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Economic performance, creditor protection, and labour inflexibility

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We present a static general equilibrium model of an open economy where agents are heterogeneous in terms of observable wealth and there are endogenous credit constraints due to imperfect creditor protection. Improved credit protection, harder assets, and more efficient bankruptcy procedures increase output, investment, and credit penetration. Better credit protection and harder assets lead to higher interest rate spreads. In a capital constrained (unconstrained) economy, greater (lower) wealth inequality leads to higher (lower) investment and output. Interest rate spreads are lower in richer and more unequal economies in terms of their wealth distribution. We also show that increased labour protection leads to lower wages and output in the presence of credit market imperfections. Nevertheless, increased protection benefits workers in (and owners of) firms with strong balance sheets.

JEL classifications: 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 (see 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 labour market distortions on the performance of the economy.

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 that is 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. The banking system is competitive and can obtain unlimited funds from abroad at a fixed rate.[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, because 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 behaviour, 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. We denote this by '*ex post* creditor protection rights', and measure these as the fraction of the salvage value received by outside investors. Finally, another dimension of the bankruptcy system is its efficiency, measured as the loss in salvage value due to suboptimal bankruptcy regulations, which we assume is a legal characteristic of a country.

There is one final factor that can influence the ability to obtain loans in a given sector of the economy. In the case of bankruptcy, the liquidation value that can be pledged to outside investors depends on the 'asset hardness' of the project. Asset hardness is a characteristic of a sector that quantifies the fraction of sectoral assets that can be appropriated by creditors in case of distress. 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.

[1] The fixed investment size simplifies the analysis. With variable sized projects most results survive in attenuated form.

[2] The web version of this paper also considers a closed economy, where interest rates are determined endogenously. Most results are similar and we only note when there are differences between the two cases.

[3] 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 a more general model with several sectors within a country.

To the simple economy described above we add labour, because we are interested in the interaction between labour 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 labour has a priority claim over creditors in the case of financial distress or bankruptcy.[4]

We find that an increase in the *ex ante* loan recovery rate, as well as more efficient bankruptcy procedures, lead to higher investment, GDP, increased credit penetration, and higher average spreads, as agents with weaker balance sheets get access to credit.[5]

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.

An improvement in the distribution of income in the sense of first-order stochastic dominance (FOSD hereafter) increases 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 mean-preserving spread (MPS hereafter) of the wealth distribution lowers total investment and output, and raises the average interest rate spread in capital constrained economies. The results are the opposite in the case of economies which have the aggregated capital.

Various of the implications regarding improvements in the credit protection are verified in empirical research, while several implications regarding the response to differences in wealth distribution are new and the evidence regarding them does not exist.[6]

We show that an increase in labour 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

[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.

[5] In the closed economy, we replicate the result (derived in Shleifer and Wolfenzon, 2002) that an improvement in *ex ante* creditor protection leads to an increase in the equilibrium interest rate, because previously excluded entrepreneurs compete for access to loans. This explains the observation in La Porta *et al.* (2000) that better creditor protection is opposed by wealthy and politically powerful families in developing countries because it increases competition and the interest rate on loans.

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

bankruptcy system leads to an increase on wages, since more entrepreneurs are able to get financing and labour demand rises. Second, we show that as *ex ante* creditor protection improves, firing costs become a more critical determinant of access to credit.[7]

The model also has political economy implications. Employees of strong firms will push for stronger employment protection legislation, because it improves their outcome in case of financial distress, but this leads to unemployment and hence lower wages, as weaker firms 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 labour 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 labour 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 (2007) 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.

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.* (1999, 2002) 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

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

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 behaviour and in the response to shocks and this role depends on the firm's reliance on financial markets (see Kiyotaki and Moore, 1997, Aghion *et al.*, 2004, and Love *et al.*, 2007 for a complete review of the literature). 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 (See, for instance, Johnson *et al.*, 2002). Since this effect can only appear if financial markets are 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 analyse the equilibrium and main implications for the case in which we allow free capital flows. Next, we extend the model to incorporate labour 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 fig. 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 wealth, K_z. The wealth distribution is given by $G(\cdot)$, which has a continuous density and bounded support given by $[0, 1]$. Wealth levels of individual agents are observable by lenders.

During the second stage, agent z with wealth K_z applies for a loan of size $D_z = I - K_z$ 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 $I \geqslant 1$.

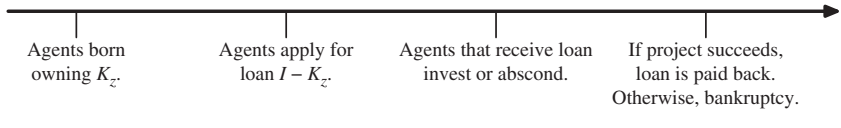

Fig. 1 Time line of the model

In the third stage, as in Burkart and Ellingsen (2004), agents who receive a loan either invest in their projects, or alternatively, they may abscond, committing (*ex ante* fraud). 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.

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.[8] In what follows we assume, as is normally done in case of failure, that 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 $D_z \geqslant \tau V$. For this assumption to hold, a sufficient condition is that the wealthiest agent requires a sufficiently large loan, i.e., $I \geqslant 1+\tau V$.[9]

2.1 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.

[8] 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.

[9] Note that this assumption implies that random liquidation in case of failure is never optimal.

There is alternative interpretation of V, which is valid in comparisons across 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 (e.g., 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 observe agents' wealth before granting a loan, and have access to the international credit market at a rate of interest ρ. 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.[10]

In order to obtain stark results, we assume that all projects have a positive net present value (NPV);

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

Hence credit constraints reduce the productive capacity of the economy.

3. The analysis

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.

3.1 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:[11]

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

and the representative bank's profit from this contract is

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

[10] 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.

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

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

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

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 non-negative expected profits, (ii) to the condition that the borrower does not abscond with the loan, and (iii) to the maximum pledgable income condition in eq. (3). That is,

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

By Assumption 1, it is socially efficient to lend money to each entrepreneur. However, only those entrepreneurs that have no incentives to abscond with the money will receive a loan. Provided that this condition holds, Assumption 1, competition and the observability of wealth imply that the representative bank sets the interest rate it charges to an agent so as 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 with a wealth level K_z who does not abscond is

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

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

An entrepreneur with wealth K_z is granted a loan if the following condition holds

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

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 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 wealth 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 eq. (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,

$$(1+r_z)D_z \leqslant R \text{ for all } K_z \geqslant K(\phi, V) \Longrightarrow$$
$$\phi(pR+(1-p)\tau V) \geqslant (1+\rho)(1-\tau)(1-p)V$$

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

Assumption 2 $\phi pR \geqslant (1+\rho)(1-p)V$.

This leads to the following result,

Proposition 1 Given Assumptions (A1) and (A2), and parameters $(\phi, \tau V, p)$, entrepreneurs with a wealth level $K_z \geqslant K(\phi, V)$ 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 $K(\phi, V) > 0$ 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.

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 lenders are not willing to grant a loan because, under the existing credit protection rules, they cannot trust the borrower.

In contrast, if $K_z \geqslant K(\phi, V)$, banks are willing to lend to the entrepreneur (i.e., 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.[12]

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:

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

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 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

[12] This neat division is an artifact of the model: if we omit Assumption 2, 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.

must consume their wealth, and since projects have a positive NPV, the utility of entrepreneurs jumps up at $K_z = K(\phi, V)$.

3.2 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.

3.2.1 *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.* (2008) 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 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.[13] 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, and equipment). Hence, the evidence suggests that better creditor protection makes collateral more effective in enhancing loan availability.

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

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

and total investment is

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

From (7), it is clear that an improvement on the loan recovery rate, i.e., a decrease in 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, firms in countries with more efficient bankruptcy procedures or with better *ex post* credit protection, 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.

[13] 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.

Result 1 (i) An improvement on creditor protection (i.e., a fall in ϕ), an increase in asset hardness, in the efficiency 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, $\frac{\partial K(\phi,V)}{\partial\phi\partial V} \geqslant 0$ 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 efficiency 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:

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

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

Proof See Appendix.

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).

3.2.3 *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) (we focus on single-crossing 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 $G_1(K_z) \leqslant G_0(K_z)$ 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 'capital constrained' if $K(\phi, V) > \bar{K}$ and unconstrained otherwise.[14] 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 country B, then investment and total output are higher in country A when countries are capital constrained, while they are lower when countries are not capital 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 $K(\phi, V) \leqslant \bar{K}$). Hence among financially developed economies, 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 those with a worse distribution in terms of MPS have greater investment and output.

[14] We interpret a capital constrained economy as either a poorer economy (average capital is smaller than the cutoff), or one that is less financially developed.

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 $(0, 1]$[15]

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

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,

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

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 $\theta \geqslant 0$ 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.

Let suppose that:

$$\frac{1 - G_1(K(\phi, V))}{g_1(K(\phi, V))} \leqslant \frac{1 - G_0(K(\phi, V))}{g_0(K(\phi, V))}. \quad (10)$$

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 country B. Then, (i) if $K(\phi, V) > \bar{K}$, the average interest spread is lower in country A; and (ii) if condition (10) 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 $K(\phi, V) \geqslant \hat{K}(\phi, V)$.

Proof See Appendix.

[15] The MPR order implies (strict) first order stochastic dominance. Also, note that the monotone likelihood ratio property implies the MPR property (see Gollier, 2004, for details).

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.

4. The effect of labour protection laws

4.1 The equilibrium

The effect of employment protection laws (EPL) has sparked an ongoing debate. Some authors believe that labour 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 labour market variables has led to ambiguous results. Some studies find that EPL 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 EPL 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 incorporate labour 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 labour market is assumed competitive and workers are paid the competitive wage. In the case of bankruptcy, the worker must be paid a firing cost f, and outside investors have access to the liquidation value of the assets of the firm, net of firing costs.[16] Thus, labour has priority claims over investors in the case of bankruptcy

[16] In many cases, the right of labour 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.

(see Perotti and von Thadden, 2006 for a similar assumption). Due to limited liability, we assume $V-f \geqslant 0$. 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.[17]

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[18]

$$K(\phi, V, f) \equiv I - \frac{p(R-w) + (1-p)\big(V-f\big)}{1+\rho+\phi}. \tag{11}$$

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 labour 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 labour market equilibrium. We assume an exogenously given supply of labour $L^S(w,f)$, which is an increasing and continuously differentiable function in both arguments and satisfies $L^S(0,0)=0$ and $\lim_{w\to\infty} L^S(w,f) \to \infty$.[19] In addition, it is assumed that $(1-p)\partial L^S(w,f)/\partial w > p\partial L^S(w,f)/\partial f$.[20] Labour demand is equal to the mass of entrepreneurs that have access to loans; that is,

$$L^D(w^*) = 1 - G(K(\phi, V, f)). \tag{12}$$

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

[17] All OECD countries, except for the the US, have some kind of mandatory severance pay or advance notice for no-fault dismissals. This is also common in some developing countries. For instance, Chilean labour 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.

[18] The definition of the wealth threshold above which lending occurs requires an assumption analogous to Assumption 2, modified to incorporate labour costs.

[19] 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.

[20] This assumption requires that the worker's response to a wage increase is greater than her response to an increase in firing costs. This may be due to various reasons such as search costs or due to the fact that f represents administrative firing costs rather than severance payments. We can dispense with this assumption and retain the results if we introduce other types of inflexibilities, for instance, if there is a statutory wage floor, initially set at the equilibrium wage.

Proposition 2 (i) There is a unique positive equilibrium wage w^* for any given (ϕ, τ, V). Only entrepreneurs with a wealth level $K_z \geqslant K(\phi, V, f)$ have access to the credit market and 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

The effects of changes in the firing costs on the labour market equilibrium are described in the following result

Result 7 (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 more efficient bankruptcy procedures result in a higher equilibrium wage; (iii) as the loan recovery rate rises, firing costs become a more critical determinant of access to credit (that is, $\frac{\partial K(\phi, V, f)}{\partial \phi \partial f} \leqslant 0$); and (iv) firing costs as a determinant of access to credit are independent of *ex post* credit protection (that is, $\frac{\partial K(\phi, V, f)}{\partial \tau \partial f} = 0$).

Proof See Appendix.

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 labour markets. Observe that if labour 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 labour market frictions that can be interpreted as firing costs become less relevant. In countries where labour 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 stronger firms (in the sense of having greater assets holdings) will lose less from more stringent labour rules, since these induce lower wages, even though they increase total labour compensation. Hence, the model predicts that business associations composed of larger and more capitalized firms may not be strongly opposed to increased labour regulations, while those 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 becomes credit constrained. Since $K(\phi, V, f)$ rises with f, we obtain the following result.

Result 8 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 labour supply in our model, wealth distribution changes have an impact on wages only through their effect on labour 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 labour supply is upward sloping and labour 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 9 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 capital constrained (i.e., $K(\phi, V, f) > \bar{K}$), while the opposite occurs when the economy is not capital 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.[21]

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 capital constrained, being in a country with a more dispersed wealth distribution has negative consequences on labour market outcomes, while wages and employment rise in economies that are not capital 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.

Result 10 An increase in firing costs increases the interest rate charged to a specific entrepreneur, but the effect on the average spread is ambiguous.

Proof See Appendix.

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

Finally, we study the effect of firing costs on the utility of entrepreneurs:

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

Observe that an increase in firing costs lowers the mass of agents with access to credit since total expected labour costs rise. Thus the increased firing costs reduce 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 labour 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 the following question: If financial development matters for economic performance, as the evidence shows, 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), Pagano and Volpin (2005), and La Porta *et al.* (2008) 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 (2007) 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 labour regulations. Setting aside for the time being the issue of labour market regulations, we focus on the difference between open and closed capital markets. The important result for the analysis that follows is that an increase in demand for credit leads to higher interest rates, and thus a smaller effect on activity than in the open economy case.

The first important distinction between these two types of economies is that in an open economy, an improvement in the different creditor protection variables

results in a larger increase in total investment and GDP, since more entrepreneurs are able to raise funds to set up firms. This results in higher wages and lower rents for 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 implies that the greater demand for funds translates into higher equilibrium interest rates and has a smaller effect on wages. It is clear from this that improved capital markets lead to a larger increase in total welfare in an economy open to capital flows. However, changes in creditor protection have important distributional consequences on different agents. labour is better-off in an open economy than 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 fewer incoming entrepreneurs and wages change by less, but interest rates are higher due to increased competition for funds, and thus incumbent entrepreneurs are worse-off.

Labour will favor the adoption of reforms that deepen the development of financial markets in an open economy, and less so in a closed economy. Incumbent entrepreneurs that already have access to credit will oppose financial reforms aimed at improving *ex ante* creditor protection, while potential entrepreneurs favor them. In a closed economy, there are fewer potential entrants to push for reform, and incumbent entrepreneurs will oppose them, because *ex ante* creditor protection increases the cost of finance and labour for incumbent entrepreneurs. Thus, as shown by Rajan and Zingales (2003) and Braun and Raddatz (2007), 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 labour 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 EPL since an increase in firing costs has a positive effect on expected labour income. The effect is larger in a closed economy since wages do not fall as much as in an open economy. Thus, employees in heavily capitalized firms (usually unionized labour), will fight for increased labour protection at the expense of workers employed in marginal firms.

In an open economy, entrepreneurs will be strongly oppose to increased employment protection since it increases expected labour costs. In contrast, in a closed economy the increase in firing costs has a smaller effect on wages since the number of firms increases by less and most of the adjustment comes about through declines in the equilibrium interest rate. Thus closed economy entrepreneurs are worse-off because they face higher labour costs due to the increased firing costs, but they are better-off since they face a lower equilibrium interest rate. This suggests that labour reforms aimed at increasing employment protection are more likely to be adopted in closed economies, since there is less of a conflict between entrepreneurs and workers in heavily capitalized firms.

This provides the following result.

Result 11 Labour 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 labour 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 labour 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 more efficient 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.

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 analyse 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 capital constrained. The results are reversed with an increase in inequality when the economies are not capital constrained.

In our model, increased labour protection leads to lower wages, because the increased cost of labour means that fewer firms have access to credit, so fewer workers are employed. On the other hand, improvements in *ex ante* creditor rights or a more efficient 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 understand why different wealth distributions may explain 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 labour 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 labour protection. These results are consistent with Rajan and Zingales (2003), who find that openness is a crucial determinant of financial development.

Supplementary material

Supplementary material (the Appendix) is available online at the OUP website.

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