effort level is taken as given. The banks realize the type of firms in their portfolio. A portion of m firms changes location to distant towns.

The banks in the second period can decide whether to share information or not. On the one hand, information sharing brings an advantage in reducing the problem of adverse selection. On the other hand, when a bank supplies information about its customers to a competitor, in effect it encourages more aggressive competition. In the case of monopoly when banks cannot compete for the clients in the neighboring towns even after information sharing was introduced, there are no disadvantages of information sharing and monopolistic banks always have incentives to share information.

The monopolistic bank thus solves the problem of adverse selection in the second period by exchanging the information about all clients. Then the bank can serve only good type entrepreneurs and charge them monopolistic prices. We have to consider two cases in which low or high effort was exerted, respectively.

The firm has to pay back the price of the credit T_2; the firm's participation

constraint in the second period is:

$$p_i(R + B - T_i^2) + (1 - p_i)B \geq 0, \ i = h, l \tag{4.1}$$

The bank as a monopolist makes a take-it-or-leave-it offer and makes the participation constraint of the firm binding, extracting the whole surplus of the project. This determines the price of the credit in the second period for the case of the soft bankruptcy law

$$T_i^2 = R + \frac{B}{p_i}, \ i = h, l \tag{4.2}$$

The first period In the this period, the moral hazard problem arises. The monopoly bank has two options. It can either charge the price that extracts the whole surplus of the project. Such a contract does not give incentives to the entrepreneur to exert any effort. The second option is that the bank can take into account the entrepreneur's incentive compatibility constraint and ask for high effort.

The firm in the first period is a high ability firm with probability q. With probability $1 - q$ the firm is a low ability firm and fails in performing the project with certainty. As in the second period information sharing eliminates the low ability firms from the credit market, they are financed only in the first period. The incentive constraint of the firm can be then written as:

$$q[p_h(R + B - T_h^1) + (1 - p_h)B + p_h(R + B - E[T_h^2]) + (1 - p_h)B] + (1 - q)B - e \geq$$
$$q[p_l(R + B - T_l^1) + (1 - p_l)B + p_l(R + B - E[T_l^2]) + (1 - p_l)B] + (1 - q)B$$

$$T < T_h^1 \equiv R - \frac{e}{q(p_h - p_l)} \tag{4.3}$$

This means that if the bank wants to make the entrepreneur exert high effort, the price of the credit in the first period cannot be larger than T_h^1 (expression (4.3)). However, if the low effort case is also profitable, the bank can extract the whole surplus from the firm, i.e. it makes the participation constraint for the low effort binding and charges the price T_l^1 (expression (4.4)).

$$q[p_l(R + B - T_l^1) + (1 - p_l)B + p_l(R + B - E[T_l^2]) + (1 - p_l)B] + (1 - q)B \geq 0$$

$$T_l^1 = R + \frac{B}{qp_l} \tag{4.4}$$

To compare the bank's options of inducing the high or low effort we consider the bank's profit in both cases.

Proposition 4.1. *Under the soft bankruptcy law ($\alpha = 0$) the monopolistic bank prefers the entrepreneur to exert the high effort if the effort costs are sufficiently low; $e < \underline{e}_M$, where*

$$e > \underline{e}_M = \frac{(p_h - p_l)(2(p_h - p_l)qR - B)}{p_h} \tag{4.5}$$

Proof. See Appendix ◻

The bank as a monopolist makes a take-it-or-leave-it offer and can decide, by choosing the appropriate contract, which effort level will be exert by the entrepreneur. Clearly, the bank prefers the high effort if costs of exerting effort are low or the reward for the high effort $(p_h - p_l)$ is high. If the costs of effort are high it is more profitable to extract the whole surplus of the project from the firm and let the entrepreneur exert the low effort.

Tough bankruptcy law

If the government implements the tough bankruptcy law in period 0, banks are allowed to punish unsuccessful entrepreneurs by liquidation. The tough bankruptcy law can work as a substitute to information sharing. In the second period, when the firms realize their own types, the bad firms are sure about their failure. The bad firms would apply for a credit knowing that they are not going to pay back the credit and the entrepreneurs just want to enjoy the private benefits of being in office. However, if the bank can liquidate the unsuccessful firm, this is going to discourage bad type firms from application and they leave the credit market. Therefore, there is no adverse selection problem in the second period under the tough bankruptcy law and the monopolistic banks do not need to share information to keep the bad firms out of the market.[7]

In our analysis we proceed in the similar way as in the soft bankruptcy law case, only the difference is that the bank can liquidate the firm and becomes the liquidation value L, while the manager loses private benefit B. This happens with probability $1 - p_i$, $i = h, l$.

The second period In the second period banks realize the type of their clients and a portion of m firms in their portfolios changes location to distant towns. Due to the tough bankruptcy law, the low ability migrant firms leave the market and the bank will serve only the high ability firms: local residents and migrants. The firm's participation constraint is:

$$p_i(R + B - T_i^2) \geq 0, \; i = h, l \tag{4.6}$$

The bank as a monopolist makes a take-it-or-leave-it offer to the firm and derives the price of the credit from the binding firm's participation constraint. This

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[7]If we assume just small cost of ϵ to set up the credit bureau to exchange information, banks will not have any incentives to incur these costs under the tough bankruptcy law.

implies the price of the credit equals to

$$T_i^2 = R + B, \ i = h, l \tag{4.7}$$

Similar as in the case of the soft bankruptcy law, the bank extracts the whole surplus of the project. There is no moral hazard problem because the effort was exerted in the first period and effort costs are sunk in the second period.

The first period The bank has again two options: (i) to extract the whole surplus and accept low effort or (ii) to fulfill the incentive constraint of the entrepreneur and ask for high effort. The incentive constraint of the firm is:

$$q[p_h(R + B - T_h^1) + p_h(R + B - E[T_h^2])] - e \geq$$
$$q[p_l(R + B - T_h^1) + p_l(R + B - E[T_l^2])]$$

$$T < T_h^1 = R + B - \frac{e}{q(p_h - p_l)} \tag{4.8}$$

The bank can charge a higher price to induce the high effort compare to the soft law case if the expression (4.8) is larger than the expression (4.3)). If the manager chooses the low effort, the bank can extract the whole surplus from the firm, i.e. it makes the participation constraint for the low effort binding:

$$q[p_l(R + B - T_h^1) + p_l(R + B - E[T_l^2])] = 0 \tag{4.9}$$

$$T_l^1 = R + B \tag{4.10}$$

Proposition 4.2. *Under tough bankruptcy law ($\alpha = 1$) the monopolistic bank prefers the entrepreneur to exert the high effort if the effort costs are sufficiently*

low; $e < \overline{e}_M$, where

$$e > \overline{e}_M = \frac{2(p_h - p_l)^2 qR}{p_h} \tag{4.11}$$

Proof. See Appendix $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\square$

The introduction of the bankruptcy law allows the bank to punish the entrepreneur in the bad state of the world and this makes the implementation of high effort less expensive. Comparing the soft and tough bankruptcy law cases it is easy to show that $\underline{e}_M$ is smaller than $\overline{e}_M$. This implies that if the costs of effort are smaller than $\underline{e}_M$, the high effort is chosen under the soft as well as under the tough law. If the effort costs lie in the interval $[\underline{e}_M, \overline{e}_M]$ then the high effort is exerted only in the case of the tough bankruptcy law. Finally, if $e > \overline{e}_M$, the effort costs are too high for the soft as well as the tough bankruptcy law and in both cases the low effort is exerted.

4.3.2 Competition in the banking market

In this scenario we allow for competition among banks from different towns. The entrant bank from a foreign town faces a cost disadvantage c. The banks compete simultaneously announcing the price of the credit maximizing its profit. To break ties, the firm is assumed to prefer the local bank if the offered interest rates are equal.

Second Period   In the second period, banks realize the type of their clients and a portion of m firms migrate to distant town. The bank has to decide whether to share information or not. To analyze the bank's decision we compare its profits under both scenarios.

No information sharing

Without information sharing the local and the foreign bank have the same information about migrants. Due to the problem of adverse selection that arises in the second period, banks cannot serve firms without information about their types. The local bank can sort out migrants and old residents and can charge the monopoly price to the good-type residents and not serve the bad types. The bank from the other town cannot distinguish among migrants and old residents and therefore cannot serve clients in the distant town.

If the bank behaves as a monopolist, it makes a take-it-or-leave-it offer to the $(1 - m)q$ good residents and makes the participation constraint of the residents binding. This implies the price of the credit being $T_i^2, i = h, l$, depending on the effort exerted in the first period.

$$T_i^2 = R + \frac{B}{p_i}, \ i = h, l$$

The bank's payoff in the second period is then:

$$\Pi_{NS} \ = \ (1 - m)(q(p_i(R + \frac{B}{p_i} - I), \ i = h, l \tag{4.12}$$

Information sharing

If the banks decide to share information about their clients in the second period they become competitors. The potential entrant offers the lowest possible price taking into account the transportation cost c. With information sharing, the participation constraint of the entrant becomes:

$$\Pi_e = q(p_i T_i^2 - I - c) \geq 0, \ i = h, l$$

The local bank can always offer the same price as the entrant and in the equilibrium the firm decides to take the credit from the local bank. The equilibrium

competition price charged by the local bank is then:

$$T_i^2 = \frac{I+c}{p_i}, \ \ i = h, l \tag{4.13}$$

The bank's payoff in the second period with information sharing is:

$$\Pi_{IS} = q(p_i \frac{I+c}{p_i} - I) = qc, \ \ i = h, l \tag{4.14}$$

Now we compare the bank's profit in the second period without information sharing (4.12) with the case of information sharing (4.14). The bank's decision on information sharing is summarized in the following lemma.

Lemma 4.1. *The banks share information about the type of the firm in the second period if the transportation costs are high enough;*

$$c > c_{min} = (1 - m)(p_i R + B - I), \ \ i = h, l$$

If the costs c are large enough $(c > c_{min} = (1 - m)(p_i R + B - I))$ the bank prefers information sharing. If c is smaller than c_{min} it is more profitable not to share. Clearly the higher the number of migrants the lower are the minimal transportation costs c_{min}. It follows that the condition for information sharing in the case when the high effort was exerted in the first period is $c > c_{minH} = (1 - m)(p_h R + B - I)$. If the condition holds for the high effort, it is also fulfilled for the low effort case as $p_h > p_l$.

If there is perfect competition in the credit market $(c = 0)$, banks can choose either not to share information, which allow them to serve only old customers and charge them monopoly prices or to exchange information and serving all clients. However, in the perfect competition environment, banks do not have any incentives to start information sharing in the second period. If they share information, Bertrand price competition drives the profits down to zero. It is clear that it is always better to serve only old customers and to charge them

monopoly prices. For brevity we concentrate from now on the situation where $c > c_{min}$.

First Period In the first period all banks have the same information about firms and the only difference is the transportation cost disadvantage c. In the first period the entrant's payoff is:

$$\Pi_e = q(p_i T_i^1 + p_i E[T_i^2] - 2I - c) - (1 - q)I - c, \ i = h, l$$

Making the participation constraint binding, it follows that the competitive price the local bank offers in the first period is $T_i^1 = \frac{I+c}{qp_i}, \ i = h, l$.

Competition in the first period only takes place if the transportation costs are not too high, so that the price offered by the entrant is still acceptable for the firm. The participation constraint of the firm in the case when high effort was exerted is:

$$
\begin{aligned}
\Pi_{firm} &= q[p_h(R + B - T_h^1) + 2(1 - p_h)B \\
&+ p_h(R + B - E[T_h^2])] + (1 - q)B \geq 0 \quad\quad (4.15)
\end{aligned}
$$

Taking into account the competitive prices T_h^1 and T_h^2, the expression (4.15) is larger or equal to zero for $c \leq c_M \equiv \frac{2p_h qR - e}{1+q} + B - I$. For $c \leq c_M$ the transportation costs are not high enough to create a monopolistic situation and competition among banks takes place.[8]

Given the competitive prices in the first and second period we determine the effort the entrepreneur is going to exert in the first period:

Proposition 4.3. *Under the tough bankruptcy law ($\alpha = 1$) and in a perfect competitive market, the entrepreneur exerts the high effort in the first period if the*

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[8]If the transportation costs c are lower than c_M this is enough to encourage competition in the second period as well as the maximum costs still ensuring competition in the second period $c_{M2} = p_h R + B - I$ are larger than c_M.

effort costs are sufficiently low; $e < \underline{e}_C$, where

$$\underline{e}_C = \frac{2(p_h - p_l)^2 qR}{p_h} \tag{4.16}$$

Proof. See Appendix □

Maximum effort costs that still ensure that the manager exerts high effort in the competition environment $(\underline{e}_C)$ is higher than the maximum effort in the monopoly case $(\underline{e}_M)$ as

$$\underline{e}_C - \underline{e}_M = \frac{(p_h - p_l)q(B + 2p_l R)}{p_h} > 0$$

We concentrate on the case when $e < \underline{e}_C$, thus in the case of competition in the credit market high effort is exerted in the first period and the government has no incentives to adopt the tough bankruptcy law. In other words, the competition among banks drives the price of the credit low enough and leaves the entrepreneur with a larger share of the project return encouraging the high effort. We focus at this parameter space to emphasize the difference between the monopoly case and the competition case with respect to the government's decision on the bankruptcy law. The choice of the optimal bankruptcy law is analyzed in the next section.

4.4 Optimal bankruptcy law

The government chooses the bankruptcy law to maximize the social welfare. The social welfare is defined as the sum of payoffs of all players minus the potential liquidation costs U. Competition in the banking market influences directly the prices of the credit, but from the social point of view it is more important that competition influences the effort exerted by the manager. The government is clearly interested in the high effort which brings a higher social welfare and would like to avoid liquidation costs U. In the case of competition in the credit market,

the government does not have any incentives to implement a tough bankruptcy law if the the competition is intensive enough to ensure the high effort.

However, in the case of a bank monopoly, if the effort costs lie in the interval $[\underline{e}_M, \overline{e}_M]$ the government might want to encourage the high effort even though the tough bankruptcy law would cause liquidation costs. The social planner compares social welfare under the tough law with liquidation costs and high effort (4.17) and social welfare under the soft law with low effort without liquidation costs (4.18).

$$SW_{tough} = q[2p_h(R+B) - 2(1-p_h)U - 2I] - (1-q)(U+I) - e \quad (4.17)$$

$$SW_{soft} = q(2p_l(R+B) + 2(1-p_l)B) - 2I) + (1-q)(B-I) \quad (4.18)$$

Proposition 4.4. *The government chooses tough bankruptcy law in the case of monopoly market if the effort costs lie in the interval $[\underline{e}_M, \overline{e}_M]$ and the liquidation costs are small enough:*

$$U < U_{max} = \frac{2(p_h - p_l)qR - (1+q-2p_h)B - e}{1 + q - 2p_h}$$

Proof. The proposition follows directly from comparing the government's payoffs in the case of monopoly for the tough and soft bankruptcy laws. SW_{tough} is larger than SW_{soft} if the liquidation costs are relatively small, i.e. $U < U_{max}$. $\qquad\square$

For effort costs lower than $\underline{e}_M$ the government implements the soft bankruptcy law because the tough law is not necessary to encourage the high effort and would only cause socially inefficient liquidation. If the effort costs are higher than $\overline{e}_M$, even the tough bankruptcy law does not encourage the high effort and again would only cause liquidation costs. The government might be interested in adopting the tough bankruptcy law to promote the high effort if effort costs lie in the interval

of $[\underline{e}_M, \overline{e}_M]$. However, this is the case only if the liquidation costs induced by the tough bankruptcy law are more than overweighed by the improvement in efficiency due to the exerted effort.

If the tough bankruptcy law is implemented, no information sharing is necessary. For the effort costs in the interval $e < \underline{e}_C$, the government does not have any incentives to implement the tough bankruptcy law in the case of competition as the high effort is exerted even under soft bankruptcy law. If competition is limited enough $(c > c_{min})$ then banks use information sharing in the case of soft bankruptcy law.

Proposition 4.4 is the central result of our analysis. We have shown that there exists a parameter space, where tougher competition is associated with information sharing. This result is driven by the government's decision on the bankruptcy law. Adopting the tough bankruptcy law the government might want to solve the moral hazard problem in the first period and to encourage high effort levels in the monopoly banking market. The introduction of the tough bankruptcy law has side effects as it solves the adverse selection problem. The solution of the adverse selection caused that monopolistic banks do not need to exchange information. In contrast, in a competitive banking market, the government does not have such strong incentives to implement a tough bankruptcy law. In the absence of the tough bankruptcy law banks have to deal with the problem of adverse selection. Banks then have incentives to share information, nevertheless only in the case when information sharing does not destroy their profits due to the increased competition.

The results are summarized in Figure 4.1. In a competitive environment, banks agree to share information only if transportation costs are high enough to ensure them sufficient profits $(c > c_{min})$. If competition becomes more intensive $(c < c_{min})$ the banks lose incentives to share information. This result is consistent with Jappelli and Pagano (1993). If the transportation costs are higher than c_M (i.e. degree of competition is lower) banks enjoy monopolistic power and the

government might want to introduce the tough bankruptcy law. If the effort costs lie in the interval $[\underline{e}_M, \overline{e}_M]$ the tough bankruptcy law then leads to an absence of information sharing in a monopolistic credit market.
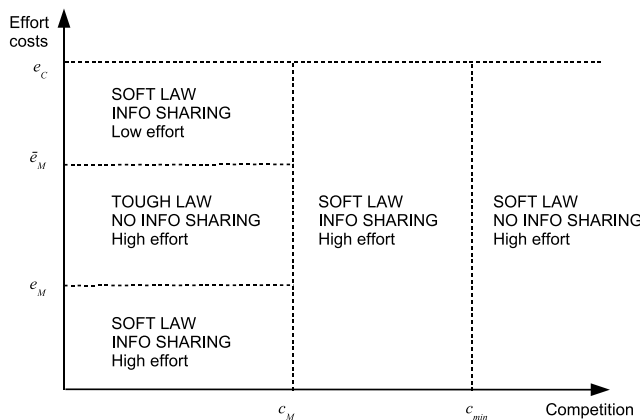

Figure 4.1: Information sharing and the bankruptcy law

4.5 Empirical evidence

Our theoretical model predicts that there exists a parameter space, where the tough competition in the credit market is associated with a higher probability of information sharing. Other theoretical models such as Jappelli and Pagano (1993), Gehrig and Stenbacka (2001) and Bouckaert and Degryse (2004) predict that more intensive competition should be associated with less information sharing. In this empirical section we would like to compare theoretical predictions with empirical evidence. We estimate a basic model analyzing the determinants of the existence of private institutions to exchange information (private bureaus).

4.5.1 Data

In our analysis we combine several databases. The final database contains data on 104 countries around the world. The data on private credit bureaus are col-

lected from the World Bank Doing Business Database.[9] The variable BUREAU COVERAGE is defined as a percentage of the adult population that is listed by the private credit bureau with current information on repayment history, unpaid debts or credit outstanding.[10] If no private bureau operates, the coverage value is zero.

In our analysis we control for the existence of the public credit registry with the variable REGISTRY COVERAGE. The variable is also reported in the World Bank Doing Business Database and measures the share of adult population covered by the public credit registry.[11]

As a proxy to measure the degree of competition on the credit market we use the variable BANK CONCENTRATION. The bank concentration is calculated as the sum of assets of three largest banks to total assets of all commercial banks in the country and is taken from the Fitch's BankScope database and are available for years 1990-2002.[12] The creditor rights index (CREDITOR) is a proxy to measure the toughness of the bankruptcy law. The index is constructed by La Porta et al. (1997). The latest results for year 2002 are reported in the study of Djankov et al. (2005). The index measures the power of secured lenders on scale from 0 (weak protection) to 4 (strong creditor protection). To control for the size of the credit market we use the measure of the share of private credit by deposit money banks to GDP (PRIVATE CREDIT).[13] Other control variables include

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[9]http://www.doingbusiness.org/ The Doing Business database provides objective measures of business regulations and their enforcement. The Doing Business indicators are comparable across 155 economies. They indicate the regulatory costs of business and can be used to analyze specific regulations that enhance or constrain investment, productivity and growth.

[10]A private credit bureau is defined as a private firm or nonprofit organization that maintains a database on the creditworthiness of borrowers (persons or businesses) in the financial system and facilitates the exchange of credit information among banks and financial institutions. Credit investigative bureaus and credit reporting firms that do not directly facilitate information exchange between financial institutions are not considered.

[11]A public credit registry is defined as a database managed by the public sector, usually by the central bank or the superintendent of banks, that collects information on the creditworthiness of borrowers (persons or businesses) in the financial system and makes it available to financial institutions.

[12]Reported at the CD-ROM Financial Structure and Economic Growth: A Cross-Country Comparison of Banks, Markets, and Development (Demirguc-Kunt, 2004).

[13]The variable is from the Fitch's BankScope database reported in Demirguc-Kunt (2004).

GDP in purchasing power parity reported in the IMF statistics World Economic Outlook and dummies for the legal system origin according to La Porta et al. (1997) reflecting 5 basic legal systems: common law (Common), French civil law (French), German civil law (German), Scandinavian law (Scandinavian) and legal system of transition countries (Transition).

4.5.2 Determinants of information sharing

We estimate a cross section for 104 countries. We run a cross section regression for explanatory variables in year 2002, however the data for the coverage of private and public registries are available only from 2004.[14]

$$BureauCoverage_i = \beta_0 + \beta_1 BankConcentration_i + \beta_2 Controls_i + \epsilon_i$$

The results for OLS estimations are reported in Table 4.1 in Appendix. In the first specification we control only for the level of GDP per capita in the country measured in purchasing power parity. In other specifications we include the toughness of creditor rights protection and other variables such as the coverage of public credit registry, size of the credit market and the legal origin of country's legal system. The coefficient by GDP has an positive sign and is statistically significant. The coverage of public credit registry is negatively correlated with the coverage of private bureau. This suggest that the public credit registry can work as a substitute for private bureaus. The higher degree of bank concentration (less competition) is correlated with a lower coverage of private credit bureau. Including the measure of bankruptcy laws does not affect the impact of the bank concentration and coefficients are statistically insignificant.

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[14]We check that the variance in private and public bureau coverage is rather small. Between years 2004 and 2005 the average coverage of private registry increased from 21.5% to 24% and coefficient of correlation is 97.5% and significant at 1% level. The correlation of the public registry coverage between years 2004 and 2005 is 90%. Therefore, we can reasonably assume that there were no large changes between years 2002 and 2004.

Clearly, there exists an endogeneity problem because of reverse causality. On the one hand, bank competition influences the decision of establishing the credit bureau. On the other hand the establishing of the credit registry leads to more intensive competition. It is difficult to disentangle the causality direction. Therefore, we use the instrumental variable approach. The instrumental variable approach provides a solution to the problem of endogeniety by using an instrument for a endogenous explanatory variable.

Our candidate for an instrument is a variable that reports bank overhead costs. The variable measures accounting value of a bank's overhead costs as a share of its total assets.[15] The instrument has to satisfied two condition: 1) The instrument is not correlated with the error term. 2) The instrument is correlated with the endogenous variable (Bank Concentration).

The first assumption of instrumental variable approach cannot be tested. The overhead costs, which measures the amount of resources used by an organization just to maintain existence, might serve as an instrument, because we can reasonably assume that the overhead costs do not influence the banks decision to set up the private credit bureau. In fact, the overhead costs might be correlated with the bank concentration. In countries with high bank concentration we observe large banks that might incur some economies of scale and their overhead costs to total assets might be lower.

To check the second assumption we test in the linear projection of bank concentration onto all the exogenous variables and the instrument (bank overhead costs). We find the coefficient linked to overhead costs is negative and statistically significant. It proves the existence of partial correlation of the instrument with the endogenous variable and suggests that the overhead costs variable is a possible instrument.

For the estimation of the instrumental variable we use a two stage least square

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[15]The variable is from the Fitch's BankScope database reported in Demirguc-Kunt (2004).

estimator, correcting for robust standard errors. The results are presented in Table 4.2 in Appendix. We find that countries with more intensive bank competition have a larger coverage of the private registry. Results show that if we include the measures for creditor protection the coefficient of bank concentration remains negative and significant. Creditor protection has the expected negative sign, however, is not statistically significant. A higher GDP per capita is associated with a higher coverage of the private registry. Assessing the legal origin dummies, we find that countries with French legal origin and countries in transition have significantly lower coverage of private registry compare to Scandinavian countries.

Empirical evidence suggests that a market with a higher degree of the bank concentration has lower private credit registry coverage. Using the instrumental variable approach we control for the impact of the information sharing on the bank concentration (banking competition). This result is coherent with our theoretical findings. Our theoretical model predicts also a substitution relationship between information sharing and creditor protection. We do not find a negative relationship between the quality of creditor protection and the extension of private credit bureaus. We do not find a significant effect of the creditor rights protection on the extent of private information sharing. This might be caused by the use of instrumental approach, the low number of observations or the fact the the creditor index is not a good proxy for variables in our theoretical model (measurement error).

4.6   Conclusions

We present a two period model with moral hazard and adverse selection where decisions on bankruptcy law and information sharing are determined endogenously. In the analysis we take into account the effect of different degrees of competition in the credit market. We find that there exists a parameter space, where information sharing is associated with more competitive markets. In this interval, the govern-

ment has incentives to implement a tough bankruptcy law to reduce the moral hazard problem in a monopoly banking environment in the first period. The side-effect of the bankruptcy law solves the adverse selection problem in the second period. In a more competitive environment, the government does not have such incentives to implement tough bankruptcy law. In the second period, banks have to solve the adverse selection problem by information sharing. Empirical evidence suggests a positive correlation between the competitiveness of credit markets and an extension of information sharing. However, we do not observe a substitution effect between information sharing and the toughness of the bankruptcy law.

4.A   Appendix

Proof Proposition 4.1

Proof. In the first period, the bank finances good and bad projects, In the second period, however, only good projects are financed, therefore the bank loses on the bad projects only once $((1-q)I)$.

$$
\begin{aligned}
\Pi_{bankH} &= q(p_h E[T_h^2] + p_h T_h^1 - 2I) - (1-q)I \\
&= q[p_h(R - \frac{e}{p_h - p_l}) + p_h(R + \frac{B}{p_h}) - 2I] - (1-q)I \quad (4.19)
\end{aligned}
$$

$$
\begin{aligned}
\Pi_{bankL} &= q(p_l E[T_l^1] + p_l T_l^1 - 2I) - (1-q)I \\
&= 2p_l qR + B - (1-q)I \quad (4.20)
\end{aligned}
$$

To realize which is the best option, we compare bank's profit in the case of high (4.19) and low effort (4.20). The profit for the high effort is larger if

$$
e > \underline{e}_M \equiv \frac{(p_h - p_l)(2(p_h - p_l)qR - B)}{p_h} \quad (4.21)
$$

In this case the monopoly bank prefers to ask for the low effort and it can extract the whole surplus of the project. $\qquad\square$

Proof Proposition 4.2

Proof. Now we compare the bank's profits from low and high effort cases.

$$
\Pi_{bankH} = q(p_h T_h^1 + p_h E[T_h^2] + 2(1-p_h)L - 2I) - (1-q)I \quad (4.22)
$$

$$
\begin{aligned}
\Pi_{bankL} &= q(p_l T_l^1) + p_l E[T_l^2] + 2(1-p_l)L - 2I) - (1-q)I \\
&= 2(p_l(R+L) - I) \quad (4.23)
\end{aligned}
$$

Taking into account the $(B = L)$ we find that the expression (4.23) is larger than the expression (4.22) if

$$e > \bar{e}_M \equiv \frac{2(p_h - p_l)^2 qR}{p_h} \tag{4.24}$$

In this case a monopoly bank prefers the manager chooses the low effort and it can extract the whole surplus of the project. □

Proof Proposition 4.3

Proof. We compare the payoffs of the firm in the case high and low effort are exerted:

$$\Pi_{Firmh} = q(p_h(R+B-T_h^1+(1-p_h)B+p_h(R+B-E[T_h^2]+(1-p_h)B)+(1-q)B-e$$

$$\Pi_{Firml} = q(p_l(R+B-T_l^1+(1-p_l)B+p_l(R+B-E[T_l^2]+(1-p_l)B)+(1-q)B$$

The high effort is exerted if $e < \underline{e}_C = 2(p_h - p_l)qR$. □

Estimated using OLS. The dependent variable is Private bureau coverage; Log(GDP-PPP) is logarithm of GDP per capita measured in purchasing power parity, BANK CONC on the banking market measured as a share of assets of three largest bank on the total sum of assets, REGISTRY COVERAGE is the variable that measures coverage of public credit registry in adult population, PRIVATE CREDIT measures private credits by deposit money banks in ration to GDP. CREDITOR is measure of creditor protection index from 1 to 4 (La Porta et al., 1997), FRENCH, GERMAN, TRANSITION, COMMON, SCANDINAVIAN are dummies indicating legal origin (La Porta et al., 1997).

Table 4.1: Estimation results : Private bureau coverage

	(OLS)	(OLS)	(OLS)	(OLS)
Constant	-101.152***	-101.990***	-81.009**	-66.755
	(24.262)	(24.296)	(39.032)	(44.182)
Bank Conc.	-19.337	-18.521	-24.924*	-24.044*
	(15.175)	(15.477)	(13.412)	(13.407)
Log(GDP - PPP)	15.626***	15.330***	15.121***	12.854***
	(2.384)	(2.469)	(2.634)	(3.741)
Creditor		1.570	2.001	1.556
		(2.322)	(2.735)	(2.748)
Private Credit				9.070
				(10.252)
Registry Coverage			-0.428**	-0.446**
			(0.201)	(0.210)
Common			-7.822	-7.763
			(25.832)	(26.213)
French			-11.422	-10.110
			(25.449)	(25.562)
German			-2.502	-4.328
			(26.569)	(27.446)
Transition			-33.416	-29.153
			(25.075)	(25.255)
Observations	104	104	104	104
R^2	0.36	0.36	0.47	0.48
F statistics:	27.37	19.16	11.24	10.38

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Estimated using IV approach. Bank overhead costs as an instrument for bank concentration. The dependent variable is Private bureau coverage; Log(GDP-PPP) logarithm of GDP per capita measured in purchasing power parity, BANKCONC on the banking market measured as a share of assets of three largest bank on the total sum of assets, REGISTRY COVERAGE is the variable that measures coverage of public credit registry in adult population, PRIVATE CREDIT measures private credits by deposit money banks in ration to GDP. CREDITOR is measure of creditor protection index from 1 to 4 (La Porta et al., 1997), FRENCH, GERMAN, TRANSITION, COMMON, SCANDINAVIAN are dummies indicating legal origin (La Porta et al., 1997).

Table 4.2: Estimation results : Private bureau coverage

	(IV)	(IV)	(IV)	(IV)
Constant	62.682	61.722	235.770	231.681
	(97.116)	(96.396)	(176.888)	(157.589)
Bank Conc.	-205.531**	-204.357**	-253.825**	-252.148**
	(101.069)	(99.820)	(120.530)	(108.399)
Log(GDP - PPP)	10.953**	11.174**	5.350	5.685
	(4.679)	(4.650)	(6.855)	(7.292)
Creditor		-0.949	-1.651	-1.572
		(4.068)	(5.185)	(5.194)
Private Credit				-1.036
				(20.108)
Registry Coverage			-0.050	-0.051
			(0.455)	(0.454)
Common			-79.629	-79.078
			(51.970)	(49.710)
French			-95.656*	-95.152*
			(55.059)	(52.685)
German			-75.450	-74.675
			(52.363)	(50.105)
Transition			-112.247**	-112.122**
			(52.715)	(52.037)
Observations	104	104	104	104
F statistics:	13.00	9.22	3.99	3.61

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%

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