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Abstract[1]

This paper studies the relationship between creditor protection and credit volatility. During the negative phase of the business cycle, credit contracts more in countries with poor creditor protection. For similar shocks to business conditions, credit is more volatile in countries where creditors are *de facto* weakly protected. We test this idea using a dataset on legal determinants of finance in a panel of data of aggregate credit growth for a sample of 139 countries during the period 1990-2003. We find support for the view that better legal protections significantly reduce the impact of exogenous shocks on credit. The results are statistically and economically significant and robust to alternative measures of creditor protection, the inclusion of variables that reflect different stages of economic development and the restriction of our sample to only developing countries.

Keywords: Law and Finance, Credit, Volatility
JEL Classifications: G31, G33, K2

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1. Introduction

A well-documented feature in recent literature on law and finance is that strong institutions are crucial in fostering the development of financial markets. An institutional set-up that protects creditor rights is needed to align the incentives of debtors with those of lenders, increase the expected payoffs of lending, and hence achieve deep financial markets.[2] A less documented feature is that a strong institutional setup can also reduce the volatility of credit. Documenting and explaining this last feature is the main purpose of this paper.

There is a long tradition in macroeconomics, beginning with Fisher and Keynes, which emphasizes the role of credit markets in the propagation of cyclical fluctuations. However, to our knowledge, there is little research on the role of protecting creditor rights in propagating shocks into financial markets.[3] This paper closes this gap by exploring theoretically and empirically the relationship between creditor protections and the credit cycle.

Figure 1 summarizes some basic findings of previous research on creditor rights and financial markets and serves as motivation for our research. Panel (a) shows how the development of credit markets (as measured by the ratio of credit to the private sector supplied by the financial sector to GDP) is strongly related to commonly used measures of creditor rights protection. On average, the size of credit markets is 3 times larger in countries where creditor rights are protected. In countries with weak creditor rights, the ratio of credit to GDP averages only 22 percent, as opposed to countries with weak creditor rights, where the same figure averages 66 percent.[4] Alternatively, in countries with a common law legal origin, which are characterized by strong creditor protection, the ratio of credit to GDP averages 51 percent of GDP, as compared to only 38 percent in countries with different legal origin.[5]

Figure 1 also shows that, besides being an important factor in explaining the breadth of credit markets, creditor protection is also important in explaining its volatility. Panel (b) of figure 1 shows that the volatility of credit (measured as the standard deviation of the annual real growth

[2] This idea has been formalized by Townsend (1979), Aghion and Bolton (1992), and Hart and Moore (1994, 1998). Recent papers by La Porta, López-de-Silanes, Shleifer and Vishny (1997 and 1998) and Djankov, McLiesh and Shleifer (2004) have provided new data that has allowed authors to identify empirically, the importance of institutions for the development of private financial markets.

[3] See Braun and Larrain (2003) for a discussion.

[4] Similar findings appear when analyzing the median country rather than the average.

[5] Formal empirical results based on these data confirm the finding that countries with poor creditor protection tend to have narrower debt and equity markets. See Inter-American Development Bank (2004) for a review and further empirical evidence following these lines.

rate of credit) is smaller in countries with stronger creditor protection. In the average country with poor creditor rights the standard deviation of the annual real growth rate of credit is 16 percent, significantly higher than in countries with strong creditor rights (12 percent). This is also true when splitting the sample according to country's legal origins. When comparing median values of credit volatility, the striking fact is that credit volatility is nearly twice as large in countries with poor institutions.

We develop a theoretical framework based on Holstrom and Tirole's model of moral hazard in credit markets in which creditor protection is explicitly modeled. Using this framework, we explain the negative relationship between protecting creditor rights and credit volatility shown by the data. The main intuition of the model is that weak creditor protection becomes relevant during bankruptcy. When debtors are successful (that is, when their investment project has a positive outcome) they repay their debts, but if they fail creditors collect only a fraction of the residual value of the project financed. This fraction increases with creditor rights and contract enforcement. Therefore, during recessions, when the likelihood of bankruptcy is high, the expected pledgeable income of firms falls more in countries with low creditor protection, and in response credit is tightened more during these periods, increasing credit growth volatility.

In our empirical analysis we corroborate these ideas. Using a panel data of aggregate credit growth for a sample of 139 countries during the period 1990-2003, we find support for the claim that better legal protections significantly reduce credit volatility. In particular, we show that the impact of exogenous shocks to credit markets is larger in countries with poor creditor protection. In common law countries, which are characterized by high creditor protection and good contract enforcement, the elasticity of credit with respect to external shocks is half that observed elsewhere. In our sample, an improvement of one standard deviation in either creditor rights or contract enforcement measures reduces credit sensitivity to external shocks by a third. These results are robust to alternative measures of creditor protection, the inclusion of variables that reflect different stages of economic development, the restriction of our sample to only developing countries, and alternative measures of shocks.

The rest of the paper is organized as follows. Section 2 briefly reviews the literature and motivates our hypothesis. Section 3 presents a simple model to organize the discussion. In particular we extend the well-known Holmstrom and Tirole (1997, 1998) model to capture the

links between creditor protection, credit market breadth and the credit cycle. Section 4 describes the data set used to test the implications of our basic hypothesis. Section 5 presents empirical evidence about the role of legal protections in explaining credit volatility. Section 6 concludes.

2. Related Literature and Motivation

Our paper is a natural extension of previous works on creditor protection and financial development. According to this literature, the *power of creditors* is a crucial determinant of the amount of credit extended by the financial to firms and individuals. Rules and regulations that protect creditors rights in financial contracts (for example regulations that clearly state the right of creditors to seize collateral in a timely manner if the debtor defaults) and that are properly and efficiently enforced increase the *power of creditors* and therefore lead to larger credit markets. This idea has been formalized by Townsend (1979), using a costly state verification model, and by Aghion and Bolton (1992) and Hart and Moore (1994, 1998) using an incomplete contract approach. La Porta, López-de-Silanes, Shleifer and Vishny (1997 and 1998), Beck, Demirgüç-Kunt and Levine, (2003), and Djankov, McLiesh and Shleifer (2004) test this idea studying the cross-country correlation between creditor protection and the size of credit markets, proxied by the amount of credit to the private sector as a share of GDP. Using a different empirical approach, Demirgüç-Kunt and Maksimovic (1998), Beck, Demirgüç-Kunt and Maksimovic (2003, 2004), and Galindo and Micco (2004) test this idea studying the firm cross-section implication of creditor protection. Weak *creditor power* has a larger detrimental effect on firms more likely to be credit constrained by financial frictions, such as small firms.

This paper moves one step ahead, focusing on the effect of creditor protection, not on credit access (first moment), but on its effect on aggregate credit volatility (second moment). To our knowledge, there has been little research on the role of creditor protections in propagating shocks into credit markets. The few empirical papers that study related issues focus on the effect of financial imperfections on either investment or output behavior. For example, using data on large listed firms around the world, Love (2003) shows that firm investment in countries with low levels of creditor protections reacts more to cash flows. Using a difference-in-difference approach and data for several manufacturing industries in countries around the world, Braun and Larrain (2003) show that the greater an industry's dependence on external finance the higher its output volatility. The observed difference in the behavior of industries is greater when financial

frictions (for example, lack of accounting standards) are more prevalent. Besides the fact that these studies do not directly analyze the main focus of this paper, the role of legal protections in credit volatility, their results cannot be easily extrapolated to the whole economy either because of data limitations (large listed firms in the case of Love, 2003) or because of the methodology used a difference-in-difference approach in the case of Braun and Larrain (2003).[6]

In a related paper, Johnson et al. (2000) present evidence that the weakness of legal institutions plays an important role in explaining the extent of depreciation and stock market decline in the Asian crisis (1997-1998). Even though their work mainly focuses on minority shareholders' expropriation by managers and not on private credit, this study is similar to ours because it suggests that corporate governance matters a great deal for the extent of macro variables' fluctuation during a shock. Our paper can be viewed as a complement to the work of Johnson et al. (2000) that uses wider country coverage and focuses on credit markets rather than on equity markets.

In addition, our paper is also closely related with *the credit channel* literature. In this literature, the financial sector, due to financial frictions, is a propagation mechanism of primitive shocks, such as monetary disturbances, preference, or terms of trade shocks. This literature has two branches. The first studies the *balance sheet effect* and focuses on the creditworthiness of firms. Kiyotaki and Moore (1997), for example, study how credit constraints interact with aggregate economic activity over the business cycle. Using a dynamic setup in which lenders cannot force borrowers to repay unless their debts are secured, these authors find that the interaction between credit limits (collateral) and asset prices turns out to be an important transmission and amplifier mechanism for exogenous shocks to credit and output.[7] Using a different approach, Bernanke, Gertler and Gilchrist (1999) develop a dynamic general equilibrium model, which exhibits a financial accelerator. In their setup entrepreneurs are financially constrained and have to borrow from a financial intermediary. To motivate a nontrivial role for the financial sector, they assume a costly state verification approach. This auditing cost, which is proportional to debt, is paid only in case of default and therefore is

[6] A difference in difference approach allows to study which sectors or firms are more affected by a given factor, a cross derivate effect, but does not allow to determine, unless we do some strong assumptions, the main effect (aggregate impact).

[7] In this model, legal creditor protections could be introduced by assuming that the fraction of the market value of asset up to which the entrepreneur can borrow is an increasing function of the legal environment.

interpretable as a bankruptcy cost. Using this setup, the paper finds that bankruptcy costs amplify the effect of exogenous shocks on both investment (which is related to credit) and output.[8]

The empirical studies in this area are concentrated in the firm cross-section implications of this channel. The literature shows that shocks have a large impact on firms more likely to be credit constrained by financial frictions (for example, small as opposed to large firms). These studies focus mainly on the United States and a few developed countries and do not focus on the role of legal protections.[9]

The second branch of models in *the credit channel* literature, which is less related with our paper, studies more specifically the role of banks (*the bank lending channel*). A negative shock affects the ability of banks to provide funds and therefore decreases real activity (Bernanke and Blinder, 1988; Stein, 1998). The basic hypothesis is that, due to capital market imperfections, financially constrained banks may not be able to freely substitute away a shock to, for example deposits, with other forms of funding. In consequence, they may optimally cut lending in response to a negative shock to deposits, affecting the availability of funds to bank-dependent firms. Tests of this hypothesis look for systematic differences in the response of loan growth to monetary conditions across banks facing different degrees of financial constraints, usually proxied by size, asset liquidity, and capitalization.

In a seminal paper focusing on credit markets, Holmstrom and Tirole (1997) develop an incentive model of financial intermediation in which, due to moral hazard problems, firms as well as banks are capital constrained. In this model, firms' and banks' wealth determines their debt capacity. The novelty of this paper is that in a simple framework it is able to study demand factors (changes in the collateral level of firms) and supply factors (changes in banks' capital), and therefore it can identify a separate balance sheet channel and a lending channel. To motivate our empirical section, in the next section we extend the demand side of this model to explicitly account for creditor rights and contract enforceability and see how those affect credit volatility.

[8] In this model, an improvement of legal and effective protections can be thought as a reduction in bankruptcy costs.
[9] This literature shows differential effects of shocks on employment (Sharpe, 1994), investment (Fazzari, Hubbard, and Petersen, 1988, and Oliner and Rudebusch, 1996), inventories (Kashyap, Lamont and Stein, 1994), sales, and short-term debt (Bernanke, Gertler and Gilchrist, 1996, and Gertler and Gilchrist, 1994).

3. A Model of Creditor Protection and Credit Volatility

We assume the now standard idea that it is difficult for a lender to enforce the level of entrepreneurial effort. This setup introduces the type of moral hazard used in the formulation in Holmstrom and Tirole (1997, 1998). Broadly speaking, we assume that there are two kinds of risk-neutral agents: borrowers that face profitable investment opportunities but do not have enough cash to finance their own projects, and banks that have plenty of cash but no investment opportunities.

The representative entrepreneur faces an investment opportunity at date t_o that returns R per unit of investment at date t_1 in case of success and L in case of failure (L is therefore the residual value per unit of investment). However, the project is subject to moral hazard. The probability of success (π) depends on the entrepreneur's effort. When the entrepreneur does not behave in terms of the level of effort, the probability of success is reduced from π to $\pi - \Delta\pi^e$. Due to this lack of effort the entrepreneur obtains a private benefit of $B > 0$ per unit of investment, regardless of the outcome of the project. We assume that the net present value of the project is negative in case the entrepreneur shirks (low effort and therefore lower probability of success).[10] In this setup the business cycle is defined as changes in π : recession times are defined as periods of low probability of success.

Now, we turn to describe the kind of contract that can be written and enforced. Let I denote the amount of investment required by the borrower to undertake his investment project, and suppose that a bank is willing to lend $C = I - W$, where W denotes the amount of wealth that the entrepreneur puts into the project. In case of success, the borrower pays the lender R_B per unit of investment; in case of failure, she pays him nothing. However, when the project fails, an outcome that we interpret here as bankruptcy, the residual investment IL is liquidated. Due to problems in the bankruptcy procedure the residual value of this investment is only αIL . Lower α implies higher bankruptcy costs. Due to legal restrictions, only a fraction x of this residual value ends up in the hands of the lender, the borrower keeps the rest ($1 - x$). In this set-up α and x are measures of creditor protection. Note that α and x are conceptually

different. α represents the loss due to inefficiencies in the bankruptcy procedure (e.g., *days to enforce the law*), while x represents the way the pie is split between the different parties involved in the credit contract after bankruptcy (e.g., if management does not retain administration of its property pending the resolution of the reorganization). In this set-up creditor protection has two dimensions: the social cost of bankruptcy (e.g., resources and time spent during the bankruptcy process - α) and the way the residual investment is divided between lenders and the entrepreneur after a bankruptcy procedure (x). Higher social bankruptcy costs and a lower share of the residual investment going to creditors, are understood as lower creditor protection.

Banks have a zero cost of funding, and the banking industry is competitive (banks break even in equilibrium). To focus on the interesting case in which entrepreneurs go bankrupt in case the project fails, we impose parameter conditions in which, in equilibrium, banks always charge a positive lending interest rate. We also make an assumption that will guarantee that the equilibrium investment is finite ($\pi(R - \frac{B}{\Delta\pi^e}) + (x - \pi)\alpha L < 1$).

Next we solve for the amount of credit in equilibrium and then we compute the elasticity of credit with respect to the cycle and how it varies for different level of creditor protection.

Conditional on π and using the assumption that the net present value of the project is negative when effort is low, entrepreneurs solve the following problem:

$$\begin{aligned} & Max \;\; \pi(R - R_B) + (1 - \pi)\alpha(1 - x)L - W \\ & st \\ IC &: \Delta\pi^e(I(R - R_B) - \alpha(1 - x)IL) > IB \\ BP &: \pi IR_B + (1 - \pi)\alpha x IL \geq I - W \equiv C \end{aligned}$$

Where IC is the incentive compatibility constraint, and BP is the creditor's (or bank's) participation constraint. On the one hand, an improvement in x relaxes the incentive constraint, although an improvement in the bankruptcy procedure (α) reduces the entrepreneurs' incentive to work. If the entrepreneur gets a fraction of the residual value of the project in case of bankruptcy ($x < 1$), an improvement in the bankruptcy procedure α increases the

[10]These are standard assumptions in this literature.

entrepreneur's payoff in case of failure and therefore reduces her incentive to work. On the other hand, any type of improvement in credit protection (x or α) relaxes the bank's participation constraint.

Banks are competitive, therefore in equilibrium they break even (that is the bank's participation constraint is binding). In addition, as profits are linear in I , in equilibrium the entrepreneur's IC is bidding too, therefore:

$$I = W\frac{1}{1-\pi(R-\frac{B}{\Delta\pi^e})-(x-\pi)\alpha L} \qquad (1)$$

This condition implies that investment is proportional to the level of the entrepreneur's wealth. The second term in the expression is known in the corporate finance literature as the *equity multiplier*. This multiplier is positively related with the pledgeable income per unit of investment ($\pi(R-\frac{B}{\Delta\pi^e})+(x-\pi)\alpha L$). The *equity multiplier* increases with our measures of legal creditor protection x. The multiplier is also increasing in the efficiency of the bankruptcy procedure (α), if there is a minimum amount of legal protection $(x > \pi)$. For a low level of legal protection $(x < \pi)$, the positive effect of α on the residual value of the project (reflected in the BP) cannot compensate the negative effect on the entrepreneur's incentive to work. There is empirical evidence that shows that a better bankruptcy procedure increases firms' leverage; as the next equation shows, this evidence implies for our model that $x > \pi$.[11] We hereafter assume $x > \pi$. Finally, as expected, the pledgeable income and therefore the multiplier decreases with the severity of the moral hazard problem (B) and increasing in the probability of success π (that captures the business cycle). From the previous equation we can derive the equilibrium amount of credit and leverage level:

$$C = I - W = W\frac{\pi(R-\frac{B}{\Delta\pi^e})+(x-\pi)\alpha L}{1-\pi(R-\frac{B}{\Delta\pi^e})-(x-\pi)\alpha L}$$

$$\frac{C}{I} = \pi(R-\frac{B}{\Delta\pi^e})+(x-\pi)\alpha L \qquad (2)$$

[11] See Djankov et al (2004).

The previous equations imply that the debt and leverage levels are lower during recessions (lower π). Equation (2) also shows that the higher the severity of the moral hazard problem (large B) the lower will leverage be in equilibrium.[12] The opposite occurs with the degree of creditor protection. Higher creditor protection, x and α (with $x > \pi$), leads to more credit. The detrimental effect of lack of creditor protection is increasing with the probability of failure. Bad institutions hurt in case of failure (during bankruptcy procedures).[13] Finally, due to the constant return assumption, credit is linear with the entrepreneur's wealth; therefore the total amount of credit does not depend on the distribution of wealth among entrepreneurs.

To study the effect of creditor protection on credit volatility over the cycle we compute the elasticity of credit with respect to our business cycle variable π.

$$\xi_{C,\pi} = \left(\frac{\pi(R - \frac{B}{\Delta\pi^e} - \alpha L)}{\pi(R - \frac{B}{\Delta\pi^e} - \alpha L) + x\alpha L} \right) \left(\frac{1}{1 - \pi(R - \frac{B}{\Delta\pi^e}) - (x - \pi)\alpha L} \right)$$
$$= \frac{\pi(R - \frac{B}{\Delta\pi^e} - \alpha L)}{\frac{C}{I}\left(1 - \frac{C}{I}\right)} \qquad (3)$$

The elasticity is positive; during booms the amount of credit in the economy is larger than during recessions. Equation 3 also shows that the size of $\xi_{C,\pi}$ is related with two factors. The first is the fraction of the expected pledgeable income ($\pi(R - \frac{B}{\Delta\pi^e} - \alpha L) + x\alpha L$) that depends on the probability of success of the project ($\pi(R - \frac{B}{\Delta\pi^e} - \alpha L)$). The smaller the stochastic component of pledgeable income, the lower the sensitivity of credit. In the limit, if the pledgeable income does not depend on the stochastic component of the outcome, credit should not be affected by the probability of success (given a constant expected value). This fraction of the stochastic component of the pledgeable income is negatively related with creditor protections (x and α).

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[12] By assumption the leverage level (C/I) is lower than one.

[13] The entrepreneur's profit is:

$$\Pi(W) = (\pi R + (1 - \pi)\alpha L - 1)\frac{1}{1 - \pi(R - \frac{B}{\Delta\pi^e}) - (x - \pi)\alpha L} W$$

The second term in $\xi_{C,\pi}$ is the equity multiplier; namely the fraction of entrepreneur's wealth in investment. As expected, a large multiplier is related with a large elasticity (sensitivity). The total non-stochastic pledgeable income ($x\alpha LI$), as well as the total pledgeable income, depends on total investment (I) which is the sum of the entrepreneur's wealth (W) and credit (C). Therefore for a given level of investment (I), the smaller W, the smaller the fraction of C that would be repaid with the non-stochastic pledgeable income.[14] As mentioned above, the equity multiplier is increasing in creditor protection. Therefore, creditor protection increases credit sensitivity to the cycle (π) through its (increasing) effect on the equity multiplier, but reduces this sensitivity through its (decreasing) effect on the fraction of pledgeable income that depends on the stochastic component of the project's outcome. To study which effect dominates, we take the derivative of the credit-probability of success elasticity ($\xi_{C,\delta}$) with respect to x and α :

$$\frac{d\xi_{C,\pi}}{dx} = -\frac{1}{(1-\frac{C}{I})\frac{C}{I}}\left(1-2\frac{C}{I}\right)\xi_{C,\pi}\alpha L \qquad (4)$$

$$\frac{d\xi_{C,\pi}}{d\alpha} = -\frac{1}{(1-\frac{C}{I})\frac{C}{I}}\left[\pi+\left(1-2\frac{C}{I}\right)\xi_{C,\pi}(x-\pi)\right]L \qquad (5)$$

Equation (4) shows that legal creditor protection (x) reduces credit sensitivity as long as the leverage level (C/I) is small (lower than $1/2$).[15] For an equity multiplier ($1/(1-C/I)$) lower

[14]On the one hand, if the fraction of entrepreneur's wealth on investment were ($1-x\alpha L$) the debt would be completely paid with non-stochastic pledgeable income and therefore it would be paid with probability one. On the other hand, if the share of entrepreneur's wealth on investment were 0, only a fraction $x\alpha L$ of debt would be paid with the non-stochastic pledgeable income.

[15]Using aggregate data, we can compute C/I, as the ratio of the stock of credit and total capital (the stock of credit is credit to the private sector over GDP and is divided by the capital-output ratio). From the law of motion of aggregate capital and assuming a 10% depreciation and a 30% investment-output ratio, the capital-output ratio is 3. Using the mean credit-GDP ratio in our sample (40 percent), we have that our variable C/I should be around 0.15, well below $1/2$.

than 2 the effect of x on the fraction of pledgeable income that depends on the stochastic component of the project's outcome dominates the effect of x on the equity multiplier.

Equation (5) shows that the efficiency of the bankruptcy procedure (α) reduces credit sensitivity to the cycle when the leverage level is low (smaller than $\frac{1}{2}(1+\frac{\pi}{\xi_{C,\pi}(x-\pi)})$). It is important to note that, if the legal protection reduces credit sensitivity, a better bankruptcy procedure does too. Finally we should mention, as expected, that the effect of legal protection on credit sensitivity increases as the residual value of investment rises (IL). This result implies that industries with more tangible assets should observe a larger fall in their credit volatility after an improvement in legal protection. Braun and Larrain (2003) find evidence in favor of this result.
Summarizing, the intuition of the model is straightforward. The main point of this framework is that the expected income that can be pledged to lenders without jeopardizing the entrepreneur's incentives to work (pledgeable income) increases with creditor protection. Poor creditor protection materializes during bankruptcy.[16] In case of success firms repay their debt, but in the case of failure the creditor only collects a fraction of the residual value of the firm. This fraction increases with creditor rights and contract enforceability. Therefore, during recessions, when the likelihood of bankruptcy is high, the expected pledgeable income of firms falls more in countries with low credit protection, and in response credit is tightened more, increasing their credit growth volatility. In the following sections we test this implication econometrically using cross-country time-varying data.

4. Empirical Methodology

In this section we provide a framework to test the main hypothesis of this paper, namely that the protection of creditor rights (x), and the efficiency with which they are enforced (α), determines the way in which credit adjusts to shocks. Our approach consists of exploiting the differential response of countries with different degrees of creditor protection to shocks that reflect changes in the profitability of projects and therefore in the probability of bankruptcy (π in the above conceptual framework).

[16] In fact, if the probability of success of projects (hence the probability of debt repudiation) is zero, then weak creditor protection will have no impact on credit fluctuations.

The dependent variable of our study is the yearly change in real credit in each of the 137 countries included in our sample, during the period 1990-2003.[17] The source data for our dependent variable is the International Financial Statistics (IFS) of the IMF, line 22d, corresponding to credit provided to the private sector by the financial system.[18] We deflate this measure of credit using the consumer price index (line 64 from the same source) to obtain a measure of credit in real terms, and take first differences of the logarithm of this variable.

The purpose of our study is to identify how real credit responds to an exogenous shock to the quality of projects (an exogenous change on the probability of success of projects - π in our model) under different institutional setups. For such purpose, a crucial aspect of this paper is to obtain an adequate proxy of the shock. A key characteristic of such a proxy is that it should not be endogenous to the behavior of real credit. This rules out straightforward measures such as GDP growth for example, given that credit and GDP are simultaneously determined.[19] In order to obtain an exogenous measure of shocks, we construct an external shock variable based on the GDP growth rate the trading partners of any given country, weighted by exports over the source country's GDP. Formally the shock measure is constructed as follows:

$$ext.shock_{it} = \overline{S_i} \sum_{j=1}^{J} s_{ij,t-1} * g_{jt}$$

where $ext.shock_{it}$ is the external shock to country i at time t, $s_{ij,t-1}$ is the share of exports from country i to country j in $t-1$,[20] $\overline{S_i}$ is the average share of exports to GDP in country i during the sample period,[21] and g_{jt} is the growth rate of real GDP of country j at time t. The source data for s_{ij} is the Direction of Trade Statistics database of the International Monetary

[17] The sample period is restricted to the 1990s and onward, since the institutional data that will be described below, is only available for the this period.
[18] For countries that adopted the Euro in 1999 we sum to line 22d.f line 22zw.
[19] See for example Beck, Levine and Loayza (2000).

[20] Given j and t , the sum of $s_{ij,t-1}$ over j is equal to 1.
[21] We use the average share of exports on GDP to avoid fluctuation in this variables related with changes in the nominal exchange rate which is endogenous. Note that in the case of $s_{ij,t-1}$ country i's exchange rate movements cancel out.

Fund, and for $\overline{S_i}$ and GDP growth rates is the World Bank's World Development Indicators database.

The relevance of the shock measure is summarized in Table 1, where we show a strong correlation between the external shock and the real growth rate of GDP. Column 1 shows that, controlling for country and year fixed effects, the external shock measure is strongly and significantly correlated to the real GDP growth rate of the countries in our sample. Column 2, confirms that this correlation remains significant even when controlling for the level of development measured by GDP per capita (interaction). Finally, columns 3 and 4 show that the correlation remains significant and the regression coefficient remains stable when splitting the sample between developing and industrialized countries. Overall, our measure of external shock appears to be a good predictor of economic activity.

Using this external shock measure we estimate regressions of the following type:

$$\Delta Credit_{it} = \beta_1 ext.shock_{it} + \beta_2 ext.shock_{it} * legal\_protection_i + DT_t + \eta_i + \varepsilon_{it}$$

where DT are year dummies included to control for any temporal fixed effects, η_i are country fixed effects introduced to control for country specific trends and to ensure that pooling of time series observations for an individual country with cross-sectional observations across countries does not generate spurious statistical significance, and $legal\_protection_i$ is a set of variables that proxy the legal protection of creditors as well as the way regulations are enforced (α and/or x in our conceptual framework). As a proxy for legal protection (x) we use the measure of Creditor Rights (CR) constructed initially by La Porta et al. (1998), and for enforcement (α) we use Rule of Law (RL), Days to enforce a Contract (CE), Total Duration of the Procedure (TD) and Efficiency of the Judiciary (EJ). We also use two variables to proxy for de jure creditor protection and enforcement at the same time ($x * \alpha$): Effective Creditor Rights (ECR) and Common Law Origin (CL). The definitions and sources of the legal protection proxies are the following:

Creditor Rights (CR): We use the Djankov et al. (2004) index of creditor rights. This measure, based on La Porta et al. (1998), measures the degree to which secured creditors are protected during bankruptcy procedures. The index ranges from 0 to 4, where a higher number indicates

greater creditor protection. A score of one is assigned when each of the following rights are defined in laws and regulations: i) there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization; ii) secured creditors are able to seize their collateral after the reorganization petition is approved (no "automatic stay" or "asset freeze."); iii) secured creditors are paid first out of the proceeds of liquidating a bankrupt firm; and iv) if management does not retain administration of its property pending the resolution of the reorganization. CR is used as a proxy for x in our model.

Rule of Law (RL): We use the Kaufmann et al. (2003) measure of the rule of law. RL includes several indicators that measure the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts. We use RL serves as a proxy of α. in the model

Days to enforce a Contract (CE): CE measures the number of days to resolve a payment dispute through courts according to Djankov et al. (2004). The data is developed analyzing a standard case across several countries. In particular the authors study the number of calendar days required to enforce a contract of unpaid debt worth 50 percent of the country's GDP. This variable is also used as a proxy of α .

Total Duration of the Procedure (TD): TD measures the duration in days of a process to collect a bounced check. The source of the data is Djankov et al. (2004) and, as above, it is also used as a proxy of efficiency in our model.

Efficiency of the Judiciary (EJ): EJ is an assessment of the efficiency and integrity of the judicial system produced by the country risk rating agency Business International Corp. as reported by La Porta et al. (1998). As above, we use this variable as a proxy of α.

Effective Creditor Rights (ECR): We develop a summary measure for both regulations and the quality of their enforcement that we label Effective Creditor Rights (ECR). ECR takes into account that weak law enforcement can diminish the quality of regulations. ECR is the product of CR and RL. Both of these are normalized between zero and one, in such a way that ECR also fluctuates within this range. A higher value indicates higher creditor protection. This summary measure proxies for both α and x simultaneously.

Common Law (CL): We use the legal origin of each country's legal code to proxy both for better creditor protection and greater law enforcement. CL is a dummy that takes a value of 1 when countries have a common law legal tradition and 0 otherwise. As shown by La Porta et al. (1998), among many others, a common law traditional is an adequate instrument for better creditor rights and law enforcement. As ECR, CL also proxies simultaneously for α and x simultaneously. The source of this data is Djankov et al. (2004).

Appendix 1 reports the average values and basic descriptive statistics at an aggregate level and at a country level. It also reports the cross correlation matrix of the institutional regressors.[22] Table 2 reports a first inspection of the data under various classifications in terms of the effects of creditor protection on credit volatility measured as the standard deviation of credit growth during 1990-2003.

In each panel of Table 2 the sample is divided by the differences in the institutional and legal characteristics described above, and the average and median values of the standard deviation of credit for the observations of the countries in each group. In the first panel the sample is divided between countries with high and low creditor rights (de jure credit protection: x). Countries with high are those in which the creditor rights index is greater than 2 and countries with low creditor rights are defined as those where the creditor rights index is lower than 2.[23] The first column reports the number of countries classified in each category. The second column reports the average real credit volatility for the countries in each group, and the third column reports the median value. Using these statistics, we report the difference between the average and median values in each group and below we report the p-value of a statistical test under the null hypothesis that the difference in the means and medians is zero. We report similar statistics using each of the legal/institutional proxies mentioned above. In such exercises we define high and low as being above or below the median of the indicator.

Each of the sample separations suggests a similar story. Countries where the indicators favor greater creditor protection or greater efficiency and enforcement of regulations tend to exhibit lower standard deviations of the growth rate of credit (i.e., credit tends to be less volatile). For our measure of de jure creditor protection (CR and x in the model) we observe that the median value of the standard deviation of credit is 14.4 percent for countries with weak

[22]For a detail description of the institutional variables see Djankov et al (2004).

creditor rights and only 9.6 percent for countries with good de jure creditor protection. The difference is 4.8 percentage points and is significant at the 5 percent significance level. Comparing the mean value in each group the difference is 2.6 percentage points and is significant at the 13 percent significance level.

Focusing on proxies for enforcement, we find that for each of our four proxies for α the difference in credit volatility between countries with high and low enforcement is negative and statistically significant at conventional levels (in all case but one at 1 percent). This is the case when we compare either the mean or the median level between groups. Finally, when focusing on our two variables that proxy both creditor rights and enforcement (ECR and CL), we find that countries with high de facto creditor protection present lower credit volatility. The magnitude of the difference in the measure of credit volatility between groups goes from 3 percentage points when we compare the mean level using CL (significant at 3 percent) to 6 percentage points in the case of ECR using the median values within groups (significant at 1 percent). In all cases the effect appears to be economically significant. For example, in the case of common law as opposed to non-common law countries, these numbers suggest that the volatility of credit is 26 percent higher in countries with non-common law legal origin, that is, rephrasing La Porta et al., in countries where the legal tradition does not favor creditor protection. These numbers, though, need to be interpreted cautiously, since they do not control for the size of the shocks faced by the economies. The following section addresses this issue through proper econometric methods.

4. Results

Equations (4) and (5) suggest that credit fluctuations are smoother in countries with higher creditor protection than in those with low protection. To test the validity of this proposition, we construct a panel in which we gather information for the 1990-2003 period for a broad set of countries across the world. We estimate the empirical model described in equation (1) using a panel that is confined to the 1990s. This is done in order to avoid the impact of possible changes in regulation, which we cannot capture due to the fact that most of the legal data are collected in only one period. Our theory suggests that $\beta_1 > 0$ and $\beta_2 < 0$, that is, credit should react positively to shocks, but the magnitude of that reaction diminishes as creditor rights improve.

[23] In this exercise we exclude countries that have the median level of creditor rights (2).

Table 3 reports a first set of results in which we include each of the legal/institutional proxies separately in each regression. Column 1 reports the result using creditor rights as our proxy for de jure protection (x). Column 2 uses rule of law as proxy for contract enforceability, and Columns 3 and 4 use duration measures. In such cases we use the negative of the log of the number of days that the procedures last, in order to maintain the same interpretation as the other indexes (i.e., higher values mean greater creditor protection) or greater efficiency in enforcing creditor protections. Column 5 reports results using the efficiency of the judiciary measure, while columns 6 and 7 use the effective creditor rights index and common law legal origin dummy, respectively.

The sample of countries in each column is dictated by data availability. All specifications include year fixed effects as well as country fixed effects. In further specifications we restrict the data set to the number of country-year observations where data on all variables are available, except for the efficiency of the judiciary, for which there is little country coverage. In column 8 we report the same regression as in column 7, but restricting the sample to that dataset.

The results reported in Table 3 are in line with the prediction of the theoretical framework. Better creditor protection and better enforcement reduce the impact of shocks on credit. All regressions reported in columns 1-8 show negative and significant coefficients on the interaction of the shock measure and the creditor protection proxies. Results using contract enforcement, efficiency of the judiciary, effective creditor rights, and the common law dummy are significant at the 1 percent level. When using rule of law, and total duration the estimated coefficients are significant at the 5 percent level, and when using creditor rights they are significant at the 10 percent level. These results are not only statistically significant, but their economic magnitude is also relevant. Moving from a creditor rights index equal to 2 (50th percentile) to one equal to 3 (75th percentile) reduces the coefficient on the external shock by nearly 1.9 points, a 30 percent decline in credit growth elasticity with respect to external shocks. Similarly, a one standard deviation increase in the rule of law index, for example, reduces the coefficient on the external shock by nearly 1.5 points. If a negative shock hits the economy, the contraction of credit will be 49 percent lower in a country that is one standard deviation ahead of a country with average rule of law that is hit by an identical shock. We find similar results for our duration measures (CE and TD). Finally, in countries with a common law legal origin the impact on credit growth of an external shock is between 75 percent and 79 percent lower than in

a non-common law country, depending on the sample of countries used in the regression analysis.

Our framework suggests that there is a differential role for the impact of variables that reflect better legal protections and those measuring better enforcement. Determining whether the proxies measure exclusively one or the other is not straightforward. Nonetheless, we try to assess the impact of each separately by simultaneously including a variable exclusively related to the content of regulations such as the creditor rights index and other variables that capture mostly the efficiency of the legal process, such as the rule of law, the duration of contract enforcement and of legal procedures, and the efficiency of the judiciary. These results are reported in Table 4. Each column reports results including the legal protection variable (creditor rights) and each of the efficiency of enforcement variables. The p-value of an f-test to test for joint significance of the regulatory and the enforcement variables is reported at the bottom of the table. In all cases, both interactive terms are jointly significant and, in all cases except the one using efficiency of the judiciary, where the sample is considerably smaller, both coefficients are individually significant. This suggests, as predicted by our theoretical framework, that both *de jure* creditor protection (CR： x in the model) and its enforcement reduce credit volatility. As before, the results are not only statistically but are also economically significant. Column 1 suggests that, other things equal, a one standard deviation increase away from the mean in the creditor rights index reduces the impact of a shock by 40 percent, while a one standard deviation increase in rule of law reduces it by 55 percent.

A concern about the results above is that they may be driven by differences in economic development and that economic development is being proxied for by the legal/institutional variables considered in the study. In order to account for this, in Table 5 we control for economic development in two different ways. In columns 1-6 we include an additional interaction between the shocks measure and income per capita.[24] In such cases, the coefficients estimated for the interactions between the creditor protections and the shock measure capture the differential impact of regulations beyond the differential impact due to different levels of economic development. In columns 7-12 we replace income per capita for dummies reflecting the income level of the country following World Bank classification: High (INC10), Medium High (INC21 - omitted group), Medium Low (INC22) and Low income countries (INC33). The results remain

unchanged. Common law countries, for example, are between 40 percent and 50 percent less sensitive to an external shock than non-common law countries, depending on the specification.

Another way of dealing with the concern that the results reflect levels of development rather than legal and institutional differences is by splitting the sample. In Table 6 we report the same results as above, but restrict the sample to developing countries (developed countries are defined using the World Bank classification).[25] While the individual significance of the creditor rights index falls in some of the specifications, the joint significance of the creditor rights measure and any of the efficiency of enforcement variables remains.[26] The significance of the effective creditor rights measure and of the common law dummy remains at the 1 percent level. The order of magnitude remains similar to the one above. A one standard deviation increase in creditor rights away from the average country reduces the impact of a shock by 36 percent, while a one standard deviation increase in the rule of law reduces the impact of a shock by 60 percent. As in Table 3, countries with high "effective" creditor rights and common law countries appear to be significantly less affected by shocks than non-common law countries. Column (5) shows that, as for the whole sample (Table 3), for a country in the 80th percentile in terms of effective creditor rights the impact of a shock is around 50 percent lower than for a country in the 20th percentile. The same is true in column 7, where we also control for the interaction of GDP per capita and the external shock. Column 6 shows that in common law countries the impact of a shock is around 80 percent lower than in non-common law countries. This percentage falls to 50 percent once we control for the interaction of GDP per capita and the external shock in Column 8. These last two results are almost identical to the ones obtained using the whole sample (Tables 3 and 6).

5. Conclusions

This paper studies the relationship between creditor protection and credit cycle. In particular it tests the idea that weak creditor protection becomes relevant during bankruptcy. When firms are unsuccessful and unable to repay their debts, creditors collect only a fraction of the residual

[24] Income per capita is measured as the average of GDP per capita (in logs) during the sample period.
[25] In our sample the countries defined as developed are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Greece, Iceland, Ireland, Italy, Japan, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and United States.
[26] Given the small number of developing countries for which we have information for EJ, we do not stress the results in column 4.

value of the firm. This fraction increases with creditor rights and contract enforceability. Therefore, during recessions, when the likelihood of bankruptcy increases, the expected pledgeable income of firms falls more in institutional environments characterized by low creditor protection; in response credit will be tightened more during these periods, increasing credit growth volatility. In other words, the contraction in credit during the negative phase of the business cycle should be greater in economies where creditor protection is weaker.

We motivate the previous idea in a framework a la Holmstrom and Tirole (1997) that explains the relationship between creditor protection, credit market breadth and the credit cycle. We test the basic implications of the model using an updated data set on legal determinants of finance in a panel of data of aggregate credit growth for a sample of up to 139 countries during the period 1990-2003. We find support for the claim that better legal protections significantly reduce credit volatility. We show that the impact of exogenous shocks on credit markets is larger in institutional environments characterized by poor creditor protection. The results are not only statistically but also economically significant. In common law countries, for example, which are characterized by high creditor protection and good contract enforcement, the elasticity of credit with respect to external shocks is half the level observed in other nations. These results are robust to alternative measures of creditor protection, the inclusion of variables that reflect different stages of economic development, the restriction of our sample to only developing countries, and alternative measures of shocks. Poor creditor protection induces an overreaction of credit markets to exogenous shocks. Overall, we find strong evidence on the role played by explicit creditor rights regulations and the efficiency of their enforcement in promoting stability in credit markets.

Table 1. Real GDP Growth and External Shock

Dependent Variable: Real GDP Growth				
	(1)	(2)	(3)	(4)
	dlgdp	dlgdp	dlgdp	dlgdp
Ext.Shock	1.268	1.107	1.566	1.202
	(0.191)***	(0.245)***	(0.507)***	(0.201)***
Ext.Shock * GDPpc		0.178		
		(0.116)		
Observations	1627	1615	286	1341
Number of Countries	137	136	23	114
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
R-squared	0.2198	0.2181	0.5417	0.2031
Sample	All	All	IND	DEV

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2. Summary Statistics

		Standard Deviation Real Credit Growth	
	Countries	Mean	Median
Low Creditor Rights	47	0.144	0.144
High Creditor Rights	37	0.118	0.096
Difference		*0.026*	*0.048*
P value		*0.13*	*0.05*
Low Rule of Law	70	0.172	0.157
High Rule of Law	67	0.089	0.073
Difference		*0.083*	*0.084*
P value		*0.00*	*0.00*
High Duration of Contract Enforcement	54	0.157	0.144
Low Duration of Contract Enforcement	55	0.118	0.103
Difference		*0.039*	*0.041*
P value		*0.01*	*0.01*
High Total Duration of Procedure	45	0.128	0.126
Low Total Duration of Procedure	45	0.103	0.084
Difference		*0.024*	*0.042*
P value		*0.11*	*0.00*
Low Efficiency of the Judiciary	24	0.132	0.138
High Efficiency of the Judiciary	23	0.059	0.038
Difference		*0.073*	*0.099*
P value		*0.00*	*0.00*
Low Effective Creditor Rights	54	0.158	0.145
High Effective Creditor Rights	55	0.118	0.083
Difference		*0.040*	*0.062*
P value		*0.01*	*0.00*
Non Common Law	87	0.142	0.130
Common Law	50	0.113	0.084
Difference		*0.029*	*0.046*
P value		*0.03*	*0.00*

Note: Annual log-changes standard deviation are computed for the period 1990-2003

We drop the 2 percent extreme values of real credit growth and country-year observations with inflation above 200%.

Low creditor rights countries are defined as countries with index values 0 or 1, and high with values 3 or 4.

For the rest of the variables, high and low refer to above and below the sample median.

Table 3. Baseline Result

Dependent Variable: Real Credit Growth								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ext.Shock	5.984	3.682	6.246	4.159	5.641	13.002	5.104	9.677
	(1.527)***	(1.141)***	(1.408)***	(1.021)***	(1.411)***	(2.217)***	(1.423)***	(1.747)***
Ext.Shock * CR	-1.861							
	(0.961)*							
Ext.Shock * RL		-1.526						
		(0.761)**						
Ext.Shock * CE			-2.754					
			(1.024)***					
Ext.Shock * TD				-1.609				
				(0.801)**				
Ext.Shock * EJ					-1.838			
					(0.598)***			
Ext.Shock * ECR						-22.654		
						(4.635)***		
Ext.Shock * CL							-4.036	-7.196
							(1.423)***	(1.866)***
Observations	1298	1629	1298	1089	577	952	1629	952
Number of Countries	109	137	109	90	47	79	137	79
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.1938	0.1896	0.1946	0.2009	0.2331	0.2268	0.1918	0.2199
Sample	1990-2003							

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Results Controlling For Creditor Rights and Enforcement Measures Simultaneously

Dependent Variable: Real Credit Growth				
	(1)	(2)	(3)	(4)
Ext.Shock	10.178	9.883	9.395	7.162
	(1.627)***	(1.548)***	(1.509)***	(1.642)***
Ext.Shock * CR	-2.306	-2.943	-2.586	-1.627
	(0.854)***	(0.818)***	(0.872)***	(1.093)
Ext.Shock * RL	-3.230			
	(0.967)***			
Ext.Shock * CE		-3.355		
		(0.912)***		
Ext.Shock * TD			-3.179	
			(1.098)***	
Ext.Shock * EJ				-1.606
				(0.643)**
Observations	952	952	952	577
Number of Countries	79	79	79	47
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
R-squared	0.2290	0.2266	0.2251	0.2366
F test	0.0000	0.0000	0.0000	0.0013
Sample	1990-2003			

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5. Results Controlling For Level of Development

Dependent Variable: Real Credit Growth												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Ext.Shock	9.833	10.328	10.352	7.554	13.011	11.484	11.124	13.091	12.719	8.711	15.545	13.279
	(1.615)***	(1.692)***	(1.705)***	(2.040)***	(2.162)***	(1.932)***	(2.330)***	(2.482)***	(2.510)***	(5.528)	(2.728)***	(2.520)***
Ext.Shock * CR	-2.441	-2.607	-2.179	-1.703			-2.196	-2.285	-1.798	-1.779		
	(0.862)***	(0.869)***	(0.884)**	(1.092)			(0.876)**	(0.870)***	(0.906)**	(1.021)*		
Ext.Shock * RL	-5.500						-6.702					
	(2.720)**						(2.100)***					
Ext.Shock * CE		-2.409						-3.742				
		(1.079)**						(1.039)***				
Ext.Shock * TD			-2.237						-2.762			
			(1.048)**						(1.004)***			
Ext.Shock * EJ				-1.458						-1.400		
				(0.877)*						(0.953)		
Ext.Shock * ECR					-22.738						-24.860	
					(6.450)***						(5.930)***	
Ext.Shock * CL						-5.617						-5.180
						(1.821)***						(1.899)***
Ext.Shock * GDPpc	1.907	-0.982	-1.368	-0.293	0.015	-1.964						
	(2.048)	(0.898)	(0.742)*	(1.157)	(0.995)	(0.713)***						
Ext.Shock * INC10							6.000	-4.693	-3.680	1.032	-5.188	-1.349
							(13.004)	(4.488)	(4.426)	(8.863)	(4.455)	(4.510)
Ext.Shock * INC22							-4.652	-6.446	-5.867	-2.777	-4.433	-5.690
							(7.134)	(2.988)**	(2.968)**	(6.492)	(2.949)	(3.097)*
Ext.Shock * INC33							-0.411	-3.549	-5.166	-1.606	-1.128	-6.384
							(7.684)	(2.563)	(2.470)**	(6.964)	(2.901)	(2.791)**
Observations	952	952	952	577	952	952	577	952	952	577	952	952
Number of Countries	79	79	79	47	79	79	79	79	79	47	79	79
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.2301	0.2277	0.2280	0.2367	0.2268	0.2277	0.2480	0.2322	0.2306	0.2377	0.2308	0.2282
F test	0.0030	0.0023	0.0012	0.0160			0.0002	0.0001	0.0004	0.0427		
Sample			All Countries 1990-2003						All Countries 1990-2003			

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6. Results for Developing Country Sample

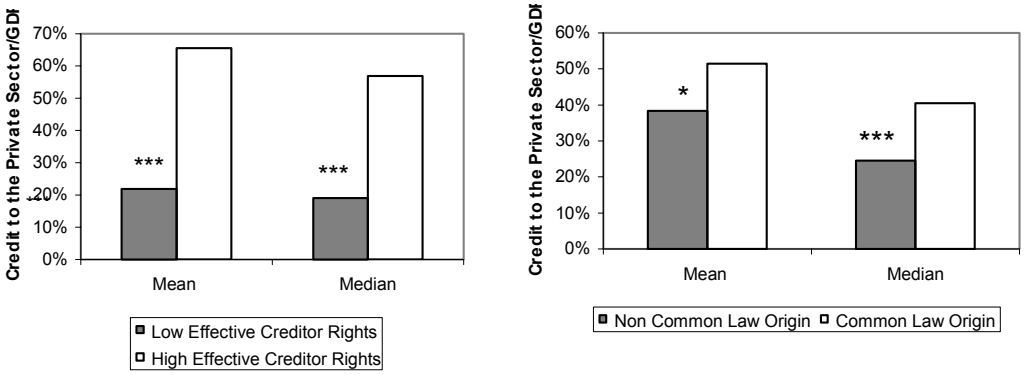
Dependent Variable: Real Credit Growth								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ext.Shock	10.085	10.371	10.103	3.795	13.544	10.522	13.412	11.714
	(1.771)***	(1.873)***	(1.881)***	(2.376)	(2.541)***	(2.149)***	(3.269)***	(2.156)***
Ext.Shock * CR	-1.862	-3.332	-3.010	0.294				
	(1.138)	(1.011)***	(1.052)***	(1.790)				
Ext.Shock * RL	-3.923							
	(1.093)***							
Ext.Shock * CE		-3.633						
		(0.996)***						
Ext.Shock * TD			-3.562					
			(1.232)***					
Ext.Shock * EJ				-1.809				
				(0.741)**				
Ext.Shock * ECR					-24.606		-23.730	
					(5.188)***		(14.413)*	
Ext.Shock * CL						-8.499		-5.572
						(2.220)***		(2.486)**
Ext.Shock * GDPpc							-0.142	-2.377
							(2.147)	(0.894)***
Observations	317	692	692	317	692	692	692	692
Number of Countries	58	58	58	26	58	58	58	58
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.2474	0.2171	0.2125	0.2410	0.2139	0.2086	0.2139	0.2170
F test	0.0000	0.0000	0.0001	0.0310				
Sample				Developing 1990-2003				

Standard errors in parentheses

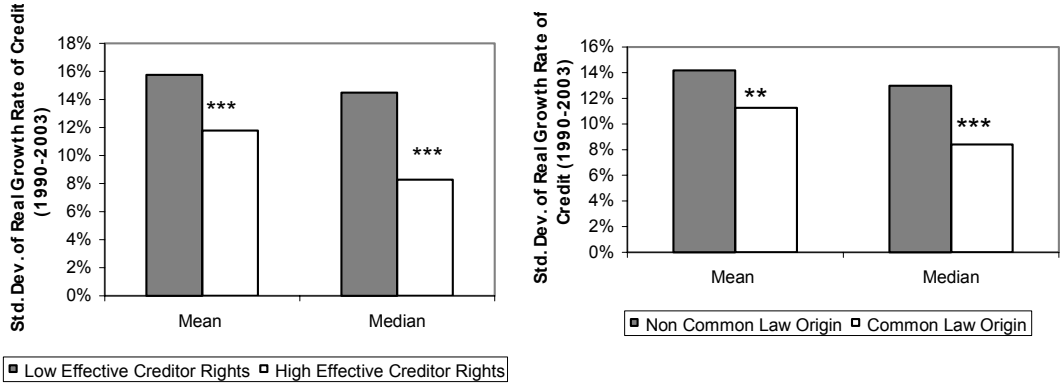
* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 1. Financial Markets and Creditor Protection

(a) Credit Market Development and Legal Protection



(b) Credit Market Volatility and Legal Protection



Notes: Low and high effective creditor rights indicates below or above the median of effective creditor rights respectively. Effective creditor rights is the product of the Creditor Rights Index and Rule of Law. *,**, and *** indicates that the difference between the indicators across groups of countries is significant at the 10% ,5% and 1% significance levels respectively.

Appendix 1

Table A1. Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Creditor Rights (CR)	1298	1.80	1.18	0	4
Rule of Law (RL)	1629	0.15	0.94	-1.35	2.14
Days to enforce a Contract (CE)	1298	380	233	27	1459
Total Duration of the Procedure (TD)	1089	237	175	7	1003
Efficiency of the Judiciary (EJ)	577	7.68	2.07	2.50	10.00
Effective Creditor Rights (ECR)	1298	0.15	0.16	0.00	0.68
Common Law	1629	0.38	0.49	0	1
Real Credit Growth	1629	0.05	0.16	-0.95	1.48
Shock	1629	0.01	0.01	-0.01	0.10

Source: Djankov et al (2003), Djankov et al (2004), Kaufmann et al (2003), IFS/IMF and WDI/WB.

Note: Creditor Rights is the average value for the 1990s. Rule of Law is the average for 1996-1998-2000-2002.

For the empirical analysis we use the log value of CE and TD. The log CE and TD Std.Dev are 0.81 and 0.68, respectively.

Table A2. Correlation Matrix

		CR	RL	CE	TD	EJ	CL
CR	Corr.	1.00					
	Obs.	109					
RL	Corr.	0.26*	1.00				
	Obs.	109	137				
CE	Corr.	0.17*	0.52*	1.00			
	Obs.	109	109	109			
TD	Corr.	0.12	0.18*	0.74*	1.00		
	Obs.	79	90	79	90		
EJ	Corr.	0.23	0.76*	0.52*	0.38*	1.00	
	Obs.	47	47	47	47	47	
CL	Corr.	0.30*	0.06	0.15	0.29*	0.19	1.00
	Obs.	109	137	109	90	47	137

Notes: Pairwise correlations are reported. One observation per country. CE and TD are in log. * significant at 10%.

Table A3. Country-Specific Data

Country	CR	RL	CE	TD	EJ	ECR	CL	Std.Dev. Real.Cred.Growth
Argentina	1.0	-0.018	520	300	6	0.067	0	0.144
Algeria	1.0	-0.684	407			0.034	0	0.195
Armenia	2.1	-0.442	195			0.097	0	0.239
Australia	3.0	1.882	157	319.5	10	0.490	1	0.031
Austria	3.0	1.974	374	434	9.5	0.504	0	0.027
Bahrain		0.841		368			1	0.073
Bangladesh	2.0	-0.713	365	270		0.065	1	0.079
Barbados		0.730		111			1	0.077
Belgium	2.0	1.466	112	120	9.5	0.285	0	0.024
Belize		0.277		60			1	0.051
Benin	0.0	-0.324	570			0.000	0	0.212
Bhutan		-0.441					1	0.155
Bolivia	2.0	-0.527	591	464		0.084	0	0.130
Botswana	3.0	0.729	154	77		0.315	1	0.141
Brazil	1.0	-0.207	566	180	5.75	0.058	0	0.136
Bulgaria	2.0	-0.105	440	410		0.126	0	0.383
Burkina Faso	0.0	-0.594	458			0.000	0	0.236
Burundi	1.0	-0.862	512			0.025	0	0.185
Cameroon	0.0	-1.108	585			0.000	0	0.133
Canada	1.1	1.864	346	421	9.25	0.186	1	0.038
Cape Verde		0.357					0	0.076
Central African Rep.	0.0	-0.639	660			0.000	0	0.149
Chad	0.0	-0.724	526			0.000	0	0.143
Chile	2.0	1.251	305	200	7.25	0.263	0	0.064
Colombia	0.0	-0.631	363	527	7.25	0.000	0	0.126
Congo, Rep.	0.0	-1.203	560			0.000	0	0.143
Costa Rica	1.0	0.720	550	370		0.105	0	0.145
Cote d'Ivoire	0.0	-0.736	525	150		0.000	0	0.098
Croatia	3.0	-0.092	415	330		0.191	0	0.222
Cyprus		0.804		360			1	0.030
Czech Republic	3.0	0.625	300	270		0.300	0	0.120
Denmark	3.0	1.942	83	83	10	0.499	0	0.084
Dominica		-0.007					1	0.054
Dominican Republic	2.0	-0.305	580	215		0.106	0	0.129
Ecuador	0.0	-0.579	388	332.5	6.25	0.000	0	0.170
Egypt, Arab Rep.	2.0	0.165	410	202	6.5	0.153	0	0.101
El Salvador	3.0	-0.401	275	60		0.144	0	0.111
Estonia		0.580		305			0	0.127
Ethiopia	3.0	-0.356	420			0.151	0	0.249
Fiji		-0.347					1	0.095
Finland	1.0	2.014	240	240	10	0.170	0	0.070
France	0.0	1.440	75	181	8	0.000	0	0.044
Gabon		-0.405					0	0.175
Gambia, The		-0.203					1	0.204
Germany	3.0	1.814	184	154	9	0.480	0	0.037

Table A3. Country-Specific Data (cont)

Country	CR	RL	CE	TD	EJ	ECR	CL	Std.Dev. Real.Cred.Growth
Ghana	1.0	-0.132	200	90		0.062	1	0.195
Greece	1.0	0.721	151	315	7	0.105	0	0.103
Grenada		0.303		128			1	0.088
Guatemala	1.0	-0.734	1459	220		0.031	0	0.127
Guinea-Bissau		-1.286					0	0.268
Haiti	2.0	-1.355	368			0.000	0	0.108
Honduras	2.0	-0.785	545	225		0.058	0	0.110
Hong Kong, China	4.0	1.557	211	61	10	0.588	1	0.082
Hungary	1.0	0.771	365	365		0.107	0	0.160
Iceland		1.871		251			0	0.132
India	2.2	0.110	425	106	8	0.164	1	0.058
Indonesia	2.6	-0.753	570	225	2.5	0.078	0	0.139
Iran, Islamic Rep.	2.0	-0.572	545			0.079	0	0.128
Ireland	1.0	1.743	217	130	8.75	0.156	1	0.149
Israel	3.4	1.046	585	315	10	0.415	1	0.036
Italy	2.0	0.901	1390	645	6.75	0.228	0	0.061
Jamaica	2.0	-0.251	202	202		0.111	1	0.323
Japan	2.5	1.594	60	60	10	0.372	0	0.026
Kazakhstan	1.4	-0.795	400	120		0.040	0	0.288
Kenya	4.0	-0.956	360	255	5.75	0.080	1	0.159
Korea, Rep.	3.0	0.763	75	75	6	0.321	0	0.049
Kuwait	3.0	0.919	390	357		0.344	0	0.108
Lao PDR	0.0	-1.119	443			0.000	0	0.464
Latvia	3.0	0.229	189	188.5		0.240	0	0.187
Lesotho	1.0	-0.144	285			0.061	1	0.167
Lithuania	1.6	0.179	154	150		0.123	0	0.157
Macedonia, FYR	3.0	-0.409	509			0.143	0	0.284
Madagascar	2.0	-0.673	280			0.069	0	0.116
Malawi	2.7	-0.393	277	108		0.132	1	0.268
Malaysia	3.0	0.673	300	90	9	0.307	1	0.083
Mali	0.0	-0.644	340			0.000	0	0.151
Malta		0.613		545			0	0.048
Mauritania	1.0	-0.478	410			0.044	0	0.145
Mauritius		0.827					0	0.065
Mexico	0.0	-0.275	421	283	6	0.000	0	0.213
Mongolia	2.0	0.256	314			0.163	0	0.315
Morocco	1.0	0.273	240	192		0.082	0	0.138
Mozambique	2.0	-0.906	580	540		0.045	0	0.182
Myanmar		-1.275					0	0.217
Namibia	2.0	0.758	270	117.5		0.213	1	0.069
Nepal	2.0	-0.360	350			0.100	1	0.081
Netherlands	3.0	1.893	48	39	10	0.492	0	0.033
New Zealand	4.0	1.989	50	60	10	0.675	1	0.032
Nicaragua	4.0	-0.756	155			0.121	0	0.256
Niger	1.1	-0.888	330			0.027	0	0.228

Table A3. Country Specific Data (cont)

Country	CR	RL	CE	TD	EJ	ECR	CL	Std.Dev. Real.Cred.Growth
Nigeria	4.0	-1.219	730	241	7.25	0.027	1	0.201
Norway	2.0	2.019	87	87	10	0.341	0	0.061
Oman	0.0	1.086	455			0.000	0	0.093
Pakistan	1.0	-0.617	395	365	5	0.037	1	0.040
Panama	4.0	0.042	355	197		0.282	0	0.092
Papua New Guinea	1.0	-0.454	295			0.045	1	0.129
Paraguay	1.0	-0.802	285	222		0.028	0	0.108
Peru	0.0	-0.442	441	441	6.75	0.000	0	0.146
Philippines	1.0	-0.294	380	164	4.75	0.054	0	0.164
Poland	2.9	0.556	1000	1000		0.276	0	0.096
Portugal	1.0	1.244	320	420	5.5	0.131	0	0.073
Rwanda	1.0	-0.803	395			0.028	0	0.191
Saudi Arabia	1.1	0.656	360			0.116	1	0.076
Senegal	0.0	-0.237	485	335		0.000	0	0.163
Seychelles		-0.055					0	0.090
Sierra Leone	2.0	-0.935	305			0.042	1	0.250
Singapore	3.0	2.008	69	46.5	10	0.509	1	0.070
Slovak Republic	2.0	0.224	565			0.159	0	0.201
Slovenia	3.0	0.821	1003	1003		0.329	0	0.067
Solomon Islands		-0.768					1	0.124
South Africa	3.0	0.247	277	84	6	0.243	1	0.051
Spain	2.0	1.239	169	147	6.25	0.262	0	0.058
Sri Lanka	2.0	0.049	440	440	7	0.142	1	0.316
St. Kitts and Nevis		0.114					1	0.061
St. Lucia		0.114					1	0.044
St. Vincent/Grenadines		0.220		35			1	0.053
Sudan		-1.303					1	0.077
Suriname		-0.624					0	0.212
Swaziland		-0.145		40			1	0.104
Sweden	1.4	1.921	208	190	10	0.236	0	0.114
Switzerland	1.0	2.141	170	223.5	10	0.176	0	0.025
Syrian Arab Republic	3.0	-0.384	672			0.147	0	0.070
Tanzania	2.0	-0.432	242	127		0.093	1	0.210
Thailand	2.6	0.385	390	210	3.25	0.232	1	0.149
Togo	0.0	-0.877	535			0.000	0	0.116
Tonga		-0.653					1	0.102
Trinidad and Tobago		0.370		194			1	0.087
Tunisia	0.0	0.295	27	7		0.000	0	0.055
Turkey	2.0	0.056	330	105	4	0.142	0	0.185
Uganda	2.0	-0.616	209	99		0.075	1	0.139
United Kingdom	4.0	1.883	288	101	10	0.654	1	0.038
United States	1.0	1.750	250	54	10	0.157	1	0.030
Uruguay	2.1	0.537	620	360	6.5	0.205	0	0.098
Vanuatu		-0.432					1	0.085
Venezuela, RB	3.0	-0.782	445	360	6.5	0.087	0	0.220
Zambia	1.0	-0.423	274	188		0.047	1	0.209
Zimbabwe	4	-0.573	350	197	7.5	0.158	1	0.165

Source: Djankov et al (2003), Djankov et al (2004), Kaufmann et al (2003), La Porta et al (1998) and IFS/IMF

Note: Rule of Law is the average for 1996-1998-2000-2002. For the empirical analysis we use the log value of CE and TD.

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