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Nº 250 ECONOMIC PERFORMANCE, CREDITOR PROTECTION AND LABOR INFLEXIBILITY

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Economic Performance, creditor protection and labor inflexibility

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Abstract

We present a static general equilibrium model of an economy with agents with heterogeneous wealth and endogenous credit constraints created by partial loan recovery rates. Higher loan recovery rates and better bankruptcy protection increase output and credit penetration, while the former raises the average interest rate spread and the latter decreases it. We also study the interaction of credit constraint with differences in wealth distribution across countries. In a closed economy, higher loan recovery rates and better bankruptcy legislation raise the prime interest rate, as well as the interest rate spread.

We incorporate a labor market in order to analyze the interaction between increased labor protection and credit restrictions. We find that stronger labor protection leads to lower wages and output. Nevertheless they will be supported by workers in firms with strong balance sheets and opposed by workers and employers in firms with weak balance sheets.

Keywords: Credit constraints, wealth distribution, efficiency.

JEL Class.: G38, E44, D53.

1 Introduction

This paper studies the effects of credit market imperfections on the economy. In the last decade or so, research has shown that a country's financial system has real effects on market efficiency and, consequently, on economic growth (e.g., Beck et al. [2005]). Our main concerns are the effects on the performance of economies and sectors of different qualities of credit protection and of bankruptcy procedures, as well as their interaction with differences in wealth distribution. Moreover, we examine the effect of the interaction of credit market imperfections with labor market distortions on the performance of the economy.

We show that improvements in credit protection and bankruptcy legislation increase credit penetration and economic activity. In addition, cross-country heterogeneity in the distribution of wealth results in different levels of aggregate income, and improvements in credit protection lead to different responses across economies with different wealth distributions.

We also show that increases in legislated firing costs are costly in terms of economic output, wages and employment. Nevertheless, they are endorsed by workers (and are not strongly opposed by employers) in strongly capitalized firms, against the interests of the weaker firms and its workers.

In our model, a continuum of entrepreneurs own heterogenous amounts of wealth. Capital investment must be combined in fixed proportions with one unit of non-tangible, unalienable unit of capital specific (e.g., human capital) to each entrepreneur in order to form a firm or carry out a project.[1] As in Holmstrom and Tirole [1997], we assume that entrepreneurs are wealth constrained and cannot fund the capital investment internally and thus need access to the credit market for loans.[2] There are two reasons why an entrepreneur faces restrictions on its demand for credit. First, because the entrepreneur cannot commit to invest all available resources into the project; and second, in case of bankruptcy, the salvage value recovered by the lender may be too low.

More precisely, an entrepreneur who is granted a loan can be tempted to abscond with the loan (as in Burkart and Ellingsen [2004]) instead of setting up a firm. In this case the recovery rate of the loan depends on the quality of creditor protection. We denote by *ex-ante creditor protection rights* the ability of the legal system to protect against this type of fraudulent behavior, and measure these rights by the fraction of the loan that is recovered. The second aspect of creditor protection is related to the efficiency of legal system in protecting the rights of outside investors in bankruptcy procedures, which we denote *ex-post creditor protection rights,* and measure as the fraction of the salvage value received by outside investors. In addition, the *inefficiency* of the bankruptcy system measures the loss in salvage value due to suboptimal bankruptcy regulations, and we will assume that it is a legal char-

[1] The fixed investment size simplifies the analysis, but many important results survive, in attenuated form, with variable sized projects.

[2] The requirement that all entrepreneurs require loans is innocuous, but simplifies the exposition. In the case of free capital flows used in the next section, imposing the restriction has no effect on results. In the closed economy model, it lowers the likelihood of a discontinuity in the marginal return to capital, which could jump down to zero under some conditions, because of the interaction of the fixed investment size of the projects with the credit constraints.

acteristic of a country. In short, we distinguish between two types of creditor protection. *Ex-ante creditor protection* is associated to financial market regulation, legal rules and their enforcement that determine the loan recovery rate from fraudulent default, while *ex-post creditor protection* is associated to the amount the outside investors can recover in case of financial distress.

There is one final factor that can influence the ability to obtain loans in a given sector of the economy. In the case of financial distress, the liquidation value that can be pledged to outside investors depends on the *asset hardness* of the project, which is a characteristic of the economic sector. Asset hardness is a characteristic of a sector that quantifies the possibility of transferring the control of the asset to creditors. Typical hard assets are real estate and equipment.[3]

The possibility of absconding with the loan (plus the personal wealth of the entrepreneur) before undertaking the investment makes it impossible for entrepreneurs with little wealth to obtain loans, and hence they will be unable to set up firms. The fact that some entrepreneurs are unable to fund their projects, coupled to the fact that specific capital is unalienable, implies that the economy does not take full advantage of its productive capability. Rich entrepreneurs obtain loans, but as all projects face the possibility of bankruptcy, they pay an interest rate spread above the *prime rate* at which lenders can access the international capital markets.

To the simple economy described above we add labor, because we are interested in the interaction between labor market frictions and the imperfections in the credit market. Setting up a firm requires not only investment (which we now interpret as working capital), but also a single worker. In the case that the firm obtains the necessary working capital and is successful, the worker is paid the equilibrium wage, while in the case of liquidation the worker is fired and receives a fixed payment, which we interpret as a firing cost. In common with the law of many countries, we assume that labor has a priority claim over creditors in the case of financial distress or bankruptcy.[4]

The implications of the model for cross-country comparisons can be divided into two broad categories. First, there are cross-section implications on investment, output, credit penetration, interest rates, and interest rate spreads, due to changes in creditor rights as well as from differences in asset hardness and the efficiency of bankruptcy procedures. Second, there are cross-section implications over the same economic variables due to difference in wealth distribution across countries (both first-order stochastic dominant (FOSD) transformations as well as mean-preserving spread (MPS) transformations of the wealth distribution. Furthermore, we analyze these effects in both open and closed economies. Various implications of the model regarding improvements in the credit protection are verified in empirical research, while several implications regarding the response to differences in wealth distribu-

[3]Alternatively, soft assets are those than cannot be easily transferred and controlled, such as specific business knowledge, ideas, and what is generally known as '*knowledge capital*. At times, we compare sectors with different asset hardness; this is not totally warranted within the model, as we have a single good, but it could be interpreted as a reduced form of an overarching model with several sectors within a country.

[4]In some countries, secured creditors have first priority over specific assets, and there are a few countries where secured creditors have general rights preceding those of workers.

tion are new and the evidence regarding them is unexistent.[5]

Our survey of the results begins with an open economy, whose interest rate is determined exogenously. We assume a competitive banking system that can obtain unlimited funds from abroad at a fixed rate to lend to entrepreneurs.[6] We find that an increase in the ex ante loan recovery rate, as well as better bankruptcy procedures, lead to higher investment, GDP, increased credit penetration and higher average spreads, as agents with weaker balance sheets get access to credit. At the sectoral level, increased asset hardness has similar effects. In addition, as credit protection worsens, the asset hardness of a sector becomes a more critical determinant of access to credit. Similarly, improved efficiency of bankruptcy procedures can compensate for worse ex ante credit protection. An improvement in ex post creditor protection has no effect on credit penetration or investment, but lowers the average interest rate spread. [7]

The effects of changes in the income distribution depend on the type of change. Positive FOSD changes to the wealth distribution increase investment and output, while lowering the average interest rate spread. While these results are to be expected, the effects of pure distributional transformations are more remarkable. A marginal MPS of the wealth distribution lowers total investment and output and raises the average interest rate spread in highly credit constrained economies. The results are the opposite in the case of economies which do not suffer from extensive credit constraints.

Next, we examine the case of a closed economy, where the interest rate is determined endogenously. A first result, also derived in Shleifer and Wolfenzon [2002] is that an improvement in ex-ante creditor protection leads to an increase in the equilibrium interest rate.[8] This is due to the increase in the demand for capital given that marginal borrowers have an increased likelihood of paying. In fact, the average spread charged to an entrepreneur increases with a fall in the ex ante loan default rate, and declines with an increase in the default rate.

Next, we add labor to this economy. We show that an increase in labor market regulations leads to lower wages, because more firms are unable to finance their project (as workers are first in line in case of bankruptcy, the liquidation value of the firm to outside investors falls), while an improvement in ex ante creditor rights or in the efficiency of the bankruptcy system leads to an increase on wages, since more entrepreneurs are able to get financing and labor demand rises. Second, we show that as ex ante creditor protection improves, firing costs become a more critical determinant of access to credit.[9]

The model also has political economy implications. Employees of strong firms will push for stronger worker protection legislation, because it improves their outcome in case of financial distress, but this leads to unemployment and hence lower wages, as weaker firms

[5]The empirical evidence related to all results is presented in the main text.

[6]Most of the results for a closed economy are similar, and we only note when there are differences.

[7]This is an artifact of the fixed size investment in our model. In a model with flexible investment, better bankruptcy legislation raises investment, as it lowers the interest rates facing entrepreneurs.

[8]This explains the observation in La Porta et al. [2000]: better creditor protection is opposed by wealthy and politically powerful families in developing countries because it increases competition and the interest rate on loans.

[9]In a related issue, Pagano and Volpin [2005] show the existence of an inverse relation between outside investor protection and employment protection legislation.

do not receive credit and must close. The owners of firms that have strong capitalization will not be strongly opposed to the actions of their workers, as they do not affect their access to credit and the rise in total expected compensation is offset by the fall in wages. These observations are common in informal discussions among entrepreneurs in developing countries, and we believe we have provided theoretical underpinnings for this observation.

Finally, we observe that labor reforms aimed at increasing employment protection are more likely to be adopted in closed economies, and financial market reforms aimed at increasing creditor protection are more likely to find opposition in closed economies. Thus, openness is an important determinant of financial development and labor market flexibility. This is consistent with a new empirical literature that attempts to explain the development of financial systems across countries. Rajan and Zingales [2003] find that openness is a crucial determinant of financial development and Braun and Raddatz [Forthcoming] provide strong empirical support for the notion that political economy conflicts between proponents and opposers of financial liberalization explain part of the differences in financial development observed between countries.[10]

1.1 Literature review

The importance of credit constraints on the performance of an economy is an important empirical issue. In a series of papers, La Porta et al. [2002], La Porta et al. [1999] and Shleifer and Wolfenzon [2002] have suggested that the degree of outside investor protection is a key determinant of the quality of the financial system, and therefore of the efficiency of the economy. In addition, better creditor protection has been found to be positively related with the size and depth of capital markets (La Porta et al. [2002]), sensitivity to investment opportunities (La Porta et al. [1997]), more extensive use of external finance for growing firms (Demirguc-Kunt and Maksimovic [1996]) and lower sensitivity of market value to financial crises (Johnson et al. [2000]). In a related issue, improved bankruptcy procedures improve the speed of recovery from a shock (Bergoeing et al. [2002]). Araujo and Funchal [2005] provide a model of bankruptcy and credit constraints that shows that improved legal protection for creditors in bankruptcy leads to more efficient outcomes and reduces fraud. The authors provide empirical evidence of lower spreads and higher credit penetration with improved bankruptcy procedures. Across sectors, Braun and Larrain [2005] show that the softness of the assets in a sector of the economy —i.e. their intangibility in case of distress— influences both the response to shocks and the relative importance of different sectors in countries depending on the degree of financial development.

A series of macro models have shown that financial constraints play an important role in aggregate behavior and in the response to shocks and this role depends on the firm's reliance on financial markets.[11] In particular, when investment is primarily financed with internal funds, worsening conditions should not have as large an impact as when external funds are the main source of financing.[12] Since this effect can only appear if financial markets are

[10] Pagano and Volpin [2005] show that the type of political arrangement can impact financial development.

[11] See Aghion et al. [2004] and Kiyotaki and Moore [1997] and Love et al. [2007] for a complete review of the literature.

[12] See, for instance, Johnson et al. [2002].

imperfect (i.e., if internal and external funds are not perfect substitutes) and entrepreneurs face credit constraints, the differential impact should be stronger in countries which are financially underdeveloped.

The rest of the paper is as follows. In the next section we present the model. In section 3, we analyze first the equilibrium and main implications for the case in which we allow free capital flows, and in the following section we do the same for the case of a closed economy in which capital flows are not allowed. Next, we extend the model to incorporate labor and then reassess the properties of the equilibrium in the resulting model. The last section presents concluding remarks.

2 The model

We examine a simple one-period model with risk neutral potential entrepreneurs who are protected by limited liability. We divide the single period into four stages (see figure 1). In the first stage, a continuum of agents indexed by $z \in [0,1]$ are born, each endowed with one unit of inalienable specific capital (an idea, a project or an ability) and different amounts of mobile capital or wealth, K_z. The wealth distribution is given by $G(\cdot)$, which has a continuous density and bounded support given by $[0,1]$.

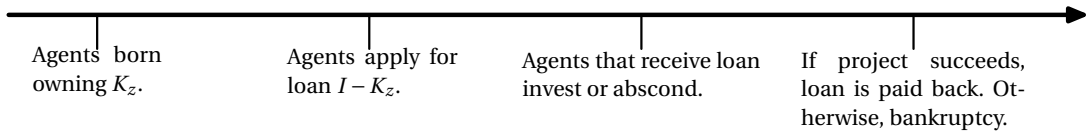

Figure 1: Time line of the model

During the second stage, agent z with wealth K_z applies for a loan of $D_z = I - K_z$ from banks in order to invest in a project (or start up a firm) that uses her specific capital and requires a fixed initial investment $I \geq 1$.[13] Wealth levels of individual agents are observable by lenders.

In the third stage, agents that receive a loan either invest in their projects, or alternatively, they may abscond, committing (*ex-ante fraud*).[14] If the agent absconds, only a fraction $1 - \phi$ of the loan can be recovered by the legal system. Thus $1 - \phi$ is the loan recovery rate.

In the fourth and last stage, if the agent invests, the project can either succeed with probability p, in which case it yields a contractible return R, or fail with probability $1 - p$, in which case it yields nothing except for its salvage value. The probability of success is independent across entrepreneurs and therefore exactly a fraction p of financed projects succeeds in any given period. If the project succeeds, entrepreneurs pay back the debt plus the interest rate to lenders. If the project fails, the liquidation value is $V < I$, and the bankruptcy procedure is applied.

[13] Having a fixed size project simplifies the analysis. In a previous version of the paper, we obtain similar results using variable size projects.

[14] As in Burkart and Ellingsen [2004].

This liquidation value is assumed to be observable, but non-contractible. In general, the value at liquidation V cannot be fully pledged to outside investors. A fraction τ can be pledged, while a fraction $1-\tau$ remains in the hands of entrepreneurs. The parameter τ captures the quality of creditor protection in the case of bankruptcy or liquidation.[15] In what follows we assume, as normally occurs in the real world, that in case of failure, the bank can only repossess up to the value of its debt. In order to avoid the uninteresting case of fully collateralized debt, we impose the condition that even the wealthiest agent borrows more than the liquidation value, i.e., that $D_z \geq \tau V$.

Interpretation of the liquidation value The ratio V/I can be interpreted as the appropriability of the sunk investment after the failure of the project, and if we compare across economic sectors, it describes the relative *asset hardness* of the sector. Because the size of the investment is the same across sectors, we simplify by denoting by V the hardness of the sector. For instance, land, structures and most equipment are typically less specific to the firm or the industry, and therefore can command a relatively higher salvage or liquidation value (Williamson [1988]; Shleifer and Vishny [1992]). Other assets are soft, and in case of financial distress can be misappropriated by the entrepreneur. They correspond, for instance, to assets that are valuable only under the entrepreneur's inalienable specific capital or to assets with a value that is contingent on the presence of the entrepreneur, such as special clients or relationships with providers.

There is alternative interpretation of V, which is valid in comparisons accross countries, rather than across sectors within a country. Under this interpretation, different values of V refer to different degrees of efficiency in bankruptcy procedures. In some countries, the value of V is close to zero (the case of Brazil before the new bankruptcy law, see Araujo and Funchal [2005]), while in others (e.g., the OECD), the value of V is close to its theoretical maximum value $V^* < I$.

We assume a competitive banking system and that the marginal cost of banks is zero. Banks can observe the mobile capital possessed by each agent before granting a loan. In the next section, banks have access to the international credit market at a rate of interest ρ; later we consider the case of a closed economy. For each agent with wealth K_z, a financial contract stipulates whether or not the project can be financed and an interest rate r_z charged to the lender in the case of success, and establishes that the project is liquidated in the case of failure or financial distress.[16]

In order to obtain stark results, we impose an assumption that implies that it would be socially optimal if all projects were implemented, that is, that projects have a positive net present value (NPV);

- (A1): $pR + (1-p)V - (1+\rho)I > 0$.

Hence credit constraints reduce the productive capacity of the economy.

[15] Under Chapter XI in the US, for instance, shareholders of the firm must approve any reorganization of the firm, and this allows them to retain a fraction of the post-reorganization value. See Tirole [2006].

[16] One can verify that it is never optimal to liquidate the project following a success, as doing so would result in a tighter incentive constraint for the entrepreneur. Also, it is easy to verify that it is optimal to liquidate the project with probability one when it fails. Thus, we consider optimal debt contracts.

3 The Analysis

Our analysis begins by considering a small open economy, where the interest rate is set by the international market for capital. We solve the model by assuming that the entrepreneur always asks for a loan. At the end of the section we show that this is a dominant strategy, since the market is competitive and the project has a positive net present value. In the following section, we study the case of a closed economy, where the available capital is equal to the aggregate wealth of agents, and the interest rate is determined endogenously.

3.1 An Open Economy

3.1.1 The Equilibrium

The expected profit of an entrepreneur whose wealth is K_z under a contract in which she promises to pay $(1 + r_z) D_z$ in case of success, and liquidates the project in case of failure (due to financial distress) is given by:[17]

$$\Pi_z = p \cdot max \{R - (1 + r_z) D_z, 0\} + (1 - p) (1 - \tau) V \tag{1}$$

and the representative bank's profit from this contract is

$$\Pi_B = p \cdot min \{(1 + r_z)D_z, R\} + (1 - p)\tau V - (1 + \rho)D_z. \tag{2}$$

With probability p the project succeeds and yields R and thus the entrepreneur can pledge at most this to outside investors and with probability $1 - p$, the project fails. In this case it is optimal for the bank to liquidate the project to obtain the share of the liquidation value that is pledgable to outside investors, τV.

Note that from (2), there is a limit to the maximum repayment in case of success of the project, given by

$$(1 + r_z) D_z \leq R, \tag{3}$$

and thus any optimal contract must satisfy this restriction.

Furthermore, because the banking system is competitive, expected profits from lending must be zero in equilibrium. This implies that the problem of the representative bank is to maximize expected profits for each entrepreneur subject to i) the constraint that the bank makes nonnegative expected profits, ii) to the condition that the borrower does not abscond with the loan, and iii) to the maximum pledgable income condition in equation (3). Thus, the

[17] If a project were certain to succeed ($p = 1$), the entrepreneur with such project would be charged the prime rate of interest, given by ρ. Alternatively, if the project is *fully collateralized*, i.e., $\tau V \geq (1 + r_z)D_z$, again the borrower would be charged the prime rate of interest ρ. Note however that even in this case, the agent may not be granted a loan, given that the agent could still have incentives to abscond with the loan.

In order to guarantee that the interest rate is non-negative, we need to assume that $\tau V \leq D_z$. For this assumption to hold, a sufficient condition is that the wealthiest agent requires a sufficiently large loan, i.e., $I \geq 1 + \tau V$. This condition is also sufficient in the case of the closed economy. Note that this assumption implies that random liquidation in case of failure is never optimal.

representative bank's problem is

$$\begin{aligned}\max_{r_z \geq 0} \Pi_z &= p\left[R - (1+r_z)\, D_z\right] + \left(1-p\right)(1-\tau)\, V \\ s.t. \quad & p(R-(1+r_z)D_z) + (1-p)(1-\tau)V \geq \phi(I-K_z) \\ & (1+r_z)\, D_z \leq R \\ & p \cdot min\left\{(1+r_z)D_z, R\right\} + (1-p)\tau V - (1+\rho)D_z \geq 0\end{aligned}$$

By assumption (A1), it is socially efficient to lend money to each entrepreneur. However, because there are agency problems, only those entrepreneurs that have no incentives to abscond with the money will receive a loan. Provided that this condition holds, assumption (A1), competition and the observability of wealth imply that the representative bank sets the interest rate it charges an agent so that the expected return from the loan, including the share of the salvage value that the investor can appropriate in case of failure, must equal the lenders' initial outlay plus the cost of financing the outlay:

$$p\,(1+r_z)\, D_z + (1-p)\tau V = (1+\rho)D_z = (1+\rho)(I-K_z). \tag{4}$$

This implies that the interest rate that competitive lenders will charge an entrepreneur who does not abscond with the money and has a wealth level K_z is

$$1 + r_z = \frac{1+\rho}{p} - \frac{1-p}{p}\frac{\tau V}{D_z}. \tag{5}$$

Observe that the interest rate charged to agents increases as the debt D_z increases, falls with improvements in the quality of bankruptcy procedure, and as asset hardness improves (higher V). The reason is that as debt is larger (corresponding to an agent with a smaller mobile capital stock), the expected returns in case of liquidation represent, *ceteris paribus* a smaller fraction of the loan. The interest rate defined by equation (5) is optimal, if the non-absconding condition holds.

The non-absconding condition sets a lower limit to wealth level K_z to be granted a loan. Thus, an entrepreneur with wealth K_z is granted a loan if the following condition holds

$$p\,(R - (1+r_z)\, D_z) + \left(1-p\right)(1-\tau)\, V \geq \phi(I-K_z). \tag{6}$$

This condition requires that the return to the entrepreneur from investment (net of expected repayment) has to be larger than the incentives to abscond. Note that the incentives to invest increase when the expected return to absconding are reduced, i.e., when the ex ante loan recovery rate $(1-\phi)$ increases. Moreover, the incentives to invest also increase with the efficiency of bankruptcy legislation, as well as with the asset hardness in particular sectors (both described by V). Note that the role of the parameter describing ex post credit protection (τ) is ambiguous: an increase in τ increases the size of the break-even loan if investment takes place, but it lowers the entrepreneur's incentives to invest.

Plugging the interest rate that emerges from the break-even condition for lenders (4) into the incentive compatibility constraint for entrepreneurs (6), we obtain the agent with the

smallest stock of mobile capital that is able to obtain a loan,

$$K(\phi, V) \equiv I - \frac{pR + (1-p)V}{1+\rho+\phi}. \tag{7}$$

In addition to the restriction imposed by the non-absconding condition, the maximum pledgable income condition (3) sets an upper limit to the size of the loan that an entrepreneur can receive, given the interest rate derived in equation (5). As the interest rate charged to an entrepreneur rises as her wealth falls, in order to ensure that maximum pledgable income restriction (3) is satisfied, we need to ensure that it is satisfied for the entrepreneur obtaining the largest loan; that is, for the agent with a wealth $K(\phi, V)$. Thus,

$$\begin{gathered}(1+r_z)\,D_z \leq R \text{ for all } K_z \geq K(\phi, V) \Longrightarrow \\ \phi\left(pR + (1-p)\,\tau V\right) \geq (1+\rho)\,(1-\tau)\,(1-p)\,V\end{gathered}$$

The first expression implies that the productivity of investment (i.e., R) must be sufficiently high, so that the marginal agent (the one with least wealth that receives a loan) will be able to repay in case of success. This condition is always satisfied for $\tau = 1$, and a sufficient condition for it to hold for all $\tau \in [0,1]$ is that it holds for $\tau = 0$, so that

- (A2): $\phi pR \geq (1+\rho)\,(1-p)\,V$.

This leads to the following result,

Proposition 1 *Given assumptions (A1) and (A2), and parameters* (ϕ, τ, V, p), *entrepreneurs with a wealth level* $K_z \geq K(\phi, V)$ *have access to credit, and they pay outside investors an interest rate equal to* $r_z = \frac{1+\rho}{p} - \frac{1-p}{p}\frac{\tau V}{D_z} - 1$.

To make things interesting we focus on the case $K(\phi, V) \in (0,1)$; otherwise a borrower with no wealth of her own would be able to finance the project. The assumption that $K(\phi, V) > 0$ (though not strictly necessary for our results) can be written (from (7)) as $\phi I > pR + (1-p)V - (1+\rho)I$, so that the entrepreneur with no stake in the project would be tempted to abscond.

Agents must have sufficient wealth in order to receive loans. Observe that if $K_z < K(\phi, V)$, the project has a positive NPV and yet is not funded. The explanation is that an entrepreneur with low wealth must borrow a large amount and therefore needs to pledge to repay a large fraction of the return in the case of success. As she will keep a small fraction of value of the project, she will be tempted to abscond instead of investing. Thus, borrowers and lenders cannot design a contract that induces the entrepreneur to undertake the project and allows lenders to recover their investment. In other words, there is credit rationing: an entrepreneur may be willing to pledge more income to investors, but the lenders are not willing to grant the loan because, under the existing credit protection rules, they cannot trust the borrower.

In contrast, if $K_z \geq K(\phi, V)$, banks are willing to lend to the entrepreneur, or as is well known, they only lend to the rich (Tirole [2006]). Observe that as ex ante credit protection improves (that is, as ϕ falls), the minimum wealth needed to receive financing falls because the expected return from the project becomes more attractive relative to absconding.

In this model there is a neat separation between the effects of ex ante credit protection, described by the parameter ϕ, which gives rise to credit rationing, and creditor protection in the case of financial distress, described by the parameter τ, which leads to higher interest rates charged on loans.[18]

Using the break even condition for lenders, the net utility of entrepreneurs (net of $(1+\rho)K_z$, which the entrepreneur would receive if she refused to undertake the project) is:

$$U_e = \begin{cases} 0 & \text{if } K_z < K(\phi, V) \\ pR + (1-p)V - (1+\rho)\,I > 0 & \text{if } K_z \geq K(\phi, V), \text{ by (A1)} \end{cases}$$

It readily follows from this expression that the entrepreneur always seeks a loan since she obtains $U_e + (1+\rho)K_z$ if she undertakes the project, while she gets only $(1+\rho)K_z$ otherwise. This is proves the claim at the beginning of the section.

The entrepreneur is the residual claimant if the project receives financing, due to the zero-profit condition for lenders. Observe that the efficiency loss in case of failure of the project is incorporated in the NPV of the project, and it includes the loss of the specific capital of the entrepreneur as well as other soft assets of the firm which are lost in the liquidation procedure due to the inefficiency of bankruptcy regulation. Since entrepreneurs who do not get financing must consume their wealth, the utility of entrepreneurs jumps at $K_z = K(\phi, V)$.[19]

3.1.2 Implications

In what follows we discuss in some detail evidence of the consequences of different degrees of creditor protection across countries and sectors, as well as the scattered evidence of the effects of differences in wealth distribution across countries and sectors. Next, we derive the cross-section empirical implications from our model that are related to the empirical observations.

Evidence on the effects of creditor rights on different equilibrium variables La Porta et al. [1998] find that countries with lower levels of investor protection, measured by the origin of legal rules or by the quality of law enforcement, have smaller and narrower capital markets. More recently, La Porta et al. [Forthcoming] review the literature and evidence on the economic consequences of legal origins. They suggest that empirical studies show that a two-standard deviation increase in creditor rights is associated with an increase of 15 percentage points in the private credit-to-GDP ratio. A two-standard deviation increase in the efficiency of debt collection is associated with an increase of 27 percentage points in the private-credit-to-GDP ratio. Using a cross section of countries, Djankov et al. [2007] find that improved loan recovery procedures, interpreted as days in court before a ruling

[18] This neat division is an artifact of the model: if we omit assumption A2, it is possible to get credit rationing due to lack of creditor protection in case of distress. It is also a consequence of the fixed investment size, since otherwise τ affects the value of $K(\phi, V)$ through the interest rate facing the marginal borrower.

[19] While the discontinuity at $K(\phi, V)$ is an artifact of having a fixed investment size, in flexible investment models with asymmetric information the previous effect translates into a jump in the marginal return to capital when a similar capital threshold is surpassed.

on a disputed loan (which we associate to ex ante credit protection), increase private credit penetration in the economy as in our model. Similarly the existence of credit registries (an ex ante measure) are associated with a higher ratio of private credit to GDP.

In a somewhat related contribution Rajan and Zingales [1998] examines whether financial development facilitates economic growth by testing whether financial development reduces the costs of external finance to firms. They find this to be true for a large sample of countries in the 1980s. One salient characteristic of poorly developed capital markets is the importance of hard assets in the allocation of credit. When external finance contractibility is poor (higher ϕ), external finance requires higher proportions of assets that can be seized by creditors if the relationship breaks down (higher τ). Braun and Larrain [2005] finds that industries with fewer tangible assets (i.e., having softer assets and thus lower V) perform disproportionately worse in terms of growth and GDP contribution in countries with poorly developed financial systems. The more dependent the industry is on external finance, the larger the impact. Firm-level evidence also suggests that leverage is less sensitive to tangibility in better-working capital markets. Demirguc-Kunt and Maksimovic [1996] and Beck et al. [2005] find that weak creditor protection has a larger negative effect on the growth of small firms, since they are more likely to be credit-constrained by financial frictions. In addition, they report that this effect is more important in countries with underdeveloped financial and legal systems and higher corruption.

Qian and Strahan [2007] find that better creditor protection lowers interest rate spreads (over Libor) that lenders charge.[20] Araujo and Funchal [2005] find a similar result, where creditor protection can be interpreted as the fraction of salvage value received by lenders in case of liquidation, which is consistent with our model, since credit protection in this sense is represented by τ. Qian and Strahan [2007] also find that loans are more likely to be secured by collateral as creditor rights improve, and this relation is stronger when firms have more tangible assets; and that better creditor rights improve the price, maturity and secured status relatively more for firms with harder assets (property, plant & equipment). Hence, the evidence suggests that better creditor protection makes collateral more effective in enhancing loan availability.

Implications of the model with regard to difference in credit protection parameters Note that total output or GDP in this economy is given by

$$GDP(\phi, \tau, V) = \int_{K(\phi,V)}^{1} (pR + (1-p)V - (1+\rho)I)dG$$

and total investment is

$$\int_{K(\phi,V)}^{1} IdG.$$

From (7), it is clear that an improvement on the loan recovery rate, i.e., a decrease in

[20]The difference in interest rate spreads among countries can be large. Demirguc-Kunt et al. [2004] show that bank spreads can range from more than 10% (Belarus, Burundi, and Ghana) to less than 2% (Netherland, Finland and Switzerland). Data from the International Financial Statistics report that spreads vary from 1.97% in Netherland to 48% in Brazil.

ϕ, increases total output in the economy by allowing more entrepreneurs to receive credit. Likewise, an increase in V increases the mass of entrepreneurs with access to loans, since in the case of liquidation the lender will recover a higher proportion of the loan. Similarly, if the probability of bankruptcy falls, lending increases. Furthermore, from (7), as credit protection worsens, asset hardness (or more efficient bankruptcy procedures) reduces the effect on credit rationing. In particular, in financial markets with less creditor protection, sectors with harder assets are more likely to receive credit.

From (5), firms in sectors with harder assets (or firms in countries with more efficient bankruptcy procedures), if granted credit, are charged a lower interest rate since when the project is under distress, investors are better protected. Thus, creditor protection is more important for projects in sectors with softer assets, since absconding is less profitable when the interest rate is lower, and higher when creditor protection is lower.
The discussion so far is summarized in the next result.

Result 1 *(i) An improvement on creditor protection (i.e., a fall in ϕ), an increase in asset hardness, in que quality of bankruptcy procedures or a decrease in the probability of financial distress (a higher p) result in higher total investment and GDP; (ii) as ex-ante creditor protection worsens and the probability of bankruptcy rises, asset hardness or better bankruptcy procedures becomes a more critical determinant of access to credit (that is, $\frac{\partial K(\phi,V)}{\partial \phi \partial V} \geq 0$ and $\frac{\partial K(\phi,V)}{\partial p \partial V} > 0$).*

Defining credit penetration as the value of loans as a fraction of GPD,

$$C(\phi, V) = \frac{1}{GDP(\phi, V)} \int_{K(\phi,V)}^{1} (I - K_z) dG.$$

and noting that a fall in $K(\phi, V)$ adds entrepreneurs who require larger loans than average, we have

Result 2 *An improvement in the loan recovery rate or in the quality of bankruptcy procedures increases credit penetration, and credit penetration as a share of sectoral output is larger in sectors with harder assets.*

In order to simplify the notation define the triplet $d \in D \equiv (\phi, \tau, V)$. Then we can define the average interest rate spread over agents that receive credit as:

$$S(D) = \frac{1}{1 - G(K(\phi, V))} \int_{K(\phi,V)}^{1} (r(p, K_z) - \rho) dG \tag{8}$$

Then, recalling that $r(p, K_z)$ does not depend on d and applying the Liebnitz rule to the

integral term we have that:

$$\frac{\partial S(D)}{\partial d} = -\left\{\frac{g(K(\phi,V))}{1-G(K(\phi,V))}\frac{\partial K(\phi,V)}{\partial d}\right\} \times \left\{(r(p,K(\phi,V))-\rho) - \frac{1}{1-G(K(\phi,V))}\left[\int_{K(\phi,V)}^{1}(r(p,K_z)-\rho)dG\right]\right\} - \left(\frac{1}{1-G(K(\phi,V))}\frac{1-p}{p}\right)\int_{K(\phi,V)}^{1}\frac{\partial}{\partial d}\left(\frac{\tau V}{D_z}\right)dG.$$

Note that $r(p,K_z) > \rho$ for all K_z, from (5). Since $r(p,K_z)$ falls with K_z, the second term in curly brackets is smaller than the term $(r(p,K(\phi,V)) - \rho)$, and thus the term in curly brackets is positive. This together with the fact that $\frac{\partial K(\phi,V)}{\partial \phi} \geq 0$, $\frac{\partial K(\phi,V)}{\partial \tau} = 0$, and $\frac{\partial K(\phi,V)}{\partial V} \leq 0$ leads to the following result.

Result 3 *The average interest rate spread is increasing in improvements in ex-ante creditor protection (lower ϕ) and decreasing in improvements in the quality of ex post creditor protection.*

Note that changes in ϕ do not affect the interest rate (and therefore the spread) faced by individual borrowers that continue to receive loans after the change in ϕ. However, changes in ϕ affect the threshold required to obtain loans. For instance, a reduction in ϕ lowers the threshold, allowing agents with less wealth access to credit. But since these newly creditworthy agents ask for larger loans (because they have less capital) on average, the expected loss is higher, and therefore lenders require a higher interest rate to break even. Hence the average interest rate spread increases. The explanation of the effects of changes in τ is simpler: since an increase in τ increases the lenders' payoff in case of bankruptcy, while it does not alter the threshold for lending, interest rates decline. Note that a change in asset hardness, or in the efficiency of bankruptcy procedures, has an ambiguous effect since i) it increase the mass of agents that are eligible for credit, which tends to raise the spread, but ii) it reduces the spread of agents who were eligible for credit before the change, by (5).

Implications of the model with regard to different wealth distributions across countries We consider countries with different wealth distributions in terms of first-order stochastic dominance (FOSD) as well as differences in terms of mean-preserving spreads (MPS). It is trivial to show that a country with a wealth distribution that dominates in terms of FOSD that of another country has fewer firms being cash constrained and greater output and investment. The effect of MPS differences across countries is more subtle. Let $\bar{K}$ be the mean of wealth distribution for each country. Recall that an MPS from any distribution implies a single-crossing property at the mean of the distribution. This implies that if G_1 is an MPS of G_0, then $G_1(K_z) > G_0(K_z)$ for all K_z below the mean of the distribution and $G_1(K_z) \leq G_0(K_z)$ for all K_z above the mean. Thus, if $K(\phi,V)$ is below the mean, an MPS leads to an increase in the mass of entrepreneurs that are credit constrained, while if the opposite happens (i.e., $K(\phi,V) > \bar{K}$), an MPS in the wealth distribution reduces the mass of entrepreneurs unable to finance the project.

In what follows, an economy is said to be *credit constrained* if $K(\phi, V) > \bar{K}$ and unconstrained otherwise.[21] Then,

Result 4 *Consider two countries A and B that differ in their wealth distribution. (i) Suppose that country A's wealth distribution is a MPS of that of coutry B, then investment and total output are higher in country A when countries are credit constrained, while they are lower when countries are not credit constrained; (ii) suppose that country A's wealth distribution dominates in terms of FOSD that of country B, then investment and total output are higher in country A.*

This seems to provide an explanation for the conflicting evidence on the relationship between financial development and wealth distribution. In economies with high standards of creditor protection, there is a low wealth threshold for an entrepreneur to have access to credit, therefore market penetration is high (which we interpret as $K(\phi, V) \leq \bar{K}$). Hence among financially developed countries those with a better wealth distribution in the sense of a MPS have lower investment and output, while richer countries in terms of FOSD have greater investment and output. In contrast, among less financially developed countries, richer countries in terms of FOSD and with a better distribution in terms of MPS have greater investment and output.

Two distributions $G_1(K)$ and $G_0(K)$ satisfy the Monotone Probability Ratio (MPR) order if the probability ratio $P(K) = \frac{G_1(K)}{G_0(K)}$ is strictly increasing on $(0, 1]$; that is, for all $x < y$ in $(0, 1]$ [22]

$$\frac{G_1(x)}{G_0(x)} < \frac{G_1(y)}{G_0(y)}.$$

Let the value added by a firm be written as: $Q(V) \equiv pR + (1-p)V - (1+\rho)I$.

Consider two countries A and B that differ in their wealth distribution in the sense of MPR. Then the difference in the change in GDP between the two countries when the credit protection parameter falls from ϕ_1 to ϕ_0 is given by,

$$Q(V)\Big([G_A(K(V,\phi_1) - G_A(K(V,\phi_0))] - [G_B(K(V,\phi_1) - G_B(K(V,\phi_0))]\Big). \tag{9}$$

Then, we have:

Result 5 *Consider two countries A and B that differ in their wealth distribution in the sense of MPR but have the same credit protection parameter. Then country A's output rises by more than country B's output when the credit protection parameter falls from ϕ_1 to ϕ_0.*

Next, we study how the average interest rate spread varies across countries with different wealth distributions. In order to do so, we define $G_\theta \equiv \theta G_1 + (1-\theta)G_0$, where $\theta \geq 0$ and G_1 is a mean-preserving spread of G_0. Then, the family generated by G_θ as θ increases is a sequence of riskier distributions that transform G_0 into G_1. Thus, θ is a measure of risk in the sense that an increase in θ implies a more uncertain environment.

[21] We interpret a credit constrained economy as one that is less financially developed.

[22] The MPR order implies (strict) first order stochastic dominance. Also, note that the monotone likelihood ratio property implies the MPR property (see, Gollier (2005) for details).

Differentiating the average spread with respect to θ and then evaluating at $\theta = 0$, we obtain the following expression

$$\left.\frac{\partial \bar{s}}{\partial \theta}\right|_{\theta=0} = \frac{1}{1-G_0(K(\phi,V))}\left\{-\frac{1-G_1(K(\phi,V))}{1-G_0(K(\phi,V))}\left[\int_{K(\phi,V)}^{1}(r(p,K_z)-\rho)dG_0\right] + \int_{K(\phi,V)}^{1}(r(p,K_z)-\rho)dG_1\right\} \quad (10)$$

Suppose first that $K(\phi,V) > \bar{K}$. Then we know that $G_1(\cdot) < G_0(\cdot)$ for all $K_z > K(\phi,V)$. This implies that $1-G_1(K(\phi,V)) > 1-G_0(K(\phi,V))$ and therefore

$$\left.\frac{\partial \bar{s}}{\partial \theta}\right|_{\theta=0} < \frac{1}{1-G_0(K(\phi,V))}\left\{-\int_{K(\phi,V)}^{1}(r(p,K_z)-\rho)d(G_0-G_1)\right\} < 0,$$

since $G_1(\cdot) \leq G_0(\cdot)$ for all $K_z > K(\phi,V)$.

Consider now the case in which $K(\phi,V) \leq \bar{K}$. This implies that $1-G_1(K(\phi,V)) \leq 1-G_0(K(\phi,V))$ and therefore the above proof does not apply. Note however that if we had $K(\phi,V) = 0$, the average interest rate spread would be greater under G_1 since $r(p,K_z)$ is a strictly concave function of K_z. Thus, if the term in curly brackets in equation (10) falls with $K(\phi,V)$, then there is a cutoff $\hat{K}(\phi,V)$ for $K(\phi,V)$ such that the interest rate spread is smaller under G_1 for all $K(\phi,V)$ greater than $\hat{K}(\phi,V)$. Observe then that the partial derivative of the term in curly brackets with respect to $K(\phi,V)$ is given by

$$\left(\frac{(1-G_1(K(\phi,V)))\,g_0(K(\phi,V)) - (1-G_0(K(\phi,V)))\,g_1(K(\phi,V))}{(1-G_0(K(\phi,V)))^2}\right) \times \left\{(1-G_0(K(\phi,V)))\,(r(p,K(\phi,V))-\rho) - \int_{K(\phi,V)}^{1}(r(p,K_z)-\rho)dG_0\right\}.$$

As $r(p,K_z)$ falls with K_z, the term in curly brackets is positive. The whole term in curly brackets in (10) is positive if the following condition holds:

$$\frac{1-G_1(K(\phi,V))}{g_1(K(\phi,V))} \leq \frac{1-G_0(K(\phi,V))}{g_0(K(\phi,V))}. \quad (11)$$

Thus, if condition (11) holds, there is a $\hat{K}$ such that for any $K(\phi,V) > \hat{K}$ a marginal MPS in the direction of G_1 increases the spread, while it reduces the spread for $K(\phi,V) < \hat{K}(\phi,V)$. Because $1-G_1(K(\phi,V)) \leq 1-G_0(K(\phi,V))$, this requires that $g_1(K(\phi,V))$ is not too small relative to $g_0(K(\phi,V))$. Thus, we obtain

Result 6 *Consider two countries A and B that differ in their wealth distribution. (i) Suppose that country A's wealth distribution dominates in terms of FOSD that of country B, then the average interest spread is lower in country A; and (ii) suppose that country A's wealth distribution is a MPS of that of coutry B. Then, (i) if $K(\phi,V) > \bar{K}$, the average interest spread is lower in country A; and (ii) if condition (11) holds, then there exists a cutoff for the credit constraint limit $K(\phi,V)$, denoted by $\hat{K}(\phi,V)$ (with $\hat{K}(\phi,V) < \bar{K}$), such that the average interest spread is lower in country A for all $K(\phi,V) \geq \hat{K}(\phi,V)$.*

This result shows first that richer economies (an economy is richer than other when its wealth distribution FOSD that for the other country) have lower average interest rate spreads. Second, when equally rich economies have a small mass of entrepreneurs with access to credit, the one with more unequal wealth distribution will have the lower interest rate spread as only very wealthy agents have access to credit and require small loans. In contrast, in equally rich economies in which the vast majority of entrepreneurs have access to credit, the opposite will happen.

3.2 A Closed Economy

3.2.1 The equilibrium

In a closed economy, it is still true that (4) and (6) hold. The difference is that now the risk free rate is endogenous, driven by the equilibrium of supply and demand for mobile capital. In order to determine the equilibrium in the market for mobile capital, note that supply and demand for capital are given by

$$K^S = \int_0^1 K_z dG, \quad \text{and} \quad K^D = I(1 - G(K(\phi, V))). \tag{12}$$

The equilibrium price of capital is the risk free interest rate ρ^* that equates supply and demand. Given that supply is fixed, at a constant value K^S, all the action occurs in the demand side. In particular, the slope of the demand for capital is given by:

$$\frac{\partial K^D}{\partial \rho^*} = -Ig(K(\phi, V))\frac{\partial K(\phi, V)}{\partial \rho^*}, \tag{13}$$

and therefore we have a unique equilibrium if $\partial K(\phi, V)/\partial \rho^* > 0$, since it implies that the demand for capital would be downward sloping. In order to calculate this effect, note that we can still use (4), since the cost of funds must equal the expected return from lending, by competition among lenders. Hence, (5) determines the interest rate facing agent z if she receives a loan. This implies that $\partial K(\phi, V)/\partial \rho > 0$, which in turn results in a negative sloped demand function. This together with the assumption

- (A3) $K^S < I(1 - G(K(\phi, V)))$ when $K(\phi, V)$ is evaluated at $\rho = 0$

proves the existence of a unique interior equilibrium in the capital market of this economy. Thus,

Proposition 2 *Given assumption (A3) there is a unique equilibrium prime interest rate in the closed economy $\rho^* > 0$.*

As before, we can define the equivalent of (7) for a closed economy,

$$K^*(\phi, V) \equiv I - \frac{pR + (1 - p)V}{1 + \rho^* + \phi}.$$

However, for this to be the equilibrium, we need to impose the equivalent to assumptions (A1) and (A2) for the case in which the market interest rate is determined by the equilibrium condition in equation (12). Define the maximum interest rate ρ_{max} as the solution to the following: $1 = G(K^*(\phi, V))$; that is, ρ_{max} is the interest rate at which the demand for capital is zero. Then we can replace assumptions (A1) and (A2) by the following assumptions (because the original conditions are increasing in ρ):

- (A1'): $pR + (1-p)V - (1+\rho_{max})I > 0$
- (A2'): $\phi pR \geq (1+\rho_{max})(1-p)V$.

Thus, the discussion so far leads to the following result.

Proposition 3 *Given assumptions (A1') and (A2') and parameters (ϕ, τ, V) only entrepreneurs with a wealth level $K_z \geq K^*(\phi, V)$ have access to the credit markets and they have to pay to outside investors an interest rate equal to $r_z = \frac{1+\rho^*}{p} - \frac{1-p}{p}\frac{\tau V}{D_z} - 1 > 0$.*

3.2.2 Implications

Consider now the effect of changes in credit protection and asset hardness (or quality of bankruptcy procedures) on the economy. The demand for funds depends on the level of creditor protection and asset hardness through the wealth cutoff $K^*(\phi, V)$ above which entrepreneurs have access to the capital market. Entrepreneurs with a wealth level greater than $K^*(\phi, V)$ receive loans. They invest their own wealth in the firm and borrow additional funds to attain the required initial outlay I. For a given interest rate ρ^*, the demand for funds rises as the loan recovery rate $1-\phi$ improves, and asset hardness increases, or as bankruptcy legislation improves. In turn, this implies that the equilibrium interest rate is higher and the size of credit markets is larger in economies with higher loan recovery rates and in sectors where asset hardness is greater (or if bankruptcy legislation improves). Formally, from the market equilibrium condition (12) and the definition of $K^*(\phi, V)$, we have:

$$g(K^*(\phi,V))\left[\frac{\partial K^*(\phi,V)}{\partial \rho^*}\frac{\partial \rho^*}{\partial d} + \frac{\partial K^*(\phi,V)}{\partial d}\right] = 0 \Longrightarrow \frac{\partial \rho^*}{\partial d} = -\frac{\partial K^*(\phi,V)}{\partial d} \Big/ \frac{\partial K^*(\phi,V)}{\partial \rho^*}. \tag{14}$$

Given the definition of $K^*(\phi, V)$, it is easy to show that $\partial K^*(\phi,V)/\partial \rho^* > 0$. Thus, the change in the equilibrium interest rate is fully determined by the change in $K^*(\phi, V)$ in response to d. If the change in d at the original interest rate results in an additional demand for capital because the threshold value $K^*(\phi, V)$ falls, the interest rate rises. This in turn leads to an increase in $K^*(\phi, V)$ in order to adjust the demand of capital to the fixed supply. Hence the mass of firms receiving loans does not change in response to changes in d, but the distribution of wealth responds to the induced change in the interest rate. For example, Figure 2 shows the effect of an increase in ϕ, i.e., a decline in the ex ante loan recovery rate, which lowers the interest rate.

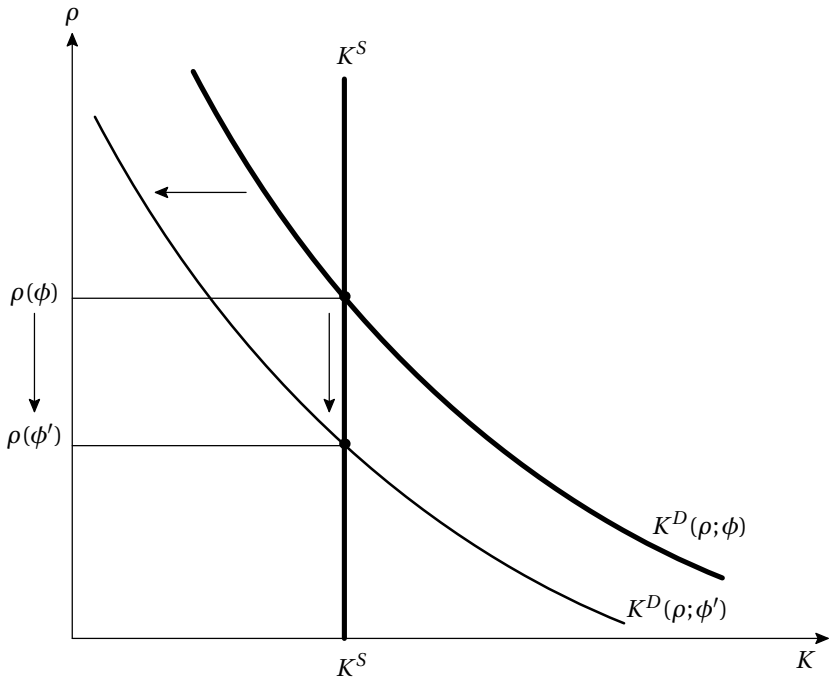

Figure 2: Prime rate change induced by a fall in the ex ante loan recovery rate ($\phi \uparrow$).

Proposition 4 *Improvements in ex ante credit protection, asset hardness or in the efficiency of bankruptcy procedures result in a higher equilibrium interest rate, but have no other effects on the economy, except for changes in the wealth distribution.*[23]

This result is similar to one obtained by Shleifer and Wolfenzon [2002], in the context of improved protection of minority shareholders (and with an elastic supply of investment funds).[24] This effect is noted in Qian and Strahan [2007], who observe that greater financial penetration in a country (driven by ex ante credit protection, asset hardness or improved bankruptcy procedures) is associated to higher interest rates. The authors claim that this "seemingly surprising" result is driven by higher loan demand, and this implicitly assumes that the relevant credit markets are not totally open, so the observation is consistent with our result. Better creditor protection broadly defined has no effect on the demand for capital: an improvement in creditor protection increases the interest rate spread for all borrowers, without having real effects (apart from distributive effects) on the economy.[25]Next, observe that the average spread can be written as:

$$S(D) = \frac{1}{1 - G(K^*(\phi, V))} \int_{K^*(\phi,V)}^{1} (r_z(p, K_z) - \rho^*) dG.$$

[23]If the reduction in $(1 - \phi, V)$ leads to a negative prime rate there is no more lending in the economy.

[24]If the supply of capital had been elastic in our model, improved protection for lenders would have increased the supply of capital and part of the adjustment to the new conditions would have enabled more entrepreneurs to borrow, as $K^*(\phi, V)$ would decrease. Nevertheless, unless the supply of labor were completely elastic (as in the open economy section), the prime rate would increase.

[25]With an elastic supply of capital, a reduction in the ex post loan recovery rate would have reduced the spread for those agents that received loans before the improvement in loan recovery rates.

We have the following result showing the impact of changes in credit protection, asset hardness and the efficiency of bankruptcy procedures on the average interest rate spread.

Proposition 5 *An improvement in ex-ante creditor protection, asset hardness, and the efficiency of bankruptcy procedures results in a lower average spread, while an improvement in credit protection in the case of financial distress (τ) raises the average spread.*[26]

Proof The total effect of a change in d on the average spread is:

$$\frac{\partial S(D)}{\partial d} = \frac{1}{1 - G(K^*(\phi, V))} \left\{ \int_{K^*(\phi,V)}^{1} \left[\frac{\partial r_z(p, K_z)}{\partial d} - \frac{\partial \rho^*}{\partial d} \right] dG \right\} \tag{15}$$

where the other two terms vanish because $\partial K^*/\partial d = 0$, as the supply of capital is fixed and we are considering the total effect of the change in the variable d.
Now, since$\partial r_z/\partial \phi = (\partial \rho^*/\partial \phi)/p$ (using (5)), the integrand in (15) simplifies to $(1-p)/p$ in the case $d = \phi$, so $\partial S/\partial \phi > 0$. In the cases $d = \tau, V$, we use (5) to obtain

$$\begin{aligned}
\frac{\partial S(D)}{\partial d} &= \frac{1}{1 - G(K^*(\phi, V))} \left(\frac{1-p}{p} \right) \int_{K^*(\phi,V)}^{1} \left(\frac{\partial \rho^*}{\partial d} - \frac{1}{I - K_z} \right) dG \\
&\leq \frac{1}{1 - G(K^*(\phi, V))} \left(\frac{1-p}{p} \right) \int_{K^*(\phi,V)}^{1} \left(\frac{\partial \rho^*}{\partial d} - \frac{1}{I - K^*(V, \phi))} \right) dG
\end{aligned}$$

In the case $d = \tau$, we have that $\partial \rho^*/\partial \tau = 0$ using (14) and the fact that $\partial K^*/\partial \tau = 0$, from (5). Therefore, $\partial S/\partial \tau \leq 0$. Finally, for the case $d = V$, observe that using the expression for K^*, and then (14) we have:

$$\frac{\partial K^*}{\partial \rho^*} = -\frac{pR + (1-p)V}{(1 + \rho^* + \phi)^2}, \quad \text{and} \quad \frac{\partial K^*}{\partial V} = -\frac{(1-p)}{1 + \rho^* + \phi} \Longrightarrow \frac{\partial \rho^*}{\partial V} = \frac{(1-p)(1\rho + \phi)}{pR + (1-p)V}$$

while

$$\frac{1}{(I - K^*(\phi, V))} = \frac{(1 + \rho^* + \phi)}{(pR + (1-p)V)}.$$

Hence the integrand in the expression for $\partial S/\partial V$ is negative and therefore $\partial S/\partial V < 0$. ∎

The intuition for this proposition is clearest in the case of changes in ex post credit protection τ. Since this has no effect on the demand for capital, given by $K^*(\phi, V)$, ρ^* does not change. Increased protection implies that lenders should be willing to ask for a lower return in case of success. At an unchanged spread, this would mean, by (4), that absconding becomes more attractive in response to the higher τ, and thus the lender must compensate by asking for a higher average spread. In the case of an improvement in ex ante credit protection (a fall in ϕ), it does not affect the individual interest rate facing an entrepreneur (by (5)). In the case of changes in V, the two effects coexist, but the negative impact on the spread dominates.

Next we investigate the consequences of differences in wealth distribution across countries on GDP, the equilibrium interest rate and on interest rate spreads. From the capital

[26] If the change in (ϕ, τ, V) leads to a negative equilibrium rate there is no lending in the economy.

market equilibrium condition, we derive the following

$$\left.\frac{\partial \rho}{\partial \theta}\right|_{\theta=0} = -\frac{\left[G_1\left(K^*(\phi,V)\right) - G_0\left(K^*(\phi,V)\right)\right] I + \int_0^1 K_z d\left(G_1 - G_0\right)}{g_0(K^*(\phi,V))\frac{\partial K^*(\phi,V)}{\partial \rho} I}. \tag{16}$$

Note that the denominator is positive, since entrepreneurs are increasingly subject to credit constraints as the equilibrium interest rate increases. The numerator can be either positive or negative depending on the relation between $K^*(\phi,V)$ and the point at which the two distributions cross and on whether the change in θ represents an FOSD or an MPS.

Consider first a FOSD change in wealth distribution. There are two effects. On the one hand, the total supply of funds rises which, ceteris-paribus, results in a lower interest rate. On the other hand, there is an increase in the number of firms that have access to the credit market, and therefore, ceteris-paribus, the demand for fund raises. The final effect is ambiguous and cannot be determined without specific assumptions regarding the wealth distribution.

In contrast, both total investment and output rise with a positive FOSD change in the wealth distribution. To see this, recall that investment and output depend only on the effect of θ on $[1 - G(K^*(\phi,V))]\, I$. Note that

$$\begin{aligned}\left.\frac{\partial \left[1 - G(K^*(\phi,V))\right] I}{\partial \theta}\right|_{\theta=0} = &-\left[G_1\left(K^*(\phi,V)\right) - G_0\left(K^*(\phi,V)\right)\right] I \\ &- g_0\left(K^*(\phi,V)\right)\frac{\partial K^*(\phi,V)}{\partial \rho}\frac{\partial \rho}{\partial \theta} I.\end{aligned} \tag{17}$$

The first term is negative while $\partial K^*/\partial \rho > 0$ (a higher interest rate leads to more credit constrained entrepreneurs). Plugging (16) into equation (17), the result follows. A similar procedure provides the result for output.

Consider now the effect of an MPS difference in the wealth distribution between countries. By definition of an MPS, the second term in the denominator of equation (16) is zero, while the first term is positive whenever $K^* \leq \bar{K}$ and negative otherwise. Following our interpretation of the development of financial markets of the previous section, an MPS difference in the wealth distribution results in a lower interest rate when comparing economies with more developed financial systems and results in a higher interest rate when comparing countries with less developed financial systems. However, total output as well as total investment remains unchanged (since there is no increase in the aggregate stock of capital). Hence, if we compare two countries with less developed financial markets, one of which has an MPS difference in the wealth distribution, the distribution of income is worse. This leads to the following result.

Result 7 *Consider two countries A and B. (i) Suppose that country A's wealth distribution marginally dominates in the sense of FOSD that of country B, then GDP and total investment are higher in country A, while the equilibrium interest rate may be higher or lower in country A. (ii) Suppose that country A's wealth distribution is a MPS of that of country B. Then GDP and total investment are the same in both countries, while the equilibrium interest rate is lower in country A if $K^*(\phi,V) > \bar{K}$, and greater in country B if the condition is reversed.*

4 The effect of Labor Protection Laws

4.1 The equilibrium

The effect of employment protection laws (EPL) has sparked an ongoing debate. Some authors believe that labor market institutions impair economic performance, while others maintain that they can improve workers' welfare without harming economic efficiency. A large body of literature assessing the impact of EPL on labor market variables has led to ambiguous results. Some studies find that employment protection regulations have important effects on employment adjustment, worker turnover, employment, or unemployment, and others find no evidence of such effects. At the same time, little is known about the effects of employment protection on value added and on productivity, given the few studies that have examined this issue. However, recent studies indicate a negative effect of EPL. Micco and Pages [2006] find that more stringent legislation slows down job turnover, and that this effect is more pronounced in sectors that are intrinsically more volatile. Moreover, employment and value added in the more volatile sectors declines. Caballero et al. [2006] find that EPL slows the creative-destruction process, especially in countries where regulations are likely to be enforced. They report that moving from the 20th to the 80th percentile in job security, in countries with strong rule of law, cuts the annual speed of adjustment to shocks by a third, while shaving off about one percent from annual productivity growth. The same shift in employment protection has negligible effects in countries with weak rule of law.

In order to study the interaction of EPL with credit protection, we modify our model in order to incorporate labor in a simple way, and consider the simplest of all EPL, namely, a fixed firing cost. We assume a population of preexisting firms that, in order to continue operations in the present (and final) period, require an investment I and the funds to pay the wage of a single worker. A firm, when successful, produces R if the investment is made and a worker is hired, and produces nothing otherwise. The labor market is assumed competitive and workers are paid the current wage. In the case of bankruptcy, or financial distress, there are labor market regulations that increase the cost of firing the worker. In particular, we assume that in case of bankruptcy the worker must be paid a firing cost f, and that outside investors have access to the liquidation value of the assets of the firm, net of firing costs.[27] Thus, labor has priority claims over investors in the case of bankruptcy.[28] Due to limited liability, we assume $V - f \geq 0$. This is intended to capture in a reduced form the common regulatory requirement that firms pay a firing cost either in the form of a severance pay or a as a layoff tax when the worker is dismissed.

The OECD publishes an index of EPL that considers three aspects: i) difficulty of dismissal, that is, legislative provisions setting conditions under which a dismissal is "justified" or "fair"; ii) procedural inconveniences that the employer may face when starting the dismissal process; and, iii) notice and severance pay provisions. United States has the lowest value for this index and Portugal and Turkey have the highest. All OECD countries, except for the the US, have some kind of mandatory severance pay or advance noticed for no-fault

[27] In many cases, the right of labor to be first in line (priority) in case of bankruptcy has limits, but for most purposes workers are well protected, when compared to other lenders.

[28] See Perotti and von Thadden [2006] for a similar assumption.

dismissals. [29]

In the case that the project continues, the entrepreneur can pledge an amount equal to $R - w$ to outside investors. Thus, in the previous expressions for the minimum wealth that provides access to credit, we need to replace R by $R - w$ and V by $V - f$ in conditions (4) and (6). Doing so, we obtain[30]

$$K(\phi, V, f) \equiv I - \frac{p\,(R - w) + (1 - p)\,(V - f)}{1 + \rho + \phi}. \tag{18}$$

Observe that the threshold wealth that gives access to the capital market is, ceteris-paribus, increasing in firing costs and wages. The reason is straightforward. The higher the wage, the smaller the amount that can be pledged to outside investors and the higher the severance pay, the lower the amount that outside investors get back in the case of financial distress. Moreover, as labor costs $(w,\ f)$ rise, the greater the firm's incentive to abscond before investing. In order to determine the total effect of EPL on credit rationing we need to derive the equilibrium of this economy. The wage is obtained by examining the solution to the labor market equilibrium. We assume an exogenously given supply of labor, which is an increasing and continuously differentiable function $L^S(w)$ that satisfies $L^S(0) = 0$ and $\lim_{w\to\infty} L^S(w) \to \infty$.[31] Labor demand is equal to the mass of entrepreneurs that have access to loans; that is,

$$L^D(w^*) = 1 - G(K(\phi, V, f)). \tag{19}$$

Because labor demand is downward sloping and labor supply is upward sloping, we obtain the following result.

Proposition 6 *(i) There is a unique positive equilibrium wage w^* for any given (ϕ, τ, V). Only entrepreneurs with a wealth level $K_z \geq K(\phi, V, f)$ have access to the credit markets and they pay an interest rate equal to $r_z = \frac{1+\rho}{p} - \frac{1-p}{p}\frac{\tau(V-f)}{D_z} - 1$ to outside investors.*

4.2 Implications

For any given level of the variables $d = (\phi, \tau, V)$, the effect of a change in firing costs f on the labor market equilibrium is then given by:

$$\frac{\partial L^S}{\partial w}\frac{\partial w^*}{\partial f} = \frac{\partial L^D}{\partial f} + \frac{\partial L^D}{\partial w}\frac{\partial w^*}{\partial f}$$

[29] This is also common in some developing coutries. For instance, Chilean labor market regulations require firms to pay workers severance pay equal to one monthly salary for each year of tenure, with a limit of 11 years, for no-fault dismissals (fault is extremely difficult to prove). Even in the case of financial distress, firms must pay the firing cost.

[30] The definition of the wealth theshold above which lending occurs requires an assumption analogous to (A2), modified to incorporate labor costs.

[31] We can think of workers as agents that are born without wealth, or with no specific capital. We implicitly assume that agents with positive wealth cannot become workers.

Reordering:

$$\frac{\partial w^*}{\partial f}\left(\frac{\partial L^S}{\partial w}-\frac{\partial L^D}{\partial w}\right)=\frac{\partial L^D}{\partial f}. \tag{20}$$

Noting that

$$\frac{\partial L^D}{\partial f}=-g(K(\phi,V,f))\frac{\partial K(\phi,V,f)}{\partial f},$$

as well as that labor supply is upward sloping, labor demand is downward sloping, and that the mass of entrepreneurs that are credit constrained rises, other things equal, as firing costs increase, we conclude that the equilibrium wage falls as firing costs rise. Having fewer entrepreneurs with access to credit (if the wage remained constant) and that bid for workers, salaries must fall.

Furthermore, note that the mass of entrepreneurs who are not eligible for a loan rises as firing costs increase (from (18)) if and only if $p(\partial w^*/\partial f)+(1-p)\geq 0$. Because the equilibrium wage falls as f rises, this requires that

$$\frac{\partial w^*}{\partial f}\geq -\frac{1-p}{p}. \tag{21}$$

Note that from (19) and (20) we have:

$$\frac{\partial w^*}{\partial f}=\left(-g(K(\phi,V,f))\frac{(1-p)}{1+\rho+\phi}\right)\Bigg/\left(\frac{\partial L^S}{\partial w}+g(K(\phi,V,f))\frac{p}{1+\rho+\phi}\right).$$

Plugging this expression into (21) and recalling that $\partial L^S/\partial w>0$ leads to the following result.

Result 8 *(i) As firing costs rise, the equilibrium wage falls and more entrepreneurs become credit constrained, but total compensation costs, including firing costs, increase; (ii) an improvement in the loan recovery rate, an increase in asset hardness, or better bankruptcy procedures result in a higher equilibrium wage; (iii) as the loan recovery rate rises, firing costs becomes a more critical determinant of access to credit (that is, $\frac{\partial K(\phi,V,f)}{\partial\phi\partial f}\leq 0$); and (iv) firing costs as a determinant of access to credit are independent of the quality of ex post credit protection (that is, $\frac{\partial K(\phi,V,f)}{\partial\tau\partial f}=0$).*

Thus, an improvement in ex ante creditor protection not only allows more entrepreneurs to finance their projects, but also results in higher total expected compensation ($pw^*+(1-p)f$). This suggests that policy reforms that increase creditor protection will have positive effects on capital and labor markets. Observe that if labor markets have unions, workers in sectors with more asset hardness (such as mining or heavy manufacturing) will be able to push for higher wages with a low risk of facing unemployment due to credit constraints. Furthermore, the result suggests that as a country's ex ante creditor protection or its bankruptcy procedures become more efficient, those labor market frictions that can be interpreted as firing costs become less relevant. In countries where labor market reforms are harder to accomplish or undertake due to political constraints, authorities can alleviate the efficiency costs by introducing reforms to the capital markets.

Also observe that firms that are stronger (in the sense of having greater assets holdings) will lose less from more stringent labor rules, since these induce lower wages, even though

they increase total labor compensation. Hence, the model predicts that business associations composed of larger and more capitalized firms may not be strongly opposed to increased labor regulations, while business associations representing weak firms will be strongly opposed to these rules. The effect of higher firing costs will be that weaker firms will be weeded out because they will not obtain working capital to continue to operate, leaving a distribution of surviving firms that is biased towards those with initially stronger capitalization.

Because workers and entrepreneurs are risk neutral, wages and firing costs represent a transfer from entrepreneurs and lenders to workers. Thus as firing costs rise, the effect on GDP occurs only through the change in the mass of entrepreneurs that become credit constrained. Since $K(\phi, V, f)$ rises with f, we obtain the following result.

Result 9 *Total output and investment fall as firing cost rises.*

The next question we attempt to answer is how firing costs and changes in the wealth distribution affect wages. Since wealth distribution changes do not affect the labor supply in our model, wealth distribution changes have an impact on wages only through their effect on labor demand. Note that

$$\left.\frac{\partial L^D}{\partial \theta}\right|_{\theta=0} = G_0(K(\phi, V, f)) - G_1(K(\phi, V, f)).$$

As labor supply is upward sloping and labor demand downward sloping, the direction of change in the equilibrium wage when the economy is hit by a change in income distribution captured by θ is captured by the sign of $G_0(K(\phi, V, f)) - G_1(K(\phi, V, f))$. This leads to following result.

Result 10 *Consider two countries A and B. (i) Suppose that country A's wealth distribution is a MPS of that of country B, then wages are lower in country A when the economy is highly constrained (i.e., $K(\phi, V, f) > \bar{K}$), while the opposite occurs when the economy is not highly constrained; (ii) suppose that country A's wealth distribution marginally dominates in the sense of FOSD that of country B, then wages are higher in country A.*[32]

This result confirms that even when differences in wealth distribution across countries that do not affect the aggregate capital stock, they have real consequences since they alter real wages. If the economy is highly constrained, being in a country with a more dispersed wealth distribution has negative consequences on labor market outcomes, while wages and employment rise in economies that are not highly constrained. In the case of an economy that becomes wealthier (an FOSD transformation), wages rise.

Next, we discuss how changes in firing costs affect interest rates and the interest rate spread. The interest rate charged to an entrepreneur with wealth $K_z \geq K(\phi, V)$ is given by

$$r(p, K_z) = \frac{1+\rho}{p} - \frac{(1-p)}{p}\frac{\tau\,(V-f)}{D_z} - 1. \tag{22}$$

[32]Because $K^*(\phi, V)$ falls.

Thus, if firing costs rise the interest rate charge to entrepreneur z rises. The change in the interest rate spread is given by

$$\frac{\partial S(D)}{\partial f} = -\frac{g(K(\phi,V,f))}{1-G(K(\phi,V,f))}\frac{\partial K(\phi,V,f)}{\partial f}\left\{r(p,K(\phi,V))-\rho \right.$$
$$\left. -\frac{1}{1-G(K(\phi,V,f))}\int_{K(\phi,V,f)}^{1}(r(p,K_z)-\rho)dG(K_z)\right\}$$
$$+\frac{1}{1-G(K(\phi,V,f))}\frac{(1-p)}{p}\int_{K(\phi,V,f)}^{1}\frac{1}{D_z}dG(K_z).$$

Note that the term in curly brackets is positive. Thus, the whole first term is negative since the mass of credit constrained entrepreneurs rises as firing costs increase and this tends to lower the spread, as the remaining entrepreneurs with access to credit are wealthier. The second term, which represents the direct effect of firing costs in reducing salvage value, is clearly positive. Thus, an increase in firing cost increases the interest rate charged to a specific entrepreneur, but the effect on the average spread is ambiguous.
Finally, we study the effect of firing costs on the utility of entrepreneurs:

$$U_e = \begin{cases} 0 & \text{if } K_z < K(\phi,V,f) \\ p(R-w^*)+(1-p)(V-f)-(1+\rho)I & \text{if } K_z \geq K(\phi,V,f) \end{cases}$$

Observe that an increase in firing costs lowers the mass of agents with access to credit since total expected labor costs rise. Thus the increased firing cost reduces the average entrepreneurs' utility. It is of interest to note the divergence in the effect of improvements in the loan recovery rate, of asset hardness and of improved bankruptcy procedures on credit constrained and on wealthy entrepreneurs. Since these lead to higher equilibrium wages, they reduce the utility of those entrepreneurs that had access to the credit markets before the change in the financial sector (that is, rich entrepreneurs).

4.3 Financial and Labor Market Reforms

Before presenting the main conclusions of the paper we find it worthwhile to discuss how the results presented here can shed some light on on the following question: If financial development matters for economic performance, as demonstrated by the large empirical literature, why are there some countries that attempt to develop their financial markets, while others do not? The recent literature has provided a political economy explanation to this question. In particular, Rajan and Zingales [2003], La Porta et al. [Forthcoming], Pagano and Volpin [2005], show that part of the answer comes from political opposition of the incumbent entrepreneurs and part comes from the type of democratic institutions that are in place in each country such as the voting system. Braun and Raddatz [Forthcoming] provides strong empirical support for the idea that political economy considerations help explain the differences in financial development observed within countries across time. In addition, the evidence suggests that policies that alter the development of financial markets have important distributive consequences, and this gives rise to political economy opposition to

efficient markets.

While this paper was not intended to provide a theory of financial development, the fact that the paper is able to explain several different empirical facts at once, provides a framework that can help interpret the finding that interest group politics is an important factor in financial development across countries. In particular, we find that there is a conflict of interest between wealthy and constrained entrepreneurs regarding the desirability of measures that improve credit markets.

Our explanation relies on three dimensions, heterogeneity at firm level, degree of openness of capital markets, and their interaction with labor regulations. Setting aside for the time being the issue of labor market regulations, we focus on the difference between open and closed capital markets. The first important distinction between these two types of economies is that in the former, an improvement in the different creditor protection variables results in an increase in total investment and GDP, since more entrepreneurs are able to raise funds to set up firms. In addition, this results in higher wages and thus lower rents for the incumbent entrepreneurs but higher rents for those who were unable to raise funds before the improvement. In contrast to these results, in a closed economy, improved creditor protection has no effect on the number of firms that are able to finance their projects. This implies that the greater demand for funds due to improved creditor protection legislation translates only on higher equilibrium interest rates and has no effects on wages. It is clear from this that improved capital markets leads to increased total welfare in an economy open to capital flows, but welfare remains unchanged in an economy closed to capital flows. However, changes in creditor protection have important distributional consequences on different agents. Labor is better-off in open economy and indifferent in a closed economy. In an open economy, entrepreneurs setting up new firms are better-off, while those with ongoing firms are worse-off since they have to pay higher wages. In contrast, in a closed economy, there are no incoming entrepreneurs and wages are unchanged, yet interest rates are higher due to increased competition for funds, and thus incumbent entrepreneurs are worse-off.[33]

Labor will favor the adoption of reforms that deepen the development of financial markets in an open economy, and they will be indifferent in a closed economy. Entrepreneurs that already have access to credit, in an open economy will oppose financial reforms aimed at improving creditor protection, while the other entrepreneurs will favor them. In a closed economy, there are no potential entrepreneurs that push for a reform, and incumbent entrepreneurs will oppose them, since better creditor protection does not increase credit penetration, but it does increase the cost of finance for incumbent entrepreneurs. Thus, as shown by Rajan and Zingales [2003] and Braun and Raddatz [Forthcoming], more open countries are more likely to adopt financial reforms that result in better creditor protection. Furthermore, entrepreneurs in sectors with softer assets are more likely to push for financial reforms.

Consider now the effect of labor market reforms aimed at increasing employment protection. In both an open and closed economy, workers who are assured of not being fired (as they work for heavily capitalized firms) are better-off with tougher employment protection legislation since an increase in firing costs has a positive effect on expected labor income.

[33] In a model in which wealthy agents have $K_z > I$ and lend capital through the banking system, those agents are better off with the rise in interest rates.

The effect is larger in a closed economy since wages do not change, while in a open economy they fall. Thus, employees in firms that are heavily capitalized (usually unionized labor), will fight for increased labor protection at the expense of workers employed in marginal firms.

In an open economy, entrepreneurs will oppose increased employment protection since that will increase expected labor costs. In contrast, in a closed economy an increase in firing costs has no effect on wages since the number of firms does not change and all the adjustment comes about through declines in the equilibrium interest rate. Thus, on the one hand, entrepreneurs are worse-off because they face higher labor costs due to the increased firing costs, but on the other hand, they are better-off since they face a lower equilibrium interest rate. When the former effect dominates they will oppose increased labor protection, while the opposite will occur when the latter effects dominates. This again suggests that labor reforms aimed at increasing employment protection are more likely to be adopted in closed economy since there is less of a conflict between entrepreneurs and workers in heavily capitalized firms.

This provides the following result.

Result 11 *Labor reforms aimed at increasing employment protection are more likely to be adopted in closed economies, and financial market reforms aimed at increasing creditor protection are more likely to be rejected in closed economies. Thus, openness is an important determinant of financial development and labor market flexibility.*

5 Conclusions

In this paper we present a simple model of entrepreneurs with different initial wealth levels, who require working capital loans in order to continue to run firms, in an environment with weak creditor protection. We examine entrepreneurs' decisions and the market equilibrium with credit constraints. Next, we compare the performance of economies with different degrees of creditor and labor protection, as well as different wealth distributions. The model leads to several predictions, some of which are consistent with empirical observations and tests, while others represent new predictions which appear to be untested.

Our results relate to basic economic variables: investment, GDP, credit penetration, interest rates, interest rate spreads, and wages. We untangle the effects of reforms to credit and employment protection (i.e., parameter changes) on these variables, as well as the effects of their interactions. Among the more interesting results, we show that better bankruptcy procedures as well as improved ex ante loan recovery rates lead to higher credit penetration, GDP and investment, results that are verified empirically. At the sectoral level, increased asset hardness has the same effects. We confirm the result of Shleifer and Wolfenzon [2002] that in a closed economy, an increase in ex ante credit protection raises the interest rate, as more borrowers can access the credit market.

Ex post credit protection does not affect credit penetration, but lowers the interest rate charged borrowers. We provide an explanation of the evidence in Braun and Larrain [2005], that shows that as credit protection worsens, asset hardness becomes a critical determinant of access to credit.

We also analyze the effects of differing wealth distributions among countries. If two countries have the same average GDP but in the second country wealth is more unequally distributed, investment and output are lower and the average interest rate charged on loans is higher, if the economy is very credit constrained. The results are reversed with an increase in inequality when the economies are not very credit constrained.

In our model, increased labor protection leads to lower wages, because the increased cost of labor means that fewer firms have access to credit, so fewer workers are employed. On the other hand, improvements in creditor rights or a better bankruptcy system lead to more hires and higher wages, since firms have better access to credit.

The political economy implications of the model may help us to understand why there is heterogeneity in financial development and employment protection despite the fact that we show that having a developed financial systems with less employment protection is more efficient for society. In particular, we show that there will be a divergence in the interests of workers of strong firms, and those in weaker firms. Workers in strong firms will push for more worker protection, since employment in their sectors does not fall (because these firms continue to receive credit), but are better off in case of failure of the firm. On the other hand, workers in weaker firms are worse off because their firms do not have access to credit and therefore hire fewer workers, and this effect is not compensated by the better outcomes in case of failure of the firm. There is anecdotal evidence supporting these effects. In addition countries with strong labor protection such as Italy and Brazil have large underground economies made up of small firms, while large firms operate above ground, following the legal legislation, and this is consistent with our results. An additional result is that in closed economies there will be more opposition to measures that improve access to credit and more support for increases in labor protection. These results are consistent with Rajan and Zingales [2003], who find that openness is a crucial determinant of financial development.

Extensions of this line of research are i) an examination of credit constraints arising from limited pledgability (i.e., by eliminating assumption (A1)) and ii) the endogeneization of the political economy process of employment protection sketched in section 4.3.

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