

# Informal Sector and Economic Growth: The Supply of Credit Channel\*

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## Abstract

A standard view holds that removing barriers to entry and improving judicial enforcement would reduce informality and boost investment and growth. We show, however, that this conclusion may not hold in countries with a concentrated banking sector or with low financial openness. When the formal sector becomes larger in those countries, more entrepreneurs become creditworthy and the higher pressure in the credit market increases the interest rate. This reduces future capital accumulation. We show some empirical evidence consistent with these predictions.

**Keywords:** Informal sector; Barriers to entry; Credit market; Enforcement; Financial openness

**JEL Classification Numbers:** O17

## 1 Introduction

A popular idea in policy circles holds that granting access to formal credit markets to potential entrepreneurs, by improving public institutions and specific regulations, is an important condition for economic development. In particular, reforms allowing economic agents to formalize and therefore better collateralize their assets should naturally lead them to invest more, increase their productivity, and ultimately the benefit of higher overall growth would ensue. Such reforms typically include strengthening property rights on land and housing, and reducing burdensome registration procedures.<sup>1</sup>

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<sup>1</sup>This was famously suggested by ? and ?.

This paper examines in a general equilibrium framework the chain of causality behind that line of thinking. It does so by modeling explicitly individual agents' decisions to become formal in relation with their access to a credit market plagued by moral hazard, and the effect of these decisions on the size of the formal sector and on the level of output. The main insight is that while better property rights and less burdensome regulations may under certain conditions facilitate agents' access to formal loans, such reforms interact with the characteristics of the credit market and its environment in ways that crucially shape the ultimate magnitude of the effect on formality and output.

In a nutshell, the modeling strategy relies on an overlapping-generations model where economic agents, when young, undertake productive projects, deciding whether to work in the formal or informal sector. These decisions depend on the trade-off between the costs of entry and the benefit from accessing the formal credit market, itself a function of the quality of enforcement and property rights, which allow for the efficient collateralization of assets. Entrepreneurs save part of their profits for future consumption and these savings constitute next period's supply of credit in the economy.

In this context, the equilibrium interest rate that results from the interaction between the supply of loanable funds and the demand for credit is a key variable in determining the equilibrium level of formality. Indeed, lower entry costs and better contract enforcement unambiguously imply a larger formal sector, a higher demand for credit and higher output as long as there is an infinitely elastic supply of funds at the prevailing interest rate, for example in the case of an open economy with no barriers to international capital flows and a competitive banking sector. However, absent these conditions, an increase in demand resulting from a higher rate of formality increases the interest rate, weakening the link between reforms, formality and output.

Finally, we show some empirical evidence related to the implications of our model. We find that countries with lower entry costs or a higher quality of enforcement tend to have a larger credit market and a smaller informal sector, the more so the more competitive their banking sector and the more open to international capital flows their economy.

**Related Literature** The argument above is composed of two parts. First is the link between better regulations and access to credit at the individual level, resulting in increased incentives to enter formality, and second is the link between these individual decisions and output or growth.

As for the first part of the story, it is relatively well understood how light registration procedures and strong property rights interact in providing the necessary conditions to access the credit market. As first shown by ? in the case of Peru, and further documented by ? for 85 countries, firms first face significant “entry costs”, in the form of registration and license fees, to be able to operate formally.<sup>2</sup>

As discussed in ?, formal lenders commonly impose an array of requirements on prospective borrowers before entering in legal contractual relationships. These include making operations observable through accounting books, providing credible proof of location, and being able to attach valuable assets as collateral. Complying with the entry regulations described above can be considered as a way to satisfy these requirements.<sup>3</sup> Moreover, smoothly functioning credit markets also rely on effective property rights, in at least two ways. First, the existence of property titles is a necessary condition for collateralized credit.<sup>4</sup> Second, good enforcement of such rights allows lenders to recoup their money in case of failure or conflict. Thus, slow and costly judicial processes may significantly affect access to credit for small borrowers, even in the presence of formal property titles.<sup>5</sup>

Most microeconomic empirical studies, however, find a weak or insignificant effect of improved property rights on credit market access for the poor. For example, ?, find no evidence that a nationwide titling program in Peru (the biggest of its kind worldwide) increased access to private credit among the poor. The discussion alludes to the fact that

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<sup>2</sup>According to ?, they range from a low of 2 procedures, taking two days and generating a cost equivalent to 2.3% of per capita GDP in Canada, to a high of 21 procedures, 80 days and 463% of per capita GDP in the Dominican Republic. ? and ? provide microeconomic evidence from a program in Mexico that reducing these costs spurs entry from new entrepreneurs.

<sup>3</sup>Of course, this is not to say that such regulations and their costs are efficient. Indeed, in developing countries they often respond to extractive motivations (see ?; ?).

<sup>4</sup>Collateralized loans are the most common formal credit contracts in developing countries. See ? for stylized facts and discussion.

<sup>5</sup>See for example the studies in ? for microeconomic evidence, and ?, ? for regional and cross-country evidence.

banks probably face complex changes in the composition of demand for credit and may alter the way they price loans in response to the evolution of foreclosing rules.

? provide a complementary rationale for why informality is so prevalent. They build a model of a *de Soto effect* and show that if the degree of credit market competition is low, borrowers may lose from improving property rights and thus they may oppose any such reform.

The second part of the story links the level of formality to output. Such a link has been put forward among others by ? and ?. More recently, ? analyze how much of the variation in the size of the informal sector and in the level of per capita income across countries can be explained by regulation costs and enforcement of financial contracts. Calibrating their model to US data, they conclude that it is regulation (a fixed cost of formality) that accounts for most of the differences in the size of informal sectors between the United States and Mediterranean Europe, while for a developing country like Peru, contract enforcement appears to be equally important. However, these factors fail to account for most of the income differences among countries. Importantly, Antunes and Cavalcanti assume that the local lenders have access to world capital markets and borrow or lend any amount at a constant interest rate.

Closer to our paper are ? and ? who present general equilibrium models with financial frictions and an endogenous interest rate. These references find two effects of smaller financial frictions on the economy. First, a standard positive demand effect because individuals obtain more credit. This results in a higher interest rate which leads to a second negative effect on the future supply of credit. ? compare the effect of a higher investor protection on the economy in a closed and in an open economy. In the open economy, there is only the demand effect because the interest rate is taken as given. In the closed economy, the same demand effect implies a higher interest rate which reduces the profits and the savings of entrepreneurs, leading to the second negative effect on the supply of credit. Similarly, ? show that lower intermediation costs or better enforcement have the same two counteracting effects on the economy and find the supply effect to be quantitatively significant.

Our paper focuses on the impact of the quality of enforcement and of entry costs on the size of the informal sector and on output. Its main insight is to point out the importance of the second general equilibrium negative effect that has generally been ignored in policy discussions about the merits of reducing the size of the informal sector. We show that this negative supply effect arises when there is low financial openness or weak competition in the banking sector. This has implications for the timing of development policies, suggesting that reforms aimed at reducing informality by removing barriers to entry or improving enforcement can be more effective in financially liberalized countries.

The paper is organized as follows. Section 2 presents the model. Section 3 discusses the related empirical evidence. Section 4 concludes.

## 2 The Model

This section presents an overlapping generations model with (i) a financial friction arising from a moral hazard problem between investors and entrepreneurs and (ii) an informal and a formal sector.

### 2.1 The Environment

The economy consists of an infinite sequence of two-period lived overlapping generations, with time indexed by  $t = 0, 1, \dots$ . There is no population growth and each generation is normalized to a continuum of size 1. There are three goods in the economy: capital  $k$ , final good  $y$  and a collateral good  $X$ , for example a house or a piece of land. Capital is used for the production of the final good and can be stored. The final good is used as a numeraire and for consumption. The collateral good is used to secure loans. Following ?, young agents are endowed with an amount  $X$  of collateral good, which is uniformly distributed between 0 and 1 and the cumulative distribution function of which is denoted by  $D(X)$ . At  $t = 0$  there is an initial old generation endowed with a level of capital  $k_0$ .

Individuals born at  $t$  have preferences defined over their level of consumption of final

good both at  $t$  and  $t + 1$ :

$$u(c_t, c_{t+1}) = \ln(c_t) + \beta \ln(c_{t+1}), \quad (1)$$

where  $\beta$  is the discount factor.

Young agents can use a technology that transforms capital into the final good:

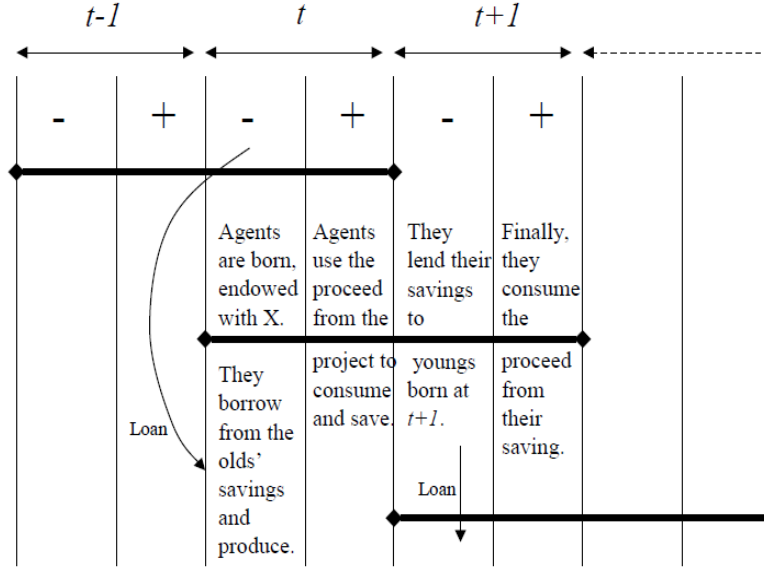
$$y_t = \tilde{a}k_t, \quad (2)$$

where  $\tilde{a}$  is a productivity parameter that can be high ( $\tilde{a} = A$ ) or low ( $\tilde{a} = 0$ ). The probability of success depends on the level of effort of the entrepreneur: he can either work, in which case the probability of success is  $p_H$ , or shirk, in which case it is only  $p_L < p_H$ , but he enjoys a non-monetary private benefit  $Bk_t$  (or equivalently saves on the cost of effort).

Young entrepreneurs do not have any capital but they can borrow from banks. We follow ? by assuming that banks can observe the outcome of the project but not the effort of the entrepreneur. These contracts specify the amount of capital  $k_t$  to be lent and a repayment  $r_t$  to the lender if the project is successful. Banks can seize the collateral  $X$  of entrepreneurs if the project fails.

This setting is summarized in Figure ???. Each period  $t$  is divided in two sub-periods  $t^-$  and  $t^+$  in the following way (considering agents born at  $t$ ): At  $t^-$ , agents are born and endowed with a an amount of collateral  $X$ . Given this endowment, they borrow from the olds of the previous generation a certain amount of capital that they use to carry out their productive project. At  $t^+$ , they use the proceed from the project to consume and save. At  $t + 1^-$ , they lend part or the totality of their savings from the previous period  $t^+$  to the young agents born at  $t + 1^-$ . Finally, at  $t + 1^+$ , they consume the rest of their saving and the return on their loan.

Figure 1: Timing



## 2.2 The Choice Between Formal and Informal Sectors

Entrepreneurs can decide to enter either the formal or the informal sector.<sup>6</sup> The benefit of entering the formal sector is that they can pledge their collateral to banks, which allows them to borrow more. The downside is that entering the formal sector is costly. This section compares these costs and benefits and infers which sector entrepreneurs decide to enter as a function of their collateral endowment.

We assume that it is less profitable for banks to lend to shirking entrepreneurs than to store and that high effort is more profitable than storing, by setting  $p_L A + B < p_H A$ . As a result, banks only offer contracts that induce entrepreneurs to work. This gives the following incentive compatibility constraint:

$$p_H(Ak_t - r_t) \geq p_L(Ak_t - r_t) + Bk_t. \quad (3)$$

Banks cannot seize the collateral of informal entrepreneurs whose project failed and

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<sup>6</sup>The difference with ? is that here income is verifiable both by formal and informal lenders. This assumption is in line with the literature on financial markets in developing countries, which generally holds that the formal financial sector has a comparative advantage in fund intermediation over space and in creating scale economies, as well as the technical possibility to attach assets as collateral, while the informal credit market enjoys superiority in solving enforcement and information problems (See ?).

they only get paid by successful entrepreneurs. The break-even constraint of banks tells us that their expected benefit should at least cover the interests paid to depositors:

$$p_H r_t \geq i_t k_t. \quad (4)$$

Assuming a competitive banking sector, equations (??) and (??) are binding. Then, combining these two constraints and using the assumption above ( $p_L A + B < p_H A$ ) gives the solutions  $k_t = 0$  and  $r_t = 0$ . No lending and thus no production occurs in the informal sector.<sup>7</sup>

If entrepreneurs decide to operate formally, they have to pay a fixed cost  $C$ , that represents the direct costs of registration or the time wasted in procedures. We assume that this cost reduces the amount of the available collateral to  $X - C$ . Formal registration allows banks to seize a proportion  $\theta$  of this available collateral. The parameter  $\theta$  can be interpreted as the quality of enforcement: seizing collateral in court can be slow and imperfect, the laws protecting creditor rights can be inefficient, etc. The remaining share  $1 - \theta$  is assumed to disappear.

The break-even constraint of a bank contracting with a formal entrepreneur becomes:

$$p_H r_t + (1 - p_H) \theta (X - C) \geq k_t i_t. \quad (5)$$

Combining equations (??) and (??) gives the following financial contract:

$$k_t = \phi(i_t) \Delta p \theta (X - C), \quad (6)$$

and

$$r_t = \phi(i_t) (\Delta p A - B) \theta (X - C), \quad (7)$$

where  $\phi(i_t) = \frac{(1-p_H)}{\Delta p(i_t-p_H A)+p_H B}$ , with  $\Phi'(i_t) < 0$ . Entrepreneurs can now borrow from banks if they operate in the formal sector.<sup>8</sup> A lower interest rate  $i_t$ , lower entry costs  $C$ , better

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<sup>7</sup>Other specifications of the model could induce banks to lend a positive amount but what is important for our purpose is that informal entrepreneurs are less able to borrow than formal ones, as shown below.

<sup>8</sup>Another interpretation is that entry to the formal sector leads entrepreneurs to choose more pro-



enforcement  $\theta$ , or higher collateral  $X$  all increase the size of the loan  $k_t$ .

Young agents trade-off the costs and benefits of entering the formal and informal sectors. In the informal sector, entrepreneurs can enjoy the full value of their collateral but are not able to finance their projects. The surplus of an informal entrepreneur is thus simply equal to his collateral  $X$ . In the formal sector, entrepreneurs have to pay the entry costs  $C$ , which allow them to borrow from banks. The surplus of a formal entrepreneur becomes  $p_H (Ak_t - r_t + X - C)$ . Comparing these two surpluses shows that there exists a cutoff quantity of collateral  $X_t^*$  below which entrepreneurs prefer to enter the informal sector and above which they prefer to enter the formal sector:

$$X_t^*(i_t) = \frac{p_H \phi(i_t) \theta B + p_H}{p_H \phi(i_t) \theta B + p_H - 1} C. \quad (8)$$

This quantity of collateral determines the size of the informal sector. By definition, it is bounded between 0 and 1. Zero entry costs lead to a totally formal economy. There also exists a cutoff level of  $C$  above which and a cutoff level of  $\theta$  below which the economy is completely informal. We can show the following result (proof omitted):

**Proposition 1** *A lower interest rate  $i_t$ , lower entry costs  $C$ , or a better quality of enforcement  $\theta$  reduce the size of the informal sector  $X_t^*$ .*

A larger interest rate makes entrepreneurs less creditworthy and thus increases the size of the informal sector. A better quality of enforcement increases the amount of collateral that banks can seize and thus increases the size of loans. The effect of lower entry costs is obvious. These results are consistent with the empirical evidence documented, for example, in ? and ?.

## 2.3 Equilibrium in an Open Economy

In this section, we present a version of the model that is consistent with the standard view on informality and economic growth. The main insight is that a larger formal sector

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ductive technologies, consistently with ?.

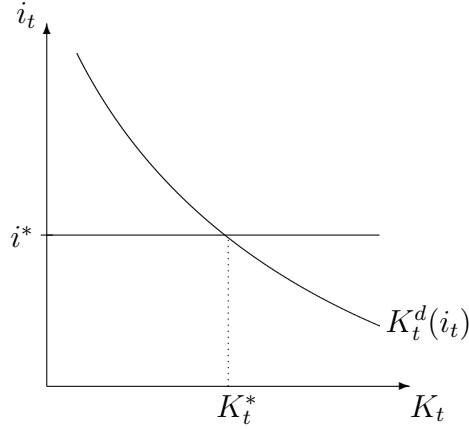


Figure 2: Equilibrium in an open economy

is beneficial for the economy because the ability of entrepreneurs to collateralize their assets increases investment.

We consider a small open economy with free capital flows and that cannot influence the world interest rate. As a result, agents take the interest rate  $i^*$  as exogenous. The supply curve of capital is thus represented in Figure ?? by a horizontal line.

Equations (??) and (??) give the aggregate demand for capital, which is equal to the sum of the credits granted by banks:

$$K_t^d(i_t) = \int_{X_t^*}^1 k_t dD(X). \quad (9)$$

When the interest rate  $i_t$  increases, banks respond by lending less to satisfy their break-even constraint. An indirect effect is that less entrepreneurs are willing to enter the formal sector. Overall, we have a standard demand function decreasing in the price. It is represented in Figure ??.

The equilibrium stock of capital  $K^{op}$  in an open economy is simply given by the intersection of the supply and demand of capital:

$$K_{t+1}^{op} = K_t^d(i^*). \quad (10)$$

Let  $Y_t = p_H A K_t^*$  be the level of output in the economy. Then, the following result holds:

**Proposition 2** *In an open economy, lower entry costs  $C$  or a better quality of enforcement  $\theta$  at date  $t$  have a positive impact on output  $Y_t$ .*

**Proof.** From Equation (??), the function  $K_t^d$  is increasing in  $k_t$  and decreasing in  $X_t^*$ ; From Equation (??),  $k_t$  is increasing in  $\theta$  and decreasing in  $C$ ; From Proposition 1,  $X_t^*$  is increasing in  $C$  and decreasing in  $\theta$ . This proves Proposition 2. ■

Intuitively, a higher quality of enforcement  $\theta$  or lower entry costs  $C$  have two effects on the aggregate demand for capital. First, it increases the amount banks are willing to lend to entrepreneurs. Second, more entrepreneurs enter the formal sector and this allows them to borrow more. Such changes shift the demand for capital to the right. The equilibrium stock of capital and production increase.

## 2.4 Equilibrium in a Closed Economy

We now show how the mechanism of the previous section is affected by the introduction of restrictions on international capital flows. Closing the economy affects the supply of credit as banks are now limited in their capacity to lend by the size of national savings. As a consequence, the equilibrium interest rate  $i_t^c$  of the economy is endogenously determined by capital supply and demand. We show that, in contrast to the previous section, the effect of larger entry costs or of a better quality of enforcement on the economy now vanishes.

**The consumption/saving decision** We start by characterizing the supply of credit, which is equal to the sum of individual savings. We show how individuals decide to allocate their income between present and future consumption. Informal entrepreneurs and unsuccessful formal entrepreneurs make zero profit and thus do not consume or save.<sup>9</sup> The profit  $\pi_t$  of successful formal entrepreneurs is given by:

$$\pi_t = Ak_t - r_t \tag{11}$$

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<sup>9</sup>Informal entrepreneurs only consume their endowment. This is a normalization and does not affect our results.

This profit is allocated between consumption  $c_t$  and savings  $s_t$ :

$$c_t + s_t = \pi_t \quad (12)$$

When old, individuals are constrained by the proceeds from their savings:

$$c_{t+1} = i_{t+1}s_t \quad (13)$$

The problem of young individuals is to choose the allocation of income between present and future consumption that maximizes (??) under the constraints (??), (??), and (??).

The straightforward solution to this problem is:

$$s_t = \frac{\beta}{1 + \beta} \pi_t. \quad (14)$$

Thus the savings of entrepreneurs are a fixed fraction of their profit.

**The capital market** The supply of capital  $K_t^s$  is given by the sum of individual savings  $s_{t-1}$ :

$$K_t^s = \int_{X_{t-1}^*}^1 p_H s_{t-1} dD(X). \quad (15)$$

Because  $K_t^s$  is independent of the contemporary interest rate  $i_t$ , Figure 3 represents this equation as a vertical line. The closed economy (indexed by  $c$ ) equilibrium interest rate  $i_t^c$  and capital  $K_t^c$  are such that the demand for capital equals the supply:

$$K_t^c = K_t^s(i_t^c) = K_t^d(i_t^c) \quad (16)$$

We get the following result:

**Proposition 3** *In a closed economy, the effect of permanent lower entry costs  $C$  or of a better quality of enforcement  $\theta$  at date  $t$  on output  $Y_t$  is nil.*

**Proof.** On the one hand, using equations (??) and (??), Equation (??) can be rewritten as  $\pi_t = \phi(i_t^c)B\theta(X - C)$ . Then, Equation (??) can be rewritten as  $K_t^s =$

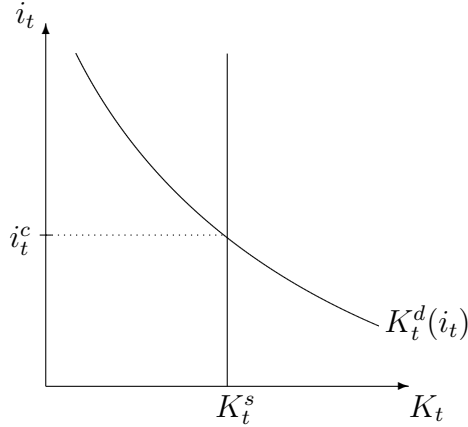


Figure 3: Equilibrium in a Closed Economy

$\frac{\beta}{\beta+1}p_H B \phi(i_{t-1}^c) \theta \int_{X^*(i_{t-1}^c)}^1 (X - C) dD(X)$ . On the other hand, using Equation (??), Equation (??) becomes  $K_t^d = \phi(i_t^c) \Delta p \theta \int_{X^*(i_t^c)}^1 (X - C) dD(X)$ . Finally, combining these expressions gives the law of accumulation of capital:

$$K_1^c = \frac{\beta p_H B}{(\beta + 1) \Delta p} K_t^c. \quad (17)$$

The growth rate of the economy is thus independent of  $C$  and  $\theta$ . This proves Proposition 3. ■

Intuitively, lower entry costs  $C$  or better enforcement  $\theta$  at  $t$  have two effects on the economy at date  $t + 1$ . First, because more entrepreneurs are formal and because each formal entrepreneur makes more profit, the aggregate savings are also higher and this shifts the supply curve of capital to the right. Second, such policies increase the interest rate  $i_t^c$  because of the demand effect described in the previous section. As a consequence, the profit and the savings of entrepreneurs are lower. We showed that these two effects always cancel out.

Comparing Propositions 2 and 3, lower entry costs or better enforcement have a positive impact on the size of the formal sector and on output in an open economy but no impact in a closed one. Of course, the knife-edge nature of this result hinges strongly on the logarithmic utility assumption, which ensures that savings are independent of the interest rate. With a more general utility function, for example CRRA, there would be a third effect on savings as the interest rate would then depend on the elasticity of

intertemporal substitution. However, for reasonable values of this elasticity, this effect is likely to remain small and thus the impact of lowering  $C$  or increasing  $\theta$  would still be lower in a closed economy.

## 2.5 Large Banks

We now relax the assumption of a competitive banking sector. If financial intermediaries have some market power, they ask for a higher repayment, which further reduces the savings of young entrepreneurs and thus the supply of credit.

We follow ? in assuming that the marginal cost of lending is equal to the interest rate  $i_t$  plus a parameter  $\tau$ . There are two banks in the economy competing à la Bertrand. One has a marginal cost equal to zero ( $\tau = 0$ ) and the other has a strictly positive marginal cost ( $\tau > 0$ ). The efficient bank offers loan contracts such that entrepreneurs do not prefer to contract with the inefficient bank. The parameter  $\tau$  can thus be thought of as a measure of competition between the two banks. The lower this parameter, the more competitive the banking sector.

We now show how the parameter  $\tau$  modifies the previous analysis. The break-even constraint of the lender becomes:

$$p_H r_t + (1 - p_H) \theta (X - C) \geq k_t (i_t + \tau), \quad (18)$$

In an open economy where the interest rate  $i_t$  is given, a higher  $\tau$  increases the repayment that can be asked to entrepreneurs and reduces the size of the loan. Entrepreneurs thus end up with a lower profit and save less. In this setting, a more concentrated banking sector thus reduces the accumulation of capital.

Let us now solve for the equilibrium interest rate in a closed economy. This is done in a simple way with the change of variables  $I = i_t + \tau$ . This gives the same results as before, that is  $I = i_t^c$ . This implies that the interest rate in an economy with a concentrated banking sector is equal to  $i_t^c - \tau$ . In the extreme case of a perfectly closed economy,  $i_t$  and  $\tau$  are thus perfect substitutes. Finally, Proposition 3 is unchanged in the case of large

banks in a closed economy.

To summarize, in an open economy, a more concentrated banking sector makes the impact of lower entry costs or better enforcement less positive. In a closed economy, by contrast, the size of banks does not change this impact.

### 3 Empirical Evidence

In this section, we present some empirical illustration of the key predictions of our model. We are interested in the impact of a better quality of enforcement or of lower entry costs on both the size of the credit market and of the informal sector depending on, first, financial openness and, second, the degree of concentration of the banking sector. We expect such policies to have a greater impact in economies with a more competitive and open credit market. The channel emphasized in our model, linking the policy variables  $C$  and  $\theta$  to both output and formality, goes through the size of the credit market. For this reason, we study the determinants of both access to credit and informality. To do so, we use the following cross-country data.

**STEPS** refers to the number of steps necessary to open a business and is provided by ?. The number of steps to register a business varies from 2 in Australia and Canada to 20 in Bolivia, with an average of 9.5.

**FORMALISM** is a measure of the quality of contract enforcement from ?. They computed the number of legal procedures to collect a bounced check in court. The variable varies from 0 to 7, with a mean of 3.5 and where a higher value means a lower quality of contract enforcement.

**OPENNESS** refers to the measure of regulatory restrictions on international capital flows from ? averaged over 1996-2000. This index ranges from -1.83 to 2.5, where a higher value means more financial openness.

**SPREAD** is the interest rate spread from the World Bank and we use it to proxy for the competitiveness of the banking sector. Indeed, in our model, the measure of concentration  $\tau$  can also be interpreted as a spread. It is the difference between the

lending rate and the deposit rate. This measure is averaged over 1996-2000. It varies between 1 and 82 with a mean of 10. More direct measures of concentration exist but cover fewer countries.

**GDP** refers to the measure of real GDP per capita from ?. We take the logarithm of its average over 1996-2000.

**CREDIT** refers to the ratio of private credit over GDP averaged over 2001-2005 from ?. It varies from 7 to 195 percent, with an average of 66 percent.

**INFORMALITY** refers to the size of the informal sector as measured by an indicator of unofficial or unregistered business activity from the World Economic Forum's Global Competitiveness Report 2006-2007 that we take from ?.

We divide our sample between countries that have low and high OPENNESS, and between countries that have a high and a low SPREAD, high meaning above the median and low below. Consistently with the predictions of our model, Figures ?? and ?? show that the relationship between CREDIT and STEPS (our proxy for entry costs) or FORMALISM (our proxy for enforcement) is more negative in countries with a low value of SPREAD, i.e., those with a more competitive banking sector and Figures ?? and ?? show a slightly more negative relationship in countries with a high value of OPENNESS. A similar pattern emerges from Figures ??-?? that use the size of the informal sector as a dependent variable. In particular, Figures ?? and ?? show a striking difference between low and high spread countries in terms of the impact of both STEPS and FORMALISM.

We then run OLS regressions of CREDIT and INFORMALITY on STEPS or FORMALISM, interacted with OPENNESS and SPREAD. In all regressions we control for GDP as richer countries are likely to provide more developed credit markets. Tables ?? and ?? show the results.

Column 1 of Table ?? shows that the coefficient of the interaction between OPENNESS and STEPS is significantly negative, which means that higher entry costs have a more negative impact on credit in countries that are more open to international capital flows. Take France which belongs to the group of the most open countries and where it takes 14 steps to open a new business. Reducing the number of steps to 10 in France



(equivalent to a one standard deviation reduction) would increase the size of the credit market by 23 percentage points. On the other hand, for Chile, which is the least open country in our sample with a score of -1.55 for openness, the overall effect of STEPS on CREDIT becomes positive and equal to .5. A one standard deviation reduction in STEPS in Chile (from 10 to 6) would decrease the size of the credit market there by 2 percentage points. The coefficient on STEPS also becomes positive for 24 other countries out of the 80 observations available.

In column 3, the coefficient of the interaction between SPREAD and STEPS is significantly positive, suggesting that higher entry costs have a more negative impact on lending in countries with a higher spread. In a country with a relatively low spread like South Korea with 1.2 percent, 4 fewer steps would increase credit by 21 percentage points. By contrast, in Peru, which has a relatively high spread of 21 percent, the overall effect of STEPS on CREDIT becomes positive and equal to .7. A reduction of the number of steps to open a business in Peru would thus decrease credit by 2.8 percentage points.

In columns 2 and 4, we look at the impact of the policy variables on informality and find consistent results. Reducing the number of steps would have a bigger impact in countries that are more open and that have a lower spread.

The results of Table ?? also mostly support our results. In particular, in column 3, the coefficient of the interaction between SPREAD and FORMALISM is significantly positive, which means that a higher quality of enforcement has a more positive impact on lending in countries with a more competitive banking sector. Take again Peru, which has a spread of 21 percent. A one standard deviation improvement in our measure of enforcement would have no effect on credit. By contrast, the same policy in South Korea, which has a spread 1.3 percent, would increase credit by 20 percentage points. Similarly, column 4 shows that improving the quality of enforcement would stimulate formality more in countries with a lower spread.

Overall, the results suggest that reducing the cost of entering the formal sector or improving the quality of enforcement can have a sizable positive impact on credit and formality in countries that are open to international capital flows or with a low spread,

i.e., with a competitive banking sector. The same policy in closed or high spread countries would have lower or even negative impacts on credit and formality.

## 4 Conclusion

In this paper, we presented a general equilibrium model with an informal and a formal sector. We have analyzed how reforms to entry costs and judicial enforcement can affect formality and output. The conventional wisdom states that such policies should be associated with positive outcomes along these dimensions. We have shown, however, that in the context of our model, this prediction becomes less obvious if we take into account characteristics of the credit market like its degree of concentration or its openness to international capital flows. We also have presented some empirical evidence consistent with these predictions.

Our work is consistent with a number of results in the literature pointing to an ambiguous impact of the type of reforms discussed here. It also suggests the importance of taking into account general equilibrium effects when implementing such policies. Indeed, incentives to enter formality and access credit may require a more competitive and open credit market to be effective.

Figure 4: CREDIT and STEPS: Low versus high SPREAD

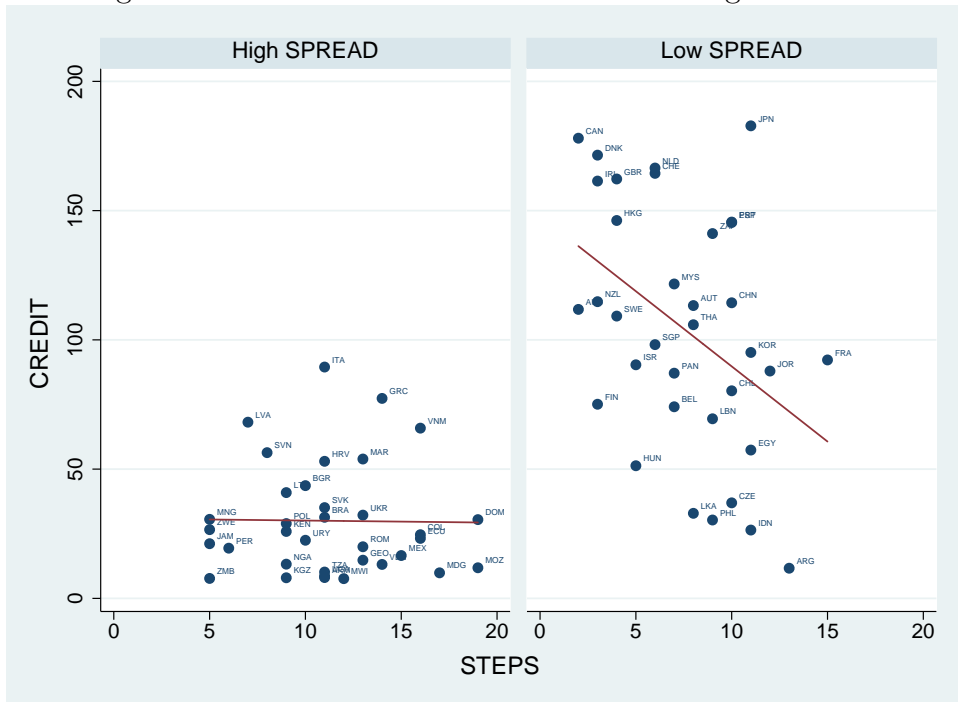


Figure 5: CREDIT and FORMALISM: Low versus high SPREAD

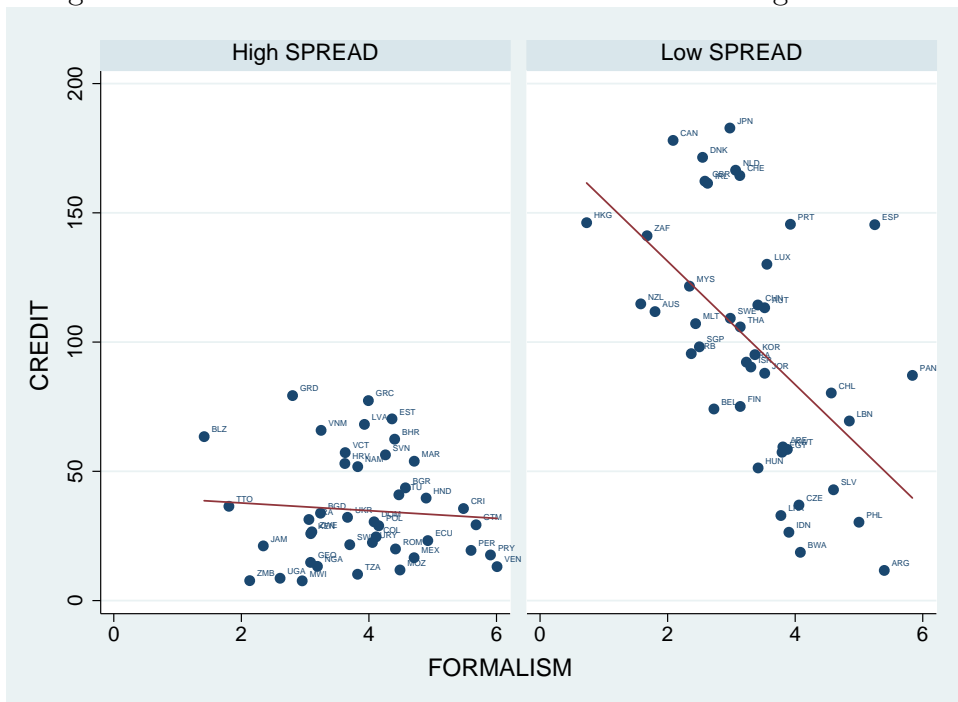


Figure 6: CREDIT and STEPS: Low versus high OPENNESS



Figure 7: CREDIT and FORMALISM: Low versus high OPENNESS

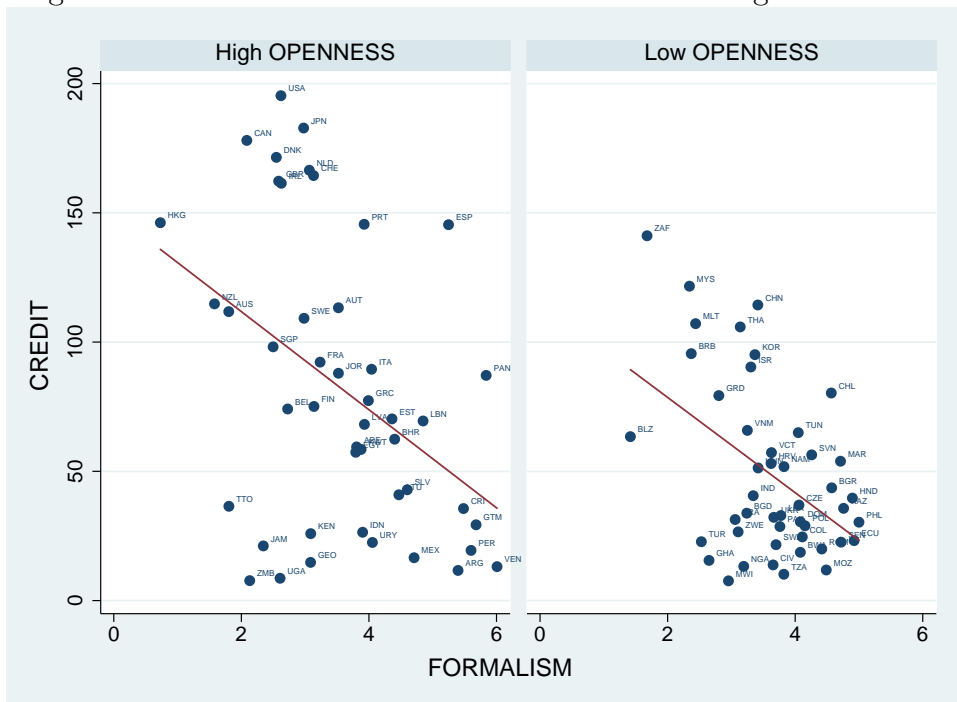


Figure 8: INFORMALITY and STEPS: Low versus high SPREAD

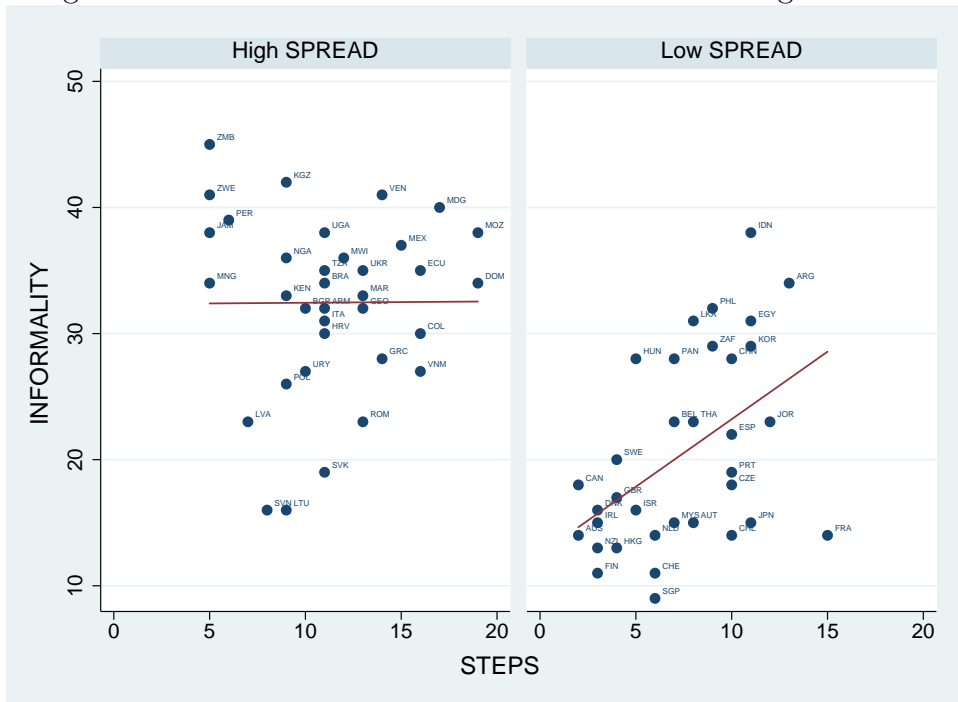


Figure 9: INFORMALITY and FORMALISM: Low versus high SPREAD

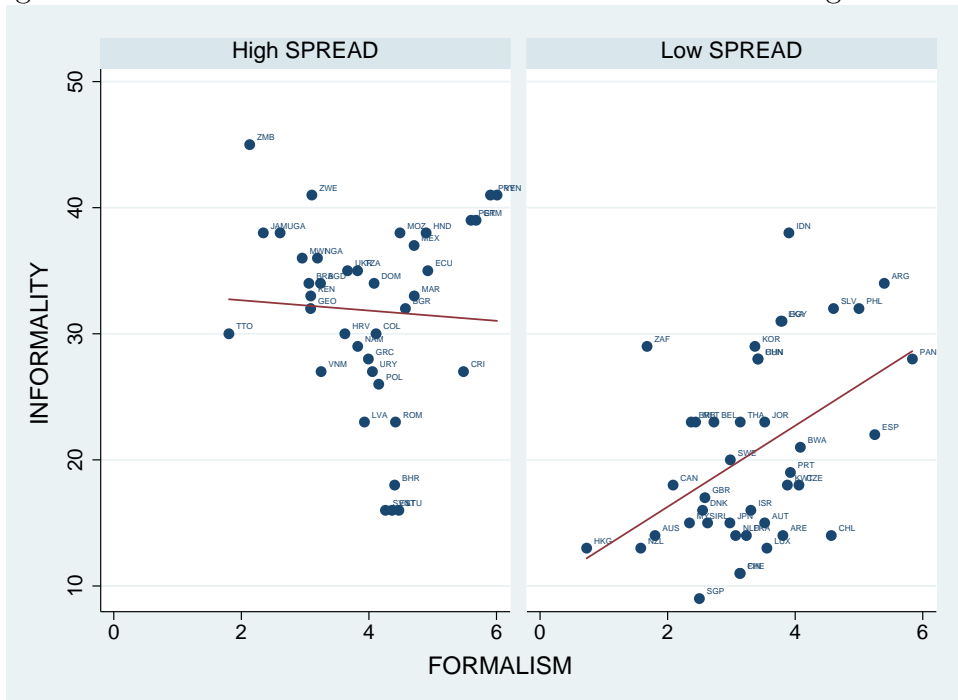


Figure 10: INFORMALITY and STEPS: Low versus high OPENNESS



Figure 11: INFORMALITY and FORMALISM: Low versus high OPENNESS

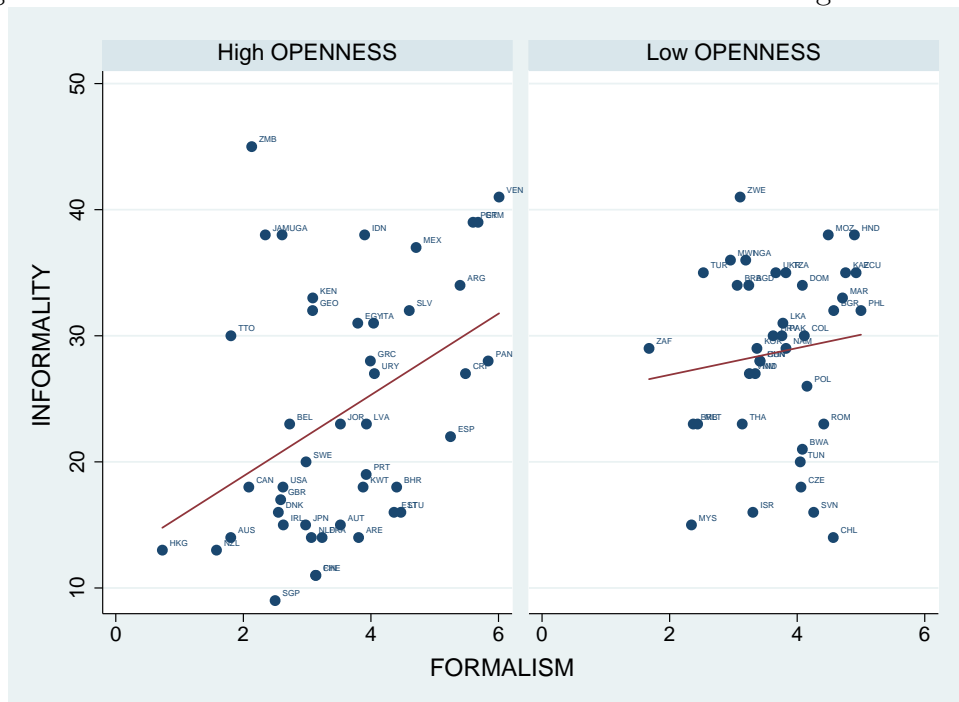


Table 1: The impact of entry costs on credit and informality

dependent variable	(1)	(2)	(3)	(4)
	CREDIT	INFORMALITY	CREDIT	INFORMALITY
GDP	28.539*** (3.475)	-6.177*** (0.778)	25.611*** (4.104)	-5.334*** (0.762)
STEPS	-1.876** (0.933)	0.416* (0.217)	-5.621*** (1.937)	1.046*** (0.354)
OPENNESS	16.737*** (6.278)	-0.614 (1.195)		
STEPS*OPENNESS	-1.533** (0.610)	0.122 (0.120)		
SPREAD			-3.937** (1.676)	0.905*** (0.330)
STEPS*SPREAD			0.300** (0.149)	-0.076** (0.031)
constant	-177.525*** (32.568)	78.189*** (7.878)	-101.484** (48.850)	63.357*** (9.184)
$N$	80	78	70	70
adj. $R^2$	0.595	0.616	0.586	0.666

Robust standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2: The impact of enforcement on credit and informality

dependent variable	(1) CREDIT	(2) INFORMALITY	(3) CREDIT	(4) INFORMALITY
GDP	27.621*** (3.372)	-6.213*** (0.763)	25.165*** (3.577)	-5.962*** (0.560)
FORMALISM	-13.841*** (3.536)	1.038 (0.775)	-21.564*** (5.494)	2.561*** (0.731)
OPENNESS	4.579 (9.121)	-2.206 (1.474)		
FORMALISM*OPENNESS	-0.129 (2.373)	0.571 (0.413)		
SPREAD			-4.795*** (1.755)	0.529** (0.216)
FORMALISM*SPREAD			0.990** (0.411)	-0.101* (0.054)
constant	-136.340*** (33.585)	79.016*** (8.135)	-74.000 (45.205)	69.669*** (6.641)
$N$	93	86	85	81
adj. $R^2$	0.560	0.595	0.594	0.645

Robust standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$