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Credit markets under asymmetric information regarding the law

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ABSTRACT

This theoretical paper shows that asymmetric information regarding the law generates the same problems as the standard form of asymmetric information: credit rationing, underinvestment, and overinvestment. Collateral or personal guarantees eliminate these problems efficiently under the standard form of asymmetric information, but they are rather inefficient under asymmetric information regarding the law. It is optimal to create a centralized financial intermediary, a bank, which procures legal expertise and evaluates the legal risks on behalf of depositors who lack this legal expertise. The bank provides fundamental asset transformation services to the economy by transforming complex loans (requiring legal expertise) into simple deposits (which do not require legal expertise).

1. Introduction

This paper explores *asymmetric information regarding the law in credit markets*. The law and judicial system are assumed to be unambiguous and reliable so that the decisions are foreseeable to everyone who has legal expertise. The problem is that *legally-naive lenders* lack legal expertise. The law often provides special protection to a few debt categories. La Porta, Lopez-de-Silanes, and Shleifer (1998), for example, mention that in many countries payments to secured lenders are subordinated to payments to the government and workers, who have absolute priority. These laws may cause unexpected losses to legally-naive lenders whose loans are fully secured. In the UK, the law offers several orders of seniority between secured loans (Franks & Sussman, 2005). Payments to fixed charge security holders are, for instance, senior to the payments to lenders that have floating charge security. The latter lenders may suffer unexpected losses if they are legally-naive and assume that the floating charge security protects their investments. One legal attribute that may strongly reduce the market value of the collateral asset and thereby cause unexpected losses to legally-naive lenders is an encumbrance (Glen, 2011). In the US, the *homestead exemption* protects guarantors in most states and varies strongly among states (Gropp, Scholz, & White, 1997). The value of personal guarantee may be 1 million dollars if the guarantor lives in state A, or zero if they live in state B. The latter scenario may cause unexpected losses to lenders. Developing countries have more problems. The ownership of the collateral asset may be unclear (de Soto, 2000; Glen, 2011).[1] The law in the jurisdiction may be obscure or overly complicated (de Soto, 2000; Glen, 2011). In an informal property system, titling requirements and issues of enforceability will be based on community norms and local knowledge. An outside lender may have neither the knowledge nor ready access to peculiar local information or knowledge (de Soto, 2000; Glen, 2011). Consequently, direct investments by legally-naive lenders may lead to dramatic losses and the non-intermediated market may dry up as a result. These examples raise fundamental questions. What are the impacts of asymmetric information regarding the law in credit markets? How does it differ from the standard form of asymmetric information? How can it be eliminated?

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[1] De Soto (2000, p. 32) describes it as follows: "It is a world where the ownership of assets is difficult to trace and validate, and it is governed by no legally recognizable set of rules."

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To address these questions, we develop a theory of credit markets under asymmetric information regarding the law. The theory demonstrates how asymmetric information regarding the law may cause the same problems as the standard form of asymmetric information: credit rationing, underinvestment or overinvestment. To eliminate these problems, we investigate methods that alleviate the standard form of asymmetric information efficiently: inside collateral, outside collateral, and personal guarantees. These methods prove to be rather ineffective under asymmetric information regarding the law. The paper goes on to consider other solutions to these problems. The findings reveal how financial intermediaries, which have legal expertise, and designed security contracts will endogenously arise as to a response to the information problems.

Put differently, the purpose of this paper is to construct a model of credit that is consistent with the examples and evidence reported above, e.g. de Soto (2000) and Glen (2011). More precisely, de Soto (2000) focuses on developing countries and Glen (2011) is primarily interested in foreign direct investments in real estate. They provide seminal evidence on the legal risks and information problems. Our main contribution to this literature is to utilize their evidence and design a model that analyzes carefully the consequences of asymmetric information regarding the law using the traditional theory of banking. Most of all we will examine alternative methods to mitigate information problems in credit markets and the role of financial intermediaries in this context.

We examine these issues in two models. In the first one, the law provides special protection to a few debt categories (e.g. Hilson, 2013; La Porta et al. 1998). We label them as *senior debts*. Maybe the most common example is that wage and tax payments in many countries are senior to repayments on secured and unsecured loans. The number of specially protected debt categories may be large (Hilson, 2013). Now, asymmetric information regarding the law implies that legally-naive lenders have no knowledge as to whether a borrower has this kind of senior debts. Even if they can contact the borrower and observe their liabilities, these lenders have no knowledge as to whether the existing debt represents senior debt because they lack sufficient legal expertise. Therefore, the borrower's other liabilities can become a risk to legally-naive lenders. This risk may generate the same kind of credit rationing equilibrium as in the classic article by Stiglitz and Weiss (1981). Overinvesting and underinvesting are possible. In the second model, the standard form of asymmetric information and asymmetric information regarding the law are present at the same time.

The paper introduces several incidents of asymmetric information regarding the law. Under these circumstances legally-naive lenders are unwilling to invest directly in firms because they cannot evaluate the legal risks. A lender can develop their legal expertise. However, if each lender endeavors to qualify, the total costs of qualification multiply. To prevent useless multiplication, it is optimal to found one centralized financial intermediary, a bank, which builds up its legal expertise and evaluates the legal risks on behalf of legally-naive lenders (depositors). The bank advances a groundbreaking *asset transformation* service to the economy by transforming complex loans (financial securities requiring legal expertise) into simple deposits (financial securities that do not require legal expertise). By investing in deposits, legally-naive lenders can protect themselves.

The present paper touches on many strands of banking theory. First, the paper builds on research conducted on *credit rationing*: e.g. Jaffee and Russell (1976), Stiglitz and Weiss (1981), Gale and Hellwig (1985), Besanko and Thakor (1987) and Winton (1995). The contribution of this paper is to show that credit rationing is more common than the traditional theory suggests. This theory rests on asymmetric information on the borrower's assets; that is, project types (e.g. Stiglitz & Weiss, 1981; Besanko & Thakor, 1987). The novelty of our analysis is that asymmetric information regarding the law causes credit rationing under a fixed, commonly known project type and observable output. Now, lenders do not know the borrower's other liabilities and that generates risks.

Second, researchers have made significant progress in understanding *financial intermediation*: e.g. Diamond (1984), Ramakrishan and Tahkor (1984), Gale and Hellwig (1985), Calomiris and Kahn (1991), Winton (1995, 1997), von Thadden (1995, 2004), Boot and Thakor (1997, 2000), Hellwig (2000, 2001), Coval and Thakor (2005), Merton and Thakor (2018) and Donaldson, Piacentino, and Thakor (2018). In this theory, banks operate as financial intermediaries and *delegated monitors* on behalf of the depositors. In our paper, banks operate as financial intermediaries and *delegated legal experts* on behalf of the depositors. Consequently, the paper proposes a new explanation for the existence of financial intermediaries in the economy.

The theory of financial intermediation emphasizes the banks' role in information acquisition under the standard form of asymmetric information. This role is unnecessary under secured lending. The lender observes the value of the collateral asset and can make a risk-free loan directly to the borrower without bank intermediation.

In reality, banks favor fully secured loans (e.g. Koch & MacDonald, 2014, p. 533). In their study on small firms in the US, Steijvers, Voordeckers, and Vanhoof (2010) find that 86.5% of the bank loans have collateral. Binks et al. (1988) report that, for 85% of UK business loans, the ratio of collateral provided to the size of the loan exceeds unity. As to small firms and their bank loans in France, Davydenko and Franks (2008) discover that at default the value of the collateral and guarantees as a percentage of exposure is 124%. These observations challenge the traditional theories of financial intermediation. If monitoring is the main function of banks, why do banks grant mostly secured loans? Why do depositors not make secured loans directly to borrowers without bank intermediation? This is realistic according to the traditional theories because full collateral eliminates the standard form of asymmetric information, makes the loan risk free, and thereby removes the need of bank monitoring. Asymmetric information regarding the law suggests one explanation: the law may make loan collateral or personal guarantee valueless (risky). Banks are needed to evaluate and eliminate asymmetric information regarding the law. That is, banks are needed to mitigate the legal risks in secured lending. Consequently, banks advance essential financial intermediation services to the economy even if they grant only fully secured loans.

Third, the paper is related to empirical research conducted on *law and finance*: e.g. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997), La Porta et al. (1998), Gropp et al. (1997), Franks and Sussman (2005), Davydenko and Franks (2008), Che and Spier (2008), and Calomiris, Larrain, Liberti, and Sturgess (2017). Our theoretical paper utilizes this empirical evidence and develops a model in which the law causes risks to a lender that lacks legal expertise. The legally-naive lender cannot evaluate the credit risk accurately, even if they know the distribution of the project output, because the law has an important impact on the allocation of the output.

Finally, the paper contributes to the research conducted on *collateral*: e.g. Besanko and Thakor (1987), Boot, Thakor, and Udell

(1991), Rajan and Winton (1995), Manove, Padilla, and Pagano (2001), Udell (2004), Franks and Sussman (2005), Davydenko and Franks (2008), Steijvers et al. (2010), Love, Peria, and Sandeep (2016), and Calomiris et al. (2017). Our main contribution to this literature is to construct a theoretical model in which the law has a strong effect on the value of collateral. A fully secured loan is risky even if the value of the collateral asset is fixed and observable.

The paper proceeds as follows. Section 2 shows that credit rationing may be optimal if the law provides special protection to a few debt categories. In Section 3, a financial intermediary, a bank, arises to eliminate asymmetric information regarding the law and Section 4 draws conclusions.

2. Credit rationing

This section studies an economy in which the law provides special protection to a few debt categories. The study reveals that credit rationing, underinvestment and overinvestment problems may occur and that these problems cannot be eliminated using inside collateral (business assets). In detail, in the case of a bankruptcy, payments on specially protected debt categories are senior to payments on unsecured loans and secured loans. In these circumstances, we examine the lending decision of *a legally-naive lender* who lacks legal expertise. Even if they observe that a loan applicant has an existing loan that belongs to debt category Z, they do not know whether Z represents specially protected debt. To shed light on these kinds of debts, we review a few examples. In bankruptcy procedures, lenders are compensated according to priority rules. Tirole (2006, p. 87) documents:

> For example, in the United States, (1) administrative expenses of the bankruptcy process are paid first, then come (2) unpaid taxes or debts to government agencies (e.g. the Pension Benefit Guarantee Corporation), (3) some wage claims (up to some ceiling), (4) secured and senior creditors, (5) junior creditors, (6) preferred shares, and, at last (7) equity holders.

Hilson (2013, p. 11–12) reports more evidence from the US:

> Nowhere in the course of structuring and documenting an asset-based transaction is it more important to know your borrowers than in analyzing and anticipating the risks of competing liens or claims. It is not enough to craft a set of documents that will grant the investor an apparent first perfected lien or security interest in the desired collateral if some other creditor can come in and displace the investor from its first position when the borrower experiences financial difficulty. …there are so many statutory provisions that have been enacted by the various states and the federal government to protect selected classes of creditors at the expense of other classes. Farmers, cattle ranchers, potato growers, stevedores, construction traders, and movie labs are a few of the lucky businesses and industries that have been favored by legislative action and have been granted special liens with varying degrees of muscle when competing with other more traditional liens.

In addition, Hilson (2013) lists the common cases in which a lender will find its security interest junior to the security interest of the other party: collateral is transferred from another jurisdiction, nonfiling perfection (possession), a collateral asset may have a previous owner and a previous lien, purchase money obligation, etc.[2] In sum, Tirole (2006) and Hilson (2013) document several scenarios in which the law provides special protection to numerous debt categories and thereby has a dramatic influence on the allocation of loan repayments. We label these debt categories *senior debts*. In the model, a firm (borrower) retains this kind of senior debt or normal debt from the previous period. A legally-naive lender grants a new loan (secured or unsecured) to a firm. Since they do not know whether the firm retains senior debt (asymmetric information regarding the law), the old debt of the firm causes a risk to them.

(i) If the firm retains old senior debt, the repayments on the lender's new loan are junior to the old senior debt. The lender receives a small repayment (if any) if the project is unsuccessful and the firm fails.
(ii) If the firm inherits old normal debt, the lender that makes a new loan receives a substantial repayment if the project is unsuccessful and the firm fails.

We label type (i) borrowers high-risk firms and type (ii) borrowers low-risk firms. The names describe borrowers from the lender's point of view. We will contrast asymmetric information regarding the law with the standard form of asymmetric information. Therefore, it is necessary to make the following definition.

Definition (Standard form of asymmetric information): *Under the standard form of asymmetric information in finance, the distribution of project output varies among projects. A risky project may, for example, succeed with a small probability, but then produce a large output, whereas a safe project is successful with a high probability producing a relatively low output. The project type may be given and varies between borrowers (adverse selection) or a borrower may choose the project type (asset substitution) or implicitly influence the distribution of output through the choice of effort (effort aversion).*

Under asymmetric information regarding the law, only one project type exists and is commonly known. However, the allocation of the realized project output is affected by the law that is not commonly known. Given the status of the Stiglitz and Weiss (1981) model, we aim to model the information problem in the same way. This makes it easy to compare the findings. Subsection 2.1 sketches the economy. In Subsection 2.2, a legally-naive lender grants an unsecured loan and a credit rationing equilibrium occurs. In Subsection 2.3, they make a secured loan and credit rationing is again optimal. Subsection 2.4 surveys more evidence.

[2] Hilson's comprehensive 1200 page book cites numerous examples of this kind of legislation. We can give only a few scenarios here.

2.1. Economy

Consider a risk-neutral economy with borrowers (firms) and legally-naive lenders. Everyone maximizes their expected return and firms are protected by limited liability. Firms are run by wealth-constrained owner-mangers who must raise outside funds to cover the investment input. The model has one period. However, the firms retain ongoing investment projects from the previous period. The projects are funded by existing old debt (senior or normal) and a new loan from a lender. We begin by describing the characteristics of the projects and turn to funding options and interest rates.

Projects: Each firm has a similar project. It requires $\frac{1}{2}$ units of new input at the start of the current period, whereas $\frac{1}{2}$ units of input have been invested in the previous period. The output materializes at the end of the period. With probability p the project is successful and has value Y_H. With probability $1-p$, it is unsuccessful and has the value Y_L, $Y_L < 1 < Y_H$. Here, Y_L consists of factory buildings, land, and equipment that represent collateral assets, whereas Y_H-Y_L denotes the production output. A project has positive NPV: $pY_H + (1-p)Y_L > 1$.

Lenders: Each lender is endowed with $\frac{1}{2}$ capital units and is ready to finance a project by granting a new loan for a period. Alternatively, they can store the endowment at no cost.

Liabilities and asymmetric information: Each firm inherits $\frac{1}{2}$ units of old debt from the previous period. Share $1-s$ of the firms are *low-risk firms* and retain $\frac{1}{2}$ units of old normal debt. Share s of the firms are *high-risk firms*, which inherit $\frac{1}{2}$ units of old senior debt. Both firm types contact lenders to raise $\frac{1}{2}$ units of new loans. The firm type (low-risk, high-risk) is unobservable to the lenders. They do not know whether the firm has old senior debt.

Loan interests: Let r_S denote the fixed loan interest of an old senior debt. It is possible that r_S is specified by law if the senior debt consists of unpaid taxes or pension payments. The following assumption shortens and simplifies the analysis:

Assumption 1. *Senior debt is risk free:* $\frac{1}{2}r_S < Y_L$.

The interest rate of old normal debt is r_n. Since old senior debt is risk free and old normal debt risky, we have $r_S < r_n$. Moreover, r refers to the interest of new loans that are granted by legally-naive lenders in the current period. They aim to set r so that their expected interest income is maximal.[3]

Time line: Firms and lenders contact and lenders grant loans. Firms invest the capital. At the end of the period, the projects mature and financial claims are settled.

2.2. Credit rationing under unsecured lending

In this subsection, lenders' new loans are unsecured. If a lender grants a new loan to a low-risk firm and the project fails, the output, Y_L, is shared equally between the new loan and the old normal loan. If the lender grants a new loan to a high-risk firm and the project fails, the output is allocated mostly to cover repayments on the senior old debt, $\frac{1}{2}r_S$, and the new lender receives $Y_L-\frac{1}{2}r_S$. The lender aims to raise the interest of a new loan, r. Firms are profitable if r is sufficiently low. We make the following definition on the maximal loan interests for the low-risk and high-risk firms.

Definition 1. *We define two loan interest rates,* r_1 *and* r_2*, which meet:* $\frac{1}{2}r_1 = Y_H-\frac{1}{2}r_n$ *and* $\frac{1}{2}r_2 = Y_H-\frac{1}{2}r_S$*. These imply* $r_2 > r_1$.

The value of the output is the same in both firm types, but low-risk firms pay more interest on old debt than high-risk firms because old normal debt is more expensive than old senior debt, $r_n > r_S$. As a result, low-risk firms cannot pay as much interest on new loans as high-risk firms. In definition 1, $r = r_1$ ($r = r_2$) indicates the maximal interest on new loans for low-risk (high-risk) firms, $r_2 > r_1$. If the interest on new loans r is at most r_1, both firm types apply for loans. If $r_1 < r \leqslant r_2$, low-risk firms are unprofitable and withdraw from the credit market, but high-risk firms seek loans. If $r > r_2$ no firm seeks a loan. Lemma 1 follows.

Lemma 1. *If the interest of new loans,* r*, rises a bit over* r_1*, the lender's expected return drops.*

Proof. At $r = r_1$ both firm types apply for loans and the lender's expected return is

$$\pi_i(r_1) = p\frac{1}{2}r_1 + (1-p)s(Y_L-\frac{1}{2}r_S) + (1-p)(1-s)\frac{1}{2}Y_L \tag{2.1}$$

The first term on the R.H.S. is the expected repayment from a successful project. The second (third) term indicates the expected repayment from an unsuccessful project of a high-risk (low-risk) firm. If $r = r_1 + \varepsilon$ only high-risk firms apply for loans and the lender's expected return is

$$\pi_i(r_1 + \varepsilon) = p\frac{1}{2}(r_1 + \varepsilon) + (1-p)(Y_L-\frac{1}{2}r_S). \tag{2.2}$$

The first (second) term on the R.H.S. is a repayment from a successful (unsuccessful) project. When loan interest rises from r_1 to $r_1 + \varepsilon$, the change in the lender's expected return is $\pi_i(r_1 + \varepsilon)-\pi_i(r_1)$ or $p\frac{1}{2}\varepsilon + \frac{1}{2}(1-p)(1-s)(Y_L-r_S)$. Here, the second term is negative. The first term is positive but approaches zero when ε approaches zero. Thus, $\pi_i(r_1 + \varepsilon) - \pi_i(r_1)$ is negative. *Q.E.D.*

Intuitively, if r rises a bit over r_1, low-risk firms withdraw from the credit market due to relatively large costs of borrowing and only high-risk firms apply for loans. Both firm types pay the same interest to the lender, r, when the project is successful. If it is unsuccessful, the lender receives a smaller repayment from a high-risk firm than from a low-risk firm, $Y_L-\frac{1}{2}r_S < \frac{1}{2}Y_L$. Thus, if r rises a

[3] We examine only standard debt, which is derived as the optimal financial contract between borrowers and lenders in Diamond (1984) and Gale and Hellwig (1985). See also Hellwig (2000, 2001).

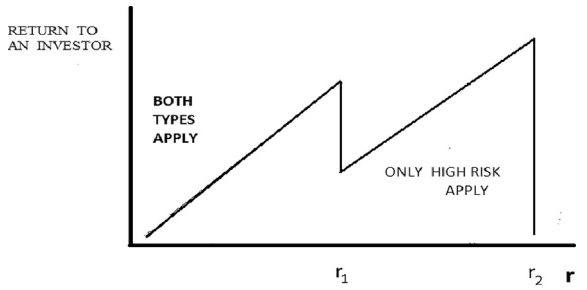

Fig. 1. The second local maximum is the global maximum.

bit over r_1, the lender's expected repayment from an unsuccessful project drops because the low-risk firms withdraw from the credit market. Therefore, the lender's expected return from the loan decreases if r rises a bit over r_1. This is an adverse selection effect. In sum (Fig. 1), if $r \leqslant r_1$ the lender's expected return increases with r. If r rises a bit over r_1, the adverse selection effect occurs and the expected return drops. If $r_1 < r \leqslant r_2$ the expected return increases with r. Hence, either r_1 or r_2 maximizes the lender's expected return. We get the following result.

Proposition 1. *Under unsecured lending either loan interest r_1 or r_2 maximizes the lender's expected return. If p and s are small, r_1 maximizes the expected return. If p and s are large, r_2 maximizes the expected return. Thus, credit rationing may be optimal.*

Proof. If $r = r_1$, the expected return $\pi_i(r_1)$ can be seen from (2.1). If $r = r_2$, the expected return is $\pi_i(r_2) = p\frac{1}{2}r_2 + (1-p)(Y_L - \frac{1}{2}r_S)$. Now $\pi_i(r_2) - \pi_i(r_1)$ is $\frac{1}{2}p(r_2 - r_1) + \frac{1}{2}(1-p)(1-s)(Y_L - r_S)$. The first term is positive and the second is negative. Hence, $\pi_i(r_2) - \pi_i(r_1)$ increases with p and s. If p is large (small) enough, $\pi_i(r_2) - \pi_i(r_1)$ is positive (negative) and $r = r_2$ ($r = r_1$) maximizes the expected return. *Q.E.D.*

Intuitively, an unsuccessful project of a high-risk firm yields a minimal repayment to the lender. This risk is insignificant if the probability of success, p, approaches 1. Then, the lender does not make a desperate attempt to avoid high-risk firms. That is, if p is sufficient, the lender favors interest r_2 to r_1, even if r_2 attracts only high-risk firms. As for s, although r_1 attracts both firm types, this advantage is quite insignificant if the share of high-risk firms is large in the economy; that is, s is large. Assume that 99% of the borrowers are high-risk firms: $s = 0.99$. If the lender charges interest r_1, both firm types seek loans and 99% of borrowers are high risk. If they charge r_2, only high-risk firms seek loans and 100% of borrowers are high risk. The difference in the share of high-risk borrowers, 100% − 99% = 1%, is likely to be so small that the lender prefers r_2 to r_1 even if r_2 attracts only high-risk firms. Suppose that $s = 0.05$. If the lender charges r_1, 5% of the borrowers are high risk. If they charge r_2, 100% of borrowers are high risk. The difference in the share of high-risk firms, 100% − 5% = 95%, is so large that the lender may prefer r_1 to r_2. Therefore, if s increases, r_2 becomes relatively more profitable. We can illustrate credit rationing graphically hereunder.

When $r \leqslant r_1$ in Fig. 1 both low-risk firms (having normal old debt) and high-risk firms (having senior old debt) seek loans. When r is raised slightly above r_1, the mix of borrowers changes substantially: low-risk firms become unprofitable and withdraw. Fig. 1 resembles Stiglitz and Weiss (1981, p. 397). The models have the following differences.

(i) In Stiglitz and Weiss (1981, p. 397), firms have different projects. A safe (risky) project succeeds with probability p_1 (p_2), $p_1 > p_2$. A successful safe (risky) project yields r_1 (r_2), $r_2 > r_1$. An unsuccessful project has no value. When the loan interest is raised slightly above r_1, the mix of borrowers changes substantially: safe projects become unprofitable and only firms with risky projects apply for loans.

(ii) Our model has only one project type. It succeeds with probability p producing Y_H and fails with probability $1-p$ producing Y_L. Now an unsuccessful project has a positive value and a firm has two lenders (new debt, old debt). The type of the old debt (senior or normal) is unknown and generates a risk to the lender who grants a new loan.

Finally, assume $p\frac{1}{2}r_1 + (1-p)\frac{1}{2}Y_L > \frac{1}{2}$, a new loan to a low-risk firm has positive NPV, and that $\frac{1}{2} > \pi_i(r_2) = p\frac{1}{2}r_2 + (1-p)(Y_L - \frac{1}{2}r_S)$, a new loan to a high-risk firm has a negative NPV. Now r_1 is the maximal interest because r_2 attracts only high-risk firms which are unprofitable borrowers. Lenders charge interest r_1, which attracts both firm types, or they do not grant loans. If r_1 yields non-negative expected returns to lenders, both firm types seek loans and receive loans. An *overinvestment* problem appears because under perfect information lenders do not finance high-risk firms. If r_1 yields negative expected returns, lenders do not grant loans. Asymmetric information regarding the law destroys the credit market. Now an *underinvestment* problem occurs, since under perfect information lenders finance low-risk firms.[4]

[4] Assume $Y_H = 1.2$, $Y_L = 0.8$, $p = 0.6$, $r_S = 1.14$, $r_n = 1.18$. This implies $r_1 = 1.22$, $r_2 = 1.26$. A project has positive NPV: $p\,1.2 + (1-p)0.8 = 1.04$ because $p = 0.6$. A new loan to a low-risk firm is profitable: $p\frac{1}{2}r_1 + (1-p)\frac{1}{2}Y_L \geqslant \frac{1}{2}$, because $0.526 > 0.5$. A new loan to a high-risk firm is unprofitable: $0.5 > \pi_i(r_2)$, because $0.5 > 0.47$. The lender charges r_1 or they do not lend at all. Given (2.1), r_1 attracts both firm types and yields expected return $0.526 - s \times 0.068$. If s is small enough, we have $0.526 - s \times 0.068 > 0.5$; the lender grants a loan to everyone and the *overinvestment* problem occurs, because a high-risk firm gets a loan. If s is large enough, we have $0.526 - s \times 0.068 < 0.5$: the lender does not grant loans and the *underinvestment* problem occurs because a low-risk firm cannot borrow.

2.3. Credit rationing under secured lending

Subsection 2.2 showed how asymmetric information regarding the law may cause credit rationing if the new loan is unsecured. This subsection achieves the same result when the new loan is secured. The economy is the same as in Subsection 2.2. A borrower retains an old debt from the previous period. With probability $1-s$ the borrower is a low-risk firm which inherits old normal debt with interest r_n. With probability s the borrower is a high-risk firm which has old senior debt with interest r_s. A lender aims to find out interest r, which maximizes their expected return from a new loan that is secured by business assets Y_L (inside collateral). If the borrower is a low-risk firm, the lender receives most of the proceeds in the bankruptcy, $\min(Y_L,\frac{1}{2}r)$. If the borrower is a high-risk firm with senior old debt, the lender receives only $Y_L-\frac{1}{2}r_S$ in the bankruptcy (recall Assumption 1). Importantly, secured loans are prioritized after old senior debt in the bankruptcy! As in Definition 1, $r = r_1$ ($r = r_2$) is the maximal interest on a new loan when the borrower is a low-risk (high-risk) firm. If $r \leqslant r_1$, both firm types seek loans. If $r_1 < r \leqslant r_2$, only high-risk firms seek loans. When $r \leqslant r_1$ the lender's expected return increases with r and when $r = r_1$ it is

$$\Pi(r_1) = p\frac{1}{2}r_1 + (1-p)(1-s)\min(\frac{1}{2}r_1,Y_L) + (1-p)s(Y_L-\frac{1}{2}r_S). \tag{2.3}$$

On the R.H.S., the first term is the repayment from a successful loan. The second (third) term shows the repayment from an unsuccessful loan when the borrower is a low-risk (high-risk) firm. If $r = r_1 + \varepsilon$, the lender's expected return can be observed in (2.2). We obtain the following result.

Lemma 2. *If the interest of new loans, r, rises a bit over r_1, the lender's expected return drops.*

Proof. Now (2.2) and (2.3) give $\pi(r_1 + \varepsilon)-\Pi(r_1) = \frac{1}{2}p\varepsilon + (1-p)(1-s)[Y_L-\frac{1}{2}r_S-\min(\frac{1}{2}r_1,Y_L)]$. On the R.H.S., the second term is negative and the first approaches zero. This gives $\pi(r_1 + \varepsilon) < \Pi(r_1)$. Q.E.D.

If $r_1 < r \leqslant r_2$, the lender's expected return increases with r and if $r = r_2$ it is $\pi_i(r_2) = p\frac{1}{2}r_2 + (1-p)(Y_L-\frac{1}{2}r_S)$. Either r_1 or r_2 maximizes the expected return.

Proposition 2. *Under secured lending interest r_1 or r_2 maximizes the lender's expected return. If p is small (large), r_1 (r_2) maximizes the expected return. If s is small (large), r_1 (r_2) becomes relatively more profitable. Thus, credit rationing may be optimal.*

Proof. Now we have $\pi_i(r_2)-\Pi_i(r_1) = \frac{1}{2}p(r_2-r_1) + (1-p)(1-s)[Y_L-\frac{1}{2}r_S-\min(\frac{1}{2}r_1,Y_L)]$. On the R.H.S., the first term is positive and the second is negative. If p is large (small) enough, the R.H.S. is positive (negative) and r_2 (r_1) maximizes the expected return. The R.H.S. increases with s. If s rises, r_2 becomes relatively more profitable. Q.E.D.

The intuition is the same as in Proposition 1. Underinvestment and overinvestment are possible.[5]

Consequently, credit rationing is possible under secured lending if lenders lack legal expertise. Besanko and Thakor (1987) make a bit similar finding under the standard form of asymmetric information. Insufficient borrower wealth endowments may result in some loan applicants facing a nonzero fractional probability of being denied credit. Put differently, when the collateral constraint is binding (limited collateral), lenders cannot sort borrowers based on their collateral choices alone. The threat of rationing is an effective sorting device in this case. Besanko and Thakor (1987) focus on outside collateral, whereas we explore inside collateral.

2.4. Evidence

This subsection offers more evidence and examples in which the law provides special protection to a few debt categories. To begin, La Porta et al. (1998) examine the legal rules covering creditor rights and find that many laws reduce these rights. Some countries do not, for instance, assure the secured lenders the right to collateral in the case of reorganization. In 19% of the countries studied by these authors, secured lenders are subordinated to the government and workers, who have absolute priority. In these countries, a lender who lacks legal expertise may suffer unexpected losses even if they grant fully secured loans.

Franks and Sussman (2005, p. 71–73) shed light on the order of seniority in the U.K. A *fixed charge* is a security on a specific asset such as real estate or heavy machinery. A *floating charge* is a security that may be extended to cover the whole pool of a company's assets. Trade creditors can incorporate a *retention of title* clause into the sale contract that allows them to reclaim – in the bankruptcy – any goods supplied on credit. Wage arrears and debts owed to tax authorities (*preferential creditors*) are senior to the floating charge. In sum, titles of specific assets (a fixed charge or retention charge) are the most senior. Of the remaining pool of assets, the preferential creditors come first, then the floating charge holder and finally the unsecured creditors. Thus, a lender may suffer significant losses even if they have a floating charge security. These losses may be a surprise to a lender who lacks legal expertise.

Che and Spier (2008) focus on the tort victims of firms. Consider a firm with a riskless cash flow. However, there is a risk that the business activity of the firm will cause damages to outsiders. A taxi driver may, for example, cause a traffic accident. Consider two alternative laws. First, payments to tort victims have priority over payments to the firm's lenders. Second, debt is senior to the tort claims. The first law may cause unexpected losses to a lender who lacks legal expertise.

Love et al. (2016) find evidence that the introduction of collateral registries for moveable assets improves borrowers' access to financing. The registry notifies parties about the existence of a security claim and establishes the priority of the lenders. The findings

[5] Recall the economy of footnote 3: a project has positive NPV, a new loan to a high-risk firm is unprofitable and interest r_2 is unprofitable. A new loan to a low-risk firm is profitable, $\frac{1}{2}pr_1 + (1-p)\min(Y_L,\frac{1}{2}r_1) > \frac{1}{2}$, because $0.61 > 0.5$. The lender charges r_1 or withdraws from the credit market. Now (2.3) shows that r_1 attracts both firm types and yields an expected return of $0.61-0.152s$. If s is sufficiently small, the expected return is positive, $0.61-0.152s > 0.5$. The lender grants a loan to everyone and the *overinvestment* problem occurs because a high-risk firm can borrow. If s is sufficiently large, the expected return is negative, $0.61-0.152s < 0.5$. The lender does not make loans and the *underinvestment* problem occurs, since a low-risk firm cannot borrow.

support our results. In the absence of the registry, a lender does not know whether their loan is junior or senior to the borrower's other debts, and this lack of information causes credit rationing and underinvestment.

In sum, Section 2 investigates how asymmetric information regarding the law influences the credit market. Credit rationing, overinvestment, or underinvestment may appear under unsecured lending (Proposition 1) and under secured lending (Proposition 2). Therefore, inside collateral does not eliminate these negative effects.

3. Financial intermediary

In section 2, asymmetric information regarding the law causes credit rationing, underinvestment, and overinvestment problems. It is possible to demonstrate how these problems can be eliminated by founding a financial intermediary that develops legal expertise and utilizes it in numerous loan contracts. However, in the economy of Section 2 the role of the intermediary would be almost identical as in the traditional banking theory (e.g. Ramakrishan & Tahkor, 1984). Therefore, we examine the role of the intermediary in an alternative model. Most of all, we want to find out whether asymmetric information regarding the law can be eliminated using outside collateral (personal assets). To study this, we redesigned the model so that both the standard form of asymmetric information and asymmetric information regarding the law coexist. Outside collateral proves to be effective under the standard form of asymmetric information but rather ineffective under asymmetric information regarding the law. Due to the inefficiency of this instrument, a bank arises endogenously to operate as financial intermediaries and as delegated legal experts. The section achieves these results step by step. Subsection 3.1 characterizes an economy. In Subsection 3.2, the standard form of asymmetric information appears but asymmetric information regarding the law is not present. Outside collateral eliminates the information problems. In Subsection 3.3, asymmetric information regarding the law is also present and destroys the credit market. Now, outside collateral is ineffective. In Subsection 3.4, both information problems coexist and a financial intermediary arises to eliminate them. Finally, Subsection 3.5 explores personal guarantees.

3.1. Standard form of asymmetric information

Consider a risk-neutral economy in which the gross interest rate is 1. The economy has N firms (borrowers), where N approaches infinity, and relatively large number of potential lenders. A firm is owned by an entrepreneur. A firm maximizes its expected return, is protected by limited liability, and can undertake a project. A project requires a unit of investment capital at the start of the period and the output materializes at the end of the period. Since entrepreneurs have no investment capital, they contact lenders. Each lender has a unit of capital and can finance the whole project. Firms have market power in the loan negotiations and thus loan interest decreases to the lenders' breakeven level. The model has one period and firms do not retain old debt. Neither does the law provide special protection to any debt categories.

A successful project produces Y units and an unsuccessful project has no value. Two firm types exist. A project of a good firm succeeds with probability t_G and a project of a bad firm with probability t_B. The NPV of a good firm's project is positive, $t_G Y > 1$, and a bad project has negative NPV, $t_B Y < 1$. The project returns are independent across firms. Under perfect information lenders finance only good firms. However, the standard form of asymmetric information is assumed to appear: the firm type is unobservable to outsiders. The share of good firms in the economy, α,is assumed to be so low that lending is unprofitable in the absence of information on firm types:

$$\alpha t_G Y + (1-\alpha) t_B Y < 1. \tag{2.4}$$

Therefore, the standard form of asymmetric information destroys the credit market.

3.2. Outside collateral eliminates the standard problem of asymmetric information

Next, outside collateral eliminates the standard form of asymmetric information that destroys the credit market (recall Subsection 3.1). Asymmetric information regarding the law is not present. We make two assumptions.

Assumption 2*. It is impossible to separate good and bad loan applicants by monitoring them.*

Assumption 3. *An entrepreneur has sufficiently personal assets so that their value covers the repayment of the business loan.*

Since monitoring is ineffective, an entrepreneur must pledge their personal assets as outside collateral for the business loan of their firm. Collateral has a positive selection effect. Since the projects of bad firms have negative NPV, these firms do not seek secured loans. Only good firms whose projects have positive NPV seek secured loans. Therefore, the standard form of asymmetric information disappears. Since collateral makes loans risk free, lenders can make loans directly to firms and there is no need for banks.

3.3. Both forms of asymmetric information coexist

In Subsections 3.1 and 3.2, the standard form of asymmetric information appears and only secured lending is profitable. In this subsection, asymmetric information regarding the law is also present and generates mistakes in collateralization processes. First, we give examples of it. Then, we construct a model in which asymmetric information regarding the law destroys the credit market.

The legalities governing the collateralization process are often obscure or overly complicated. Therefore, a legally-naive lender may make a mistake in the collateralization process and the collateralization is not legally binding. As to the complexity of the collateralization, Udell (2004, p. 226) describes it in the US as follows:

The relative rights of creditors with competing liens to the same collateral are referred to as their priority. Priority is established by perfection. *Perfection* is a method by which a secured creditor puts the world on notice of its interest in the collateral and establishes the priority of its claim to the collateral, as against other secured creditors and anyone else claiming an interest in the collateral.

There exists a variety of detailed methods of perfection, depending upon the category of the collateral. Udell lists over ten different categories! Udell (2004, p. 227) goes on to comment:

Also, the rules for perfecting a security interest may vary, depending on the category of collateral. If the wrong category is selected, the wrong method of perfection may be used, with the result that the security interest will be unperformed.

Shouls and Chance (2003, p. 47) also stress the complexity of the collateralization processes:

Perfection of a security interest is often a rather complex matter …. Examples of the steps necessary, in different jurisdictions, to perfect a security interest include registration or filing of details of the charge with a public official or a public register; notarization of the document pursuant to which the security interest is created; segregating the collateral assets in a special collateral account; notification to other relevant party/ies; and taking possession of the collateral. Which, if any, of these steps will be necessary to perfect a security interest will depend on the type and location of the assets and the type and location of the counterparty. In some jurisdictions creation and perfection steps may be needed not just at the outset when collateral is first posted; they may also need to be repeated on the posting of additional or top-up collateral, or on the substitution of collateral.

Fleisig, Safavian, and de la Pena (2006, p. 23) survey worldwide evidence and report their findings as follows:

Many legal systems place needless restrictions on creating security interests excluding economically important property, agents and transactions. Where such gaps exist, lenders cannot be sure that a secured transaction, such as a loan agreement using collateral (a security agreement), will be lawful and that a court will enforce it. Special statutes authorizing the creation of security interests in moveable property may restrict the parties able to undertake the transaction, the nature of the transaction, and the type of the property that can serve as collateral. Under this fragmented approach a law may have limited application: Some laws may apply to banks, registered businesses, consumers, microentrepreneurs, or farmers. Some may apply only to pledges, leases, mortgages, trust agreements, or sales with retention of title. And some may apply only to cattle or mining equipment. The end result is that some loans cannot be secured with moveable property, some property cannot secure a loan, and some borrowers and lenders cannot use some types of instruments or give or take a security interest in some types of property.

Glen (2011), de Soto (2000), and Hilson (2013) document numerous examples of complex rules and difficulties in collateralization processes. Consequently, in the absence of professional legal expertise a lender faces the risk of making a mistake in the collateralization process so that the collateralization is not legally binding. As a result, their secured loan is in fact unsecured. We assume a legally-naive lender makes this kind of mistake with probability β. Therefore, if the entrepreneur pledges their personal assets as collateral, the security interest will be unperformed with probability β. This risk makes secured lending unprofitable:

$$(1-\beta)\alpha R + \beta[(\alpha t_G + (1-\alpha)t_B]R < (1-\beta)\alpha + \beta, \quad when\ R = t_H Y. \tag{2.5}$$

L.H.S. shows the expected loan repayments. A borrower knows whether the collateralization of their loan is legally binding. As a result, those bad firms whose collateralization is legally binding abandon the loan offer because their projects have negative NPV. The first term on the L.H.S. denotes repayment from a good firm whose collateralization is legally binding. If it is not legally binding, good and bad firms apply for loans (the second term on the L.H.S.). The R.H.S. indicates the volume of lending. A legally-naive lender correctly anticipates their risk to make a mistake β and knows that lending is unprofitable. That is, the R.H.S. exceeds the L.H.S. If loan interest rises over the critical level, only the firms whose collateralizations are not legally binding apply for loans and lending is unprofitable.

Consequently, asymmetric information regarding the law destroys the credit market. A legally-naive lender has a risk to make a mistake in secured lending so that the collateralization is not legally binding. They know that the probability of a mistake is so high that lending is unprofitable.

3.4. Financial intermediation

Subsection 3.1 introduces an economy with the standard problem of asymmetric information. The problem is so difficult that it cannot be eliminated through monitoring. Fortunately, it can be eliminated using collateral if asymmetric information regarding the law is not present (Subsection 3.2). Unfortunately, asymmetric information regarding the law makes secured lending unprofitable (Subsection 3.3). If asymmetric information regarding the law can be eliminated, secured lending is profitable. In this subsection, a bank arises to operate as a financial intermediary and a delegated legal expert between firms and legally-naive lenders. The bank eliminates asymmetric information regarding the law by avoiding legal mistakes in collateralization processes.

Suppose that a lender can attain legal expertise and use it in the collateralization processes. Legal expertise incurs a fixed non-monetary cost $K > 0$ to him. In addition, each collateralization process entails an extra non-monetary cost, $k > 0$, to him. Therefore, if they only participate in one collateralization process, the costs total $K + k$. If they participate in the collateralization processes of n firms, the costs add up to $K + nk$.

If only one lender participates in the collateralization process of a firm, the extra costs are k. If two lenders participate, the extra costs are $2k$. Therefore, it is optimal that only one lender participates in the process. Suppose that $M \leq N$ lenders in the economy attain legal expertise and utilize it in secured lending. This entails total costs of $MK + Nk$ in the economy of N firms. These costs are

minimal if only one lender attains legal expertise, $K + Nk$. It is optimal for one lender to have the role of a lender-banker who develops the legal expertise and founds a bank, whereas other lenders become lender-depositors who deposit their endowments in the bank.[6]

Consider a bank with legal expertise. Since the collateralization agreements are now legally binding, only αN good firms seek loans. The breakeven loan interest is $R_b = 1 + k + K/\alpha N$. The time line is the following.

1. One lender becomes a lender-banker and founds a bank. He publicizes R_b as the loan interest. Loans must be fully secured.
2. The lender-banker promises gross interest 1 to lender-depositors (the other lenders).
3. Lender-depositors make their deposits. The amount of deposits is $\alpha N-1$. The lender-banker injects his endowment, 1, in the bank as equity capital.
4. The lender-banker exerts its efforts to build up legal expertise.
5. The lender-banker grants αN secured loans to firms.
6. The project outputs materialize. Since loans are fully secured, each loan yields repayment R_b and the repayments total $\alpha N R_b$ or $\alpha N + k\alpha N + K$. If we subtract from this the costs of legal expertise, $k\alpha N + K$, we get αN, which covers the repayments to lender-depositors and to the lender-banker.

If the banker develops legal expertise, each loan is fully secured and yields repayment R_b to the bank. The repayments cover the costs of banking. Suppose that the banker does not develop legal expertise. In the model, as in Diamond (1984), the number of borrowers N approaches infinity and the project risks are independent. Owing to the law of large numbers perfect diversification within the bank ensures that a fixed, low share of loans is successful if the bank lacks legal expertise.[7] As a result, the loan repayments are insufficient to cover payments on deposits and the bank fails with certainty. Therefore, the banker is motivated to develop legal expertise. Perfect diversification within the bank removes the incentive problem between the bank and depositors.[8] Consequently, we need Diamond's assumption on infinite bank size and independent loan risks to remove the incentive problem. We do not need the assumption to make the bank risk free. If the banker develops legal expertise, the loans are risk free because they are fully secured.

The deposits are risk free. They have no collateral or personal guarantees and they represent the same risk class (no junior or senior deposits). Therefore, depositors can make deposits even if they lack legal expertise, but the bank's operations must be supported by legal expertise. We can state that the bank transforms complex loans, which require legal expertise, into deposits for which such expertise is unnecessary. The deposit contract between the bank and a depositor is very simple. These features protect depositors who lack legal expertise, make deposits into a liquid security and allow deposits to act as a medium of exchange. We can draw the following conclusions.

Proposition 3. *Under asymmetric information regarding the law, it is socially optimal to create a financial intermediary, a bank, which builds up legal expertise and uses it in numerous loan contracts on behalf of depositors who lack legal expertise.*

Merton and Thakor (2018) demonstrate how depositors provide financing to banks in exchange for specific services and want the service fulfillment to be free of the bank's credit risk. The bank's role in our paper, legal expertise, also reduces the credit risk borne by depositors, thereby increasing the value of the services provided by the bank. In our paper, the safety of the bank makes it easy to issue simple deposits. It is unnecessary to have junior or senior deposits, secured deposits, etc. because the bank is risk free. Hence, the paper extends the recent literature wherein a bank optimally issues risk-free deposits: e.g. DeAngelo and Stultz (2014) and Dang, Gorton, Holmström, and Ordonez (2017).

We assume that a legally-naive lender makes a mistake in a complex collateralization process with probability β so that the collateralization is not legally binding even if the collateral asset is valuable. Alternatively, it is possible to assume that the security interest is legally binding, but the collateral asset is worthless. The legally-naive lender may overrate the value of the collateral asset for many reasons: (i) the asset has a previous lien (Hilson, 2013), (ii) an encumbrance reduces the value of the asset[9] (Glen, 2011), or (iii) the entrepreneur does not own the asset (de Soto, 2000). Let us assume that each feature (i)–(iii) decreases the lender's proceeds from the collateral to zero. In addition, assume that the legally-naive lender makes this kind of mistake, overrates the value of the worthless asset, with probability β. Therefore, the scenario is the same as hereinabove when the collateralization is not legally binding with probability β. Under both scenarios, a lender does not receive anything in a bankruptcy with probability β. It is necessary to create a bank that has legal expertise and does not accept worthless collateral assets.

[6] For rather similar ideas on information costs and information reusability, see also Greenbaum, Thakor, and Boot (2015, p. 23–28).

[7] For brevity, we omit the proofs on the laws of large numbers. The proofs often utilize Chebychev's inequality and are rather standard in the literature. Chebychev's inequality can also be used in our model because project returns are independent random variables, each having the same mean and each having the same finite variance. For exact proofs on the laws of large numbers, see e.g. Rosenthal (2006). See also articles in footnote 7.

[8] For diversification, see also Winton (1995, 1997), Ramakrishan and Tahkor (1984) and Hellwig (2000). For risk-free deposits, see also the warehouse banking model of Donaldson et al. (2018).

[9] An encumbrance is the right to, interest in, or legal liability on real estate, that does not prevent the transfer of the title of the property, but which reduces its value. It is a claim against a property by a party who does not own the property. It prevents the property owner from exercising perfect control over their property. A few encumbrances – for example zoning laws and environmental regulations – eliminate specific uses for and improvements to the property. Sometimes the property can be repossessed by the government. An encumbrance may allow land owner X to drive their cattle over the owner Y's land or allow a railway company to build and maintain a rail line across the property.

3.5. Personal guarantee

So far, we have assumed that the standard form of asymmetric information is eliminated by using outside collateral. This subsection studies an alternative instrument: personal guarantees.[10] A bank is needed to eliminate asymmetric information regarding the law in the context of personal guarantees.

Consider an economy without asymmetric information regarding the law. Since the standard form of asymmetric information makes lending unprofitable (Subsection 3.1) and monitoring is ineffective, an entrepreneur gives a personal guarantee for the loan of their firm. The guarantee eliminates the standard problem of asymmetric information because it has a positive selection effect. Bad firms, whose projects have negative NPV, do not seek loans. Only good firms seek loans. Since guarantees make loans risk free, lenders can grant loans directly to firms and there is no need for banks. Assumption 4 generates the problem of asymmetric information regarding the law.

Assumption 4. *The share β of firms has a worthless personal guarantee. The share is the same among good and bad firms. Legally-naive lenders that lack legal expertise cannot observe whether a guarantee is valuable or worthless (asymmetric information regarding the law).*

Intuitively, consider the following example. In the US, the *homestead exemption* protects guarantors in most states. If the property is the guarantor's principal residence, the guarantor is entitled to receive a payment from the homestead exemption from the sale proceeds, prior to the application of the proceeds to the obligation secured. The rules of the homestead exemption are quite complex. Gropp et al. (1997) mention that in some states the level of the homestead exemption is zero (e.g. Connecticut) and in others it has no upper limit (e.g. Texas). Gropp et al. (1997, p. 218) go on: "Thus, even households with both high income and high assets can avoid repaying their debts in bankruptcy as long as their assets are below the applicable exemption level." Therefore, our model can be interpreted as follows. The homestead exemption, which protects the guarantor, is either zero (the share $1-\beta$ of firms) or has no upper limit (the share β of firms). These shares are common information. Everyone knows that the share β of the firms has a worthless guarantee and the share $1-\beta$ of them has a valuable guarantee. A legally-naive lender has not more information. If they observe a guarantee, they do not know whether it is valuable or worthless. Instead, a lender that has legal expertise knows the value of the guarantee. Asymmetric information regarding the law makes lending unprofitable:

$$(1-\beta)\alpha R + \beta[(\alpha t_G + (1-\alpha)t_B]R < (1-\beta)\alpha + \beta \quad when\ R = t_H Y. \tag{2.6}$$

Now lending is unprofitable due to the high share of worthless guarantees even if the loan interest is at the upper limit. The L.H.S. shows the expected repayments. An entrepreneur knows whether their personal guarantee is valuable. As a result, bad firms with valuable guarantees do not borrow because their projects have negative NPV. The first term denotes repayments from good firms with valuable guarantees. They always repay loans. The second term indicates repayments from firms whose guarantees have no value. This group involves both firm types and this kind of borrower repays a loan only if the underlying project is successful. The R.H.S. shows the volume of lending, which exceeds the expected repayments on the L.H.S. If R rises over $t_H Y$, good firms with valuable guarantees withdraw from the credit market. Then, the scenario is the same as in the absence of the guarantees and lending is unprofitable. Given (2.6), asymmetric information regarding the law destroys the credit market. A legally-naive lender cannot observe the quality of a guarantee. He knows that a high share of worthless guarantees makes lending unprofitable. Personal guarantees are effective under the standard form of asymmetric information but rather ineffective under asymmetric information regarding the law. This generates a need for a bank. It arises to operate as a financial intermediary and a delegated legal expert between firms and legally-naive lenders. The bank eliminates asymmetric information regarding the law by lending only to firms whose guarantees are valuable. Otherwise, the idea of the model is the same as in Subsections 3.1–3.4.

We can now summarize the findings of Section 3. In contrast to the traditional banking theory, the main task of a bank is not to acquire information about borrowers and the profitability of their projects. Now, these information problems are so difficult that banks cannot eliminate them through monitoring. These can be eliminated by using outside collateral or personal guarantees. The main task of a bank is to develop legal expertise so that it can evaluate and eliminate the legal risks of personal guarantees and collateralization processes. The bank advances seminal financial intermediation services to the economy even if it grants loans that are fully protected by collateral or personal guarantees.

A famous article by Manove et al. (2001) argues that banks may be lazy because they do not invest sufficiently in project monitoring, preferring instead to grant mostly secured loans. With full agreement on the importance of these findings, our paper suggests an alternative explanation. It may be that banks are not lazy but rather their key task is something different. Perhaps the key task of banks is to use legal expertise in secured lending and other details of financial contracts.

4. Conclusions

This paper studies asymmetric information regarding the law in credit markets. It has the same negative effects as the standard form of asymmetric information: credit rationing, underinvesting, and overinvesting. The main difference between these two categories of asymmetric information is that the standard form of asymmetric information can be eliminated using collateral or personal guarantees. These methods are rather ineffective under asymmetric information regarding the law if the lender lacks legal expertise. Obviously, it is possible to build up legal expertise. Unfortunately, most of us have such limited funds available for lending that the

[10] The entrepreneur (person A) gives a personal guarantee for the loan of their firm. Obviously, it is possible that person B gives the personal guarantee. For the economic rationale for a co-signer, observe Besanko and Thakor (1987).

small volume of lending makes qualification unprofitable. To eliminate the negative effects of asymmetric information regarding the law, it is optimal to create a financial intermediary, a bank, which builds up its legal expertise and utilizes it in numerous loan contracts on behalf of the depositors, enabling us to make deposits without legal expertise. Asymmetric information regarding the law is the most likely to generate problems in multinational lending (de Soto 2000; Glen, 2011). Foreign lenders usually have less information about the legal system than domestic lenders. This highlights the task of banks in multinational finance.

We have analyzed few incidents of asymmetric information regarding the law. It can appear in several alternative forms. Consider the following example. Davydenko and Franks (2008, p. 566–567) describe the values of collateral assets:

> While real estate collateral is the most important source of banks' recovery in Germany and the United Kingdom, it is far less valuable in France, both because sales proceeds there are diluted by preferential creditors such as employee wages and bankruptcy fees, and because French bankruptcy courts tend to sell assets below their potential market prices in order to preserve employment. By contrast, accounts receivables and personal guarantees can be realized by French banks directly, and the proceeds are not subject to dilution by creditors. As a result, these collateral types are used more often than real estate at loan origination in France.

Assume that a firm pledges its business assets as collateral. The lenders share these assets when they make loan contracts. A legally-naive lender may choose valueless collateral assets (real estate) whereas a lender who has legal expertise selects valuable collateral assets (receivables). As a result, the latter lender obtains high proceeds in the bankruptcy, whereas the lender that lacks legal expertise receives low proceeds.

Interestingly, the information advantage may vary between different types of asymmetric information. Consider a venture capital fund and a firm developing a new product. With regard to the standard form of asymmetric information, the firm may be better aware of the value of the new product (the quality of the technology or the quality of the medicine) than the venture capital fund. As to the asymmetric information regarding the law, consider the complex financial contracts between the fund and the firm. The venture capital fund is likely to understand the implications of the contract details better than the entrepreneur. We will leave these ideas for future research projects.

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