Creditor Protection and Credit Response to Shocks

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This article studies the relationship between creditor protection and credit responses to macroeconomic shocks. Using a data set on legal determinants of finance in a panel of data on aggregate credit growth for 79 countries during 1990–2004, it is shown that credit is more responsive to external shocks in countries with weak legal creditor protection and weak enforcement. The results are statistically and economically significant and robust to alternative measures of creditor protection, to the inclusion of variables that reflect different stages of economic development, to the restriction of the sample to only developing economies, to the controls for systemic crises, to alternative shock measures, and to vector autoregressive specifications. JEL codes: G31, G33, K2.

A well-documented feature in recent literature on law and finance is that strong institutions foster the development of financial markets. One strand of the literature has shown that an institutional setup that adequately protects creditor rights (CR) can align the incentives of debtors and lenders, increase the expected payoffs of lending, and deepen financial markets.[1] Less documented

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1. This idea has been formalized by Townsend (1979), Aghion and Bolton (1992), and Hart and Moore (1994, 1998). Recent papers by La Porta *et al.* (1997 and 1998) and Djankov, McLiesh, and Shleifer (2007) have provided new data allowing the authors to identify empirically the importance of institutions for the development of private financial markets.

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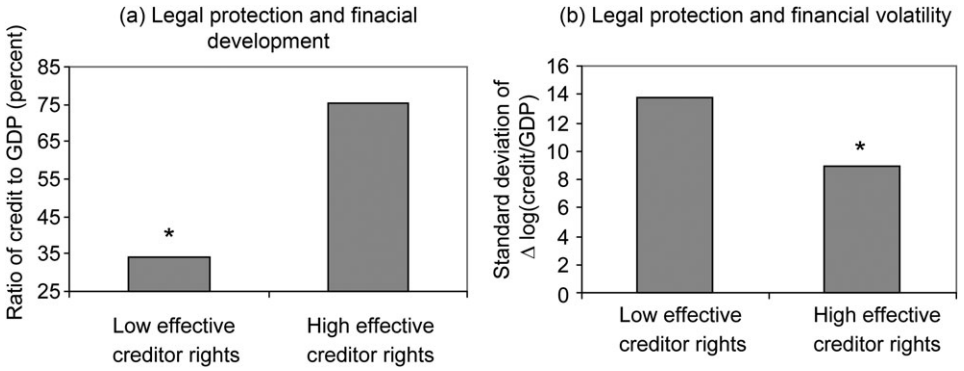
FIGURE 1. Financial Markets and Creditor Protection



*Difference significant at the 5 percent level.
Source: Authors' analysis is based on the data noted in table A-1.

is that the institutional setup can also affect the volatility of credit or the way financial markets respond to shocks.[2] Documenting and explaining this feature is the main purpose of this article.

A long tradition in macroeconomics, beginning with Fisher and Keynes, emphasizes credit markets in the propagation of cyclical fluctuations. But there has been little research on the role of CR in propagating or dispensing shocks in financial markets.[3] This article closes some of the gap by exploring empirically the relationship between creditor protections and the credit cycle.

Figure 1 summarizes some basic findings of previous research on CR and financial markets, motivating this 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 a measure of legal protection to creditors: an index of effective creditor rights (ECR) protection that combines legal protection to creditors and their enforcement (higher values indicate stronger protection). (The index is described in more detail below). Countries in the sample are split between those above and below the median ECR index. On average, the size of credit markets is twice as large in countries with stronger CR protection.[4] The figure also shows that institutions protecting CR—besides being important in explaining the size of credit markets—are also important in explaining the volatility of credit. Panel b of figure 1 shows that the volatility of credit—measured as the standard deviation of the annual real growth rate of the ratio of credit to GDP—is significantly

2. An exception is Johnson *et al.* (2000), who show that institutions explain a good part of the currency depreciations and stock market declines during the Asian crisis.

3. See Braun and Larrain (2005) for a discussion.

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

smaller in countries with stronger creditor protection. In the average country with poor CR protection, the standard deviation of the annual real growth rate of credit to GDP is 14 percent, significantly higher than in countries with strong CR protection (8 percent).

The empirical analysis corroborates this stylized fact. Panel data on aggregate credit growth for 79 countries during 1990–2004 support the claim that better legal protections significantly reduce the sensitivity of credit to shocks. Indeed, the impact of exogenous shocks to credit markets is larger in countries with low creditor protection. In common law (CL) countries, characterized by high creditor protection and good contract enforcement, the elasticity of credit to external shocks is half that elsewhere. An improvement of one standard deviation in either CR or contract enforcement substantially reduces the sensitivity of credit to external shocks. These results are robust to alternative measures of creditor protection, to the inclusion of variables that reflect different stages of economic development, to the restriction of the sample to only developing economies, to alternative definitions of shocks, to additional controls, and to different dynamic specifications.

I. Related Literature and Motivation

This article is a natural extension of previous work on creditor protection and financial development. According to that literature, the quality of institutions supporting financial contracts is a crucial determinant of the amount of credit that the financial system extends to firms and individuals. Rules and regulations that protect CR in financial contracts—for example, regulations that clearly state the right of creditors to seize collateral in a timely manner if a debtor defaults—and that are properly and efficiently enforced increase the power of creditors and the size of credit markets. Townsend (1979) formalized this idea using a costly state verification model, and Aghion and Bolton (1992) and Hart and Moore (1994, 1998) using an incomplete contract approach.

La Porta *et al.* (1997 and 1998), Beck, Demirgüç-Kunt, and Levine, (2003), and Djankov, McLiesh, and Shleifer (2007) 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, 2005), 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 article moves ahead, focusing on the effect of creditor protection, not on credit access (first moment), but on second moments; the way aggregate credit responds to external shocks. There has been little research on the role of creditor protection 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. For example, using data on large listed firms around the world, Love (2003) shows that firm investment in countries with low creditor protection reacts more to cash flows.[5]

Using a difference-in-difference approach and data from several manufacturing industries in countries around the world, Braun and Larrain (2005) and Raddatz (2006) show that the output volatility is higher in industries that are more dependent on external finance. The observed difference in the behavior of industries is bigger when financial friction is more prevalent (for example, a lack of accounting standards). These findings suggest that stronger financial systems contribute to diminished output volatility. Kroszner, Laeven, and Klingebiel (2007) find, in 19 countries, that industry growth in countries with shallower financial systems is less affected by financial crises than in countries with deeper financial systems.[6]

Their results cannot be easily extrapolated to the whole economy either because of data limitations (large listed firms in Love 2003) or because of the methodology, a difference-in-difference approach in Braun and Larrain (2005) and Raddatz (2006).[7]

This article complements this research by going one step back in the chain of events. Rather than exploring the impact of shocks on output under different scenarios of financial development, it explores the impact of shocks on financial markets, under different institutional setups.

In a related paper, Johnson *et al.* (2000) present evidence that the weakness of legal institutions is important in explaining the extent of depreciation and stock market decline in the Asian crisis (1997–98). Even though their work mainly focuses on minority shareholder expropriation by managers, not on private credit, their study is similar to this one because it suggests that corporate governance matters for the extent of macro variable fluctuation during a shock. This article can be viewed as a complement to the work of Johnson *et al.* (2000), but has a larger country coverage and focuses on credit markets rather than on equity markets.

This article is also closely related to the literature on credit channels, which shows the financial sector, due to financial friction, to be a propagation mechanism of primitive shocks, such as monetary disturbances, preferences, or terms of trade shocks. Kiyotaki and Moore (1997) 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, they find that the interaction between credit limits (collateral) and asset prices turns out

5. In a similar fashion Laeven (2003) shows that financial constraints are eased in countries with more liberal financial markets.

6. The rationale for this finding is that when credit markets are developed, firms depend more on credit in normal times and thus suffer more when credit is interrupted.

7. A difference-in-difference approach allows studying the sectors or firms that are more affected by a given factor, a cross-derivate effect, but it does not allow determining, without strong assumptions, the main effect (aggregate impact).

to be an important transmission and amplifier mechanism for exogenous shocks to credit and output.[8]

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, proportional to debt, is paid only in a default and thus is interpretable as a bankruptcy cost. The paper finds that bankruptcy costs amplify the effect of exogenous shocks on both investment and output. An improvement in legal and effective protection can be thought of as a reduction in bankruptcy costs, which would lead to the conclusion that better creditor protection reduces the impact of exogenous shocks.[9]

In seminal papers focusing on credit markets, Holmstrom and Tirole (1997 and 1998) develop incentive models of financial intermediation in which, due to moral hazards, both firms and banks are capital-constrained. In these models, firm and bank wealth determines their debt capacity. The novelty is that in a simple framework, they can study demand factors (changes in the collateral of firms) and supply factors (changes in bank capital). So they can separate a balance sheet channel and a lending channel, with credit proportional to the net worth of entrepreneurs.

In a Holmstrom and Tirole type of setup, the impact of creditor protection on credit can be ambiguous. Better creditor protection has a stabilizing effect on credit. The expected income that can be pledged to lenders without jeopardizing the entrepreneur's incentives to work increases with stronger creditor protection. The proportionality between credit and wealth, or the "equity multiplier," increases with pledgeable income. When the economy faces a negative shock (be an increase in the probability of bankruptcy of firms), pledgeable income falls, but it falls more in countries with weak creditor protections. In response, for a given level of wealth, credit is tightened more in a weak legal environment than in a strong one. In the case of success, the firm repays its debt. But in the case of failure the creditor collects only a fraction of the residual value of the firm.

8. In this model legal creditor protections could be introduced by assuming that the fraction of the market value of assets that the entrepreneur can borrow against is an increasing function of the legal environment.

9. The empirical studies in this area are concentrated in the firm cross-sectional implications of this channel. The literature shows that shocks have a large impact on firms more likely to be credit-constrained by financial friction (such small as small firms). These studies focus mainly on the United States and a few developed economies and do not focus on legal protection. This literature shows differential effects of shocks on employment (Sharpe 1994), investment (Fazzari, Hubbard, and Petersen 1988; Oliner and Rudebusch 1996), inventories (Kashyap, Lamont, and Stein 1994), sales, and short-term debt (Bernanke, Gertler, and Gilchrist 1996; Gertler and Gilchrist 1994).

This result requires the assumption that net worth is fixed. If net worth is also affected by the shock, the total impact will depend on how it affects both net worth and the multiplier. The views on this are somewhat conflicting. Raddatz's (2006) findings suggest that external shocks have a smaller impact on output in more financially developed economies (countries with better creditor protection, following La Porta *et al.* 1997, 1998). If output is used as a proxy for wealth, this would suggest an overall negative impact of creditor protection on credit fluctuations in a Holmstrom and Tirole type of setup. But Kroszner, Laeven, and Klingebiel (2007) suggest the contrary that output fluctuations could be stronger in more financially developed economies. If so, the impact of creditor protections could be ambiguous.

Overall, the credit channel view—of Kiyotaki and Moore 1997 or Bernanke, Gertler, and Gilchrist 1996, 1999—would suggest a negative impact of creditor protection on credit fluctuations, whereas the incentive view of financial intermediation suggests an ambiguous relationship.[10] The question is thus empirical and addressed in what follows.

II. Empirical Methodology

The approach here consists of exploiting the different responses of countries with different creditor protection to external shocks that change the profitability of projects and thus the probability of bankruptcy. The dependent variable is the yearly change in real credit in each of the 79 countries in the sample, during 1990–2004.[11] Specifically, it is credit provided to the private sector by the financial system divided by nominal GDP (line 22d of International Financial Statistics of the International Monetary Fund)[12]—the first difference of the logarithm of this variable. The ratio of credit to GDP (not credit) guarantees measuring the impact of the shock on the volatility of financial markets, and not merely the impact of the shock on the volatility of credit through its impact on GDP.

The study identifies how credit responds to an exogenous shock under different institutional setups. Crucial in this is obtaining an adequate proxy for such a shock. A key characteristic of this proxy is that it should not be endogenous to the behavior of credit. This rules out such straightforward measures as GDP growth, since credit and GDP are simultaneously determined (see Beck, Levine, and Loayza 2000). To obtain an exogenous measure of shocks, we construct an external shock variable based on the GDP growth rate of the trading

10. Feijen and Perotti (2005) show that another type of volatility arises in countries with weak creditor protection. Weak creditor protection reduces the availability of refinancing opportunities for small firms. This leads to an inefficiently high number of exits of small firms when the economy faces a negative shock.

11. The sample period is restricted to the 1990s and onward, since the institutional data that will be described below, is only available for this period.

12. For countries that adopted the euro in 1999, it is the sum of line 22d.f through line 22zw.

TABLE 1. Real GDP Growth and External Shock

Dependent variable: Δ log(GDP)				
	(1)	(2)	(3)	(4)
External shock	1.798 (0.296)***	1.992 (0.388)***	2.181 (0.413)***	1.471 (0.274)***
External shock* developed	—	−0.325 (0.451)	—	—
Number of observations	1.022	1.022	678	344
Number of countries	79	79	53	26
Country-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes
R-squared	0.26	0.27	0.23	0.42
Sample	All	All	Developing	Developed

*Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level.

Note: Numbers in parentheses are robust standard errors.

Source: Authors' analysis is based on the data from International Monetary Fund International Financial Statistics Database.

partners of any given country, weighted by exports over the source country's GDP. Formally, the shock measure is constructed as follows,

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

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 $t-1$,[13] $\overline{S}_i$ is the average share of exports to GDP in country i during the sample period,[14] and g_{jt} is the growth rate of real GDP of country j at time t. The data source for s_{ij} is the Direction of Trade Statistics Database of the International Monetary Fund, and for $\overline{S}$ and GDP growth rates, the World Bank's World Development Indicators Database.

The relevance of the shock measure is summarized in table 1, which shows 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 with the real GDP growth rate of countries in the sample. Column 2 confirms that this

13. Given j and t, the sum of $s_{ij,t-1}$ over j is equal to one.

14. Used here is the average share of exports in GDP, to avoid fluctuation in this variables related with changes in the nominal exchange rate, which is endogenous. Note that in $s_{ij,t-1}$, country i's exchange rate movements cancel out.

correlation remains significant even when controlling for the level of development, measured by a dummy indicating whether the country is a high-income country according to World Bank classification. (This classification is detailed in the appendix).[15] Columns 3 and 4 show that the correlation remains significant and that the regression coefficient remains stable when splitting the sample between developing and industrial economies. Overall, the measure of external shock appears to be a good predictor of economic activity.

Using this external shock measure, the study estimates regressions of the following type:

$$\Delta Credit_{i,t} = \beta_1 ext.shock_{i,t} + \beta_2 ext.shock_{i,t} * legal\_protection_i + DT_t + \eta_i + \varepsilon_{i,t} \quad (1)$$

where DT is a year dummy variable to control for any temporal fixed effects, η_i is a country fixed effect to control for country-specific trends and 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 and the way regulations are enforced. If $\beta_1 > 0$ and $\beta_2 < 0$ credit reacts positively to shocks, but the size of the reaction diminishes as legal protection improves. If $\beta_2 > 0$ credit reacts more to shocks in strong legal protection economies.

As a proxy for legal protection, the study uses the measure of CR constructed initially by La Porta *et al.* (1998); for contract enforcement, the rule of law (RL) and the days to enforce a credit contract (CE); and the total duration of the procedure (TD) to clear a check. It also uses two variables to proxy for de jure creditor protection and enforcement at the same time: ECR and CL legal origin. The definitions and sources of the legal protection proxies are the following.

(1) CR: The Djankov, McLiesh, and Shleifer (2007) index of CR is used here. This measure, based on La Porta *et al.* (1998), estimates the degree to which secured creditors are protected during bankruptcy procedures. The index ranges from zero to four, where a higher number indicates greater creditor protection. A score of one is assigned when each of the following rights is defined in laws and regulations: there are restrictions on debtors to file for reorganization, such as creditor consent or minimum dividends; secured creditors can seize their collateral after the reorganization petition is approved (no "automatic stay" or "asset freeze."); secured creditors are paid first out of the proceeds of liquidating a bankrupt firm; and when management does not retain administration of its property pending the resolution of the reorganization.

15. This classification is detailed in the appendix.

(2) RL: The Kaufmann, Kraay, and Mastruzzi (2005) measure of the RL is used here. 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.
(3) CE: This measures the number of days to resolve a payment dispute through courts, according to Djankov, McLiesh, and Shleifer (2007), who analyze a standard case across several countries and study the number of calendar days required to enforce a contract of unpaid debt worth 50 percent of the country's GDP per capita.
(4) TD: This measures the number of days of a process to collect a bounced check. The source of the data is Djankov *et al.* (2003) and, as above, it is also used as a proxy of efficiency.
(5) ECR: The product of CR and RL is a summary measure for both regulations and the quality of their enforcement. It takes into account that weak law enforcement can diminish the quality of regulations. Both CR and RL are normalized between zero and one in such a way that ECR also fluctuates within this range. A higher value indicates higher creditor protection.
(6) CL: The legal origin of each country's legal code is used as a proxy, both for a better creditor protection and for greater law enforcement. CL is a dummy that takes a value of one when countries have a CL legal tradition and zero otherwise. As shown by La Porta *et al.*(1998), among many others, a CL tradition is an adequate instrument for better CR and law enforcement. As for ECR, CL also proxies simultaneously for legal protection and enforcement. The source of this data is Djankov, McLeish, and Shleifer (2007).

Appendix table A-1 reports the average values and basic descriptive statistics at an aggregate level and at a country level. Table A-2 reports the cross-correlation matrix of the institutional regressors. Table A-3 reports country-specific values of these variables. For the econometric exercises here, all variables have been demeaned.

III. Results

To test whether the institutional setup affects how aggregate credit responds to shocks, a panel is constructed gathering information between 1990 and 2004[16] for a broad set of countries across the world and to estimate equation (1).

16. The sample of countries is dictated by data availability. All specifications include year- and country-fixed effects. The dataset is restricted to the number of country–year observations, where data on all variables are available.

Benchmark Results

Table 2 reports a first set of results that include the CR measure and each of the enforcement proxies separately in each regression. Column 1 reports the result using CR as the proxy for de jure protection. The framework allows for a differential role for the impact of variables that reflect better legal protection and those measuring better enforcement. Determining whether the proxies measure exclusively one or the other is not straightforward. Even so, the impact of each is assessed separately by simultaneously including a variable exclusively related to the content of regulations (such as the CR index) and other variables that capture mostly the efficiency of the legal process (such as the duration of enforcing contracts, the duration of clearing a bounced check, and the RL). These results are reported in columns 2–4. In columns 2 and 3 the negative of the log of the number of days that the procedures last is used to maintain the same interpretation as the other indexes (that higher values mean greater creditor protection or greater efficiency in enforcing creditor protections). Column 5 reports results using the ECR index, and column 6 uses the CL legal origin dummy. The lower part of the table includes an F test to assess the joint significance of the CR measure and the enforcement measures when included jointly in the regressions.

The results in table 2 suggest that better creditor protection and better enforcement reduce the impact of shocks on credit. All regressions reported in columns 1–6 show negative and significant coefficients on the interaction of the shock measure and the creditor protection proxies. The legal measure of CR protection is significant at the 1 and 5 percent significance levels in all specifications, and it remains significant when also including enforcement variables in the specification. The enforcement measures are also significant at the 1 percent level except in column 3, where the duration of clearing a check is significant at the 5 percent level. The ECR index and the CL dummy are significant at the 1 percent level. The negative signs indicate that credit to GDP tends to react less to an external shock in countries, where both legal protection and their enforcement are stronger. The results corroborate the hypothesis that stronger creditor protection reduces the responsiveness of credit to external shocks.

These results are not only statistically significant, but their economic magnitude is also relevant. A one-standard-deviation increase in a country with a mean value of the CR index would reduce the coefficient of the external shock by nearly 60 percent.[17] Similarly, a one-standard-deviation increase in the contract enforcement measure, everything else equal, reduces the coefficient on the external shock by nearly 1.8 points (a 30 percent fall in the coefficient). If a negative shock hits the economy, the contraction of credit will be 30 percent

17. For these and similar exercises it is important that the variables have been demeaned. The descriptive statistics of the main variables are reported in appendix table A-1.

TABLE 2. Benchmark Results

Dependent variable: Δ log(Credit/GDP)						
	(1)	(2)	(3)	(4)	(5)	(6)
External shock	4.686 (1.196)***	5.910 (1.228)***	5.895 (1.289)***	5.933 (1.212)***	5.907 (1.238)***	6.117 (1.601)***
External shock* CR	−2.571 (0.774)***	−2.198 (0.749)***	−1.918 (0.792)**	−1.629 (0.786)**	—	—
External shock* CE	—	−2.391 (0.803)***	—	—	—	—
External shock* TD	—	—	−2.309 (0.959)**	—	—	—
External shock* RL	—	—	—	−2.686 (0.783)***	—	—
External shock* ECR	—	—	—	—	−0.799 (0.177)***	—
External shock* CL	—	—	—	—	—	−5.007 (1.680)***
Number of observations	1.022	1.022	1.022	1.022	1.022	1.022
Number of countries	79	79	79	79	79	79
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
F test (joint significance)	—	0.00	0.00	0.00	—	—
R-squared	0.14	0.14	0.14	0.15	0.15	0.14
Sample 1990–2004						

*Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level.

Note: Numbers in parentheses are robust standard errors.

Source: Authors' analysis is based on the data noted in table A-1.

lower in a country one–standard-deviation ahead of a country with average contract enforcement hit by an identical shock. Results are similar for the duration of clearing a bounced check and the RL. Similarly a one-standard-deviation increase in the ECR index reduces the impact of the external shock by nearly 3.0 points (nearly half). In countries with a CL tradition, the impact on credit growth of an external shock is about 80 percent lower than in a non-CL country, depending on the sample of countries in the regression analysis.

Robustness Exercises

One concern about these results is that they may be driven by differences in economic development and that economic development is being proxied by the legal and institutional variables considered. To account for this, economic development is controlled in two ways (tables 3 and 4).

Table 3 includes an interaction of the external shock variable with a dummy indicating high income according to the World Bank classification. Table A-3 in the appendix indicates which of these countries are in the sample. In table 3 the coefficients estimated for the interactions between the creditor protections and the shock measure capture the differential impact of regulations beyond the impact of different levels of economic development. The results are very similar to those reported in table 2. There is a loss of significance in two of the enforcement measures (CE and TD), though the RL remains significant at the 5 percent level. The significance of the CR index drops, though it remains significant across specifications. The economic impact estimated after controlling for development is reduced but still remains sizeable. And CL countries are about 50 percent less sensitive to an external shock than non-CL countries.

Another way of dealing with the concern that the results reflect levels of development rather than legal and institutional differences is to split the sample. Table 4 reports the same results as before, but restricts the sample to developing economies only. Although the individual significance of the CR index falls in one of the specifications (column 3), the joint significance of the CR measure and any of the efficiency of enforcement variables remains.[18] The significance of the ECR measure remains at the 1 percent level. The order of magnitude is slightly larger than that estimated in table 3. CL countries in this sample are about 60 percent less sensitive to the external shock than non-CL ones.

Many countries suffered from systemic banking crises in the 1990s, as shown by Caprio and Klinglebiel (2003). A crisis naturally leads to a contraction in credit regardless of the quality of the legal and enforcement system. Columns 1 and 2 of table 5 control for this by including a dummy for systemic crises based on the Caprio and Klinglebiel study. The results are qualitatively

18. Given the small number of developing economies with information for EJ, the results in column 4 are not stressed here.

TABLE 3. Controlling For Development I

Dependent variable: Δ log(Credit/GDP)					
	(1)	(2)	(3)	(4)	(5)
External shock	6.512 (1.435)***	6.726 (1.452)***	5.409 (1.426)***	6.058 (1.381)***	7.309 (1.735)***
External shock* CR	−1.931 (0.774)**	−1.686 (0.799)**	−1.654 (0.779)**	—	—
External shock* CE	−1.318 (1.137)	—	—	—	—
External shock* TD	—	−1.363 (0.999)	—	—	—
External shock* RL	—	—	−3.673 (1.704)**	—	—
External shock* ECR	—	—	—	−0.729 (0.225)***	—
External shock* CL	—	—	—	—	−3.481 (1.743)**
External shock* developed	−2.523 (2.061)	−2.904 (1.573)*	2.151 (3.043)	−0.744 (1.797)	−3.798 (1.512)**
Number of observations	1.022	1.022	1.022	1.022	1.022
Number of countries	79	79	79	79	79
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes
F test (joint significance)	0.03	0.02	0.00	—	—
R-squared	0.14	0.15	0.15	0.15	0.15
Sample 1990–2004					

*Significant at the 10 percent level; **significant at the 5 percent level; ***significant at 1 percent level.

Note: Numbers in parentheses are robust standard errors.

Source: Authors' analysis is based on the data noted in table A-1.

TABLE 4. Controlling For Development II

Dependent variable: Δ log(Credit/GDP)					
	(1)	(2)	(3)	(4)	(5)
External shock	7.074 (1.572)***	7.559 (1.582)***	5.668 (1.652)***	6.532 (1.452)***	8.039 (2.002)***
External shock* CR	−2.805 (1.205)**	−2.686 (1.163)**	−2.022 (1.275)	—	—
External shock* CE	−2.052 (2.181)	—	—	—	—
External shock* TD	—	−2.802 (1.217)**	—	—	—
External shock* RL	—	—	−4.355 (2.125)**	—	—
External shock* ECR	—	—	—	−1.434 (0.412)***	—
External shock* CL	—	—	—	—	−4.726 (2.507)*
Observations	678	678	678	678	678
Number of countries	53	53	53	53	53
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes
F test (joint significance)	0.06	0.01	0.00	—	—
R-squared	0.15	0.16	0.16	0.16	0.15
Sample developing economies 1990–2004					

*Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level.

Note: Numbers in parentheses are robust standard errors.

Source: Authors' analysis is based on the data noted in table A-1.

the same as those in table 3. For brevity, only the results using the ECR measure and the CL indicator are reported here.

Columns 3 and 4 of table 5 control for a measure of domestic financial liberalization constructed by Kaminsky and Schmukler (2002). The empirical literature has shown that financial liberalization has a positive impact on financial depth. But the measures of financial liberalization cover a much smaller sample, when controlling for financial liberalization, both in countries and in years. The sample falls from 1,022 observations to 309, and the country coverage falls from 79 countries to 27 making the results of this exercise incomparable with the previous ones. But for this reduced sample, the main empirical conclusion of the article remains.

Columns 5 and 6 control for a different measure of financial liberalization, using an equity market liberalization dummy, constructed by Bekaert, Harvey, and Lundbald (2005). The dummy takes the value of one when the domestic equity market has been liberalized. This dummy is available to the year 2000. When controlling for this type of liberalization the sample falls to 654 observations in 63 countries. Again, the main conclusions of the previous estimations hold. Even when controlling for financial liberalization in smaller datasets, the finding that better creditor protection reduces the impact of external shocks remains.

Table 6 presents results using alternative definitions of the external shock. To save space the table reports results using exclusively the CL dummy, which summarizes good law enforcement and high creditor protection. Column 1 uses the lagged value of a measure of fluctuation in export prices as a shock.[19] Column 2 uses the lagged value of import prices. Column 3 uses the forecast of a regression of GDP growth on export prices, import prices, and the previous real shock measure. This measure can be interpreted as the component of GDP fluctuation explained by relevant external characteristics. As before, economic development is controlled. The results are once again in line with the main finding of the article. The sign of the interactions of the alternative measures of shocks with the CL dummy is negative and significant.

Table 7 explores whether the impact of the shock varies according to its size—to check whether the way credit responds to shocks that lead to recessions is different from the way it responds to positive shocks.[20] Negative shocks are defined in two ways. In columns 1 and 2, negative shocks are considered as those in the lowest 10th percentile of the distribution of our external shock measure. Columns 3 and 4 allow for a broader set of shocks by considering those in the lowest 25th percentile of the distribution as negative. A dummy indicating negative shocks,

19. The change in export prices is defined as the log-change of export prices from the World Development Indicators multiplied by the average share of exports over GDP during the sample period (1990–2004). Here, the variable "Exports of goods and services (current US$) – WDI (2005)" is used.

20. Asymmetries in the response of credit can also be derived from the possibility that lending standards are relaxed during booms and tightened during recessions, as in Dell'Ariccia and Marquez (2007).

TABLE 5. Controlling For Systemic Banking Crises And Financial Liberalization

Dependent variable: Δ log(Credit/GDP)						
	(1)	(2)	(3)	(4)	(5)	(6)
External shock	5.656 (1.395)***	6.804 (1.663)***	3.710 (1.790)**	7.040 (3.500)**	5.549 (1.711)***	7.990 (2.717)***
External shock* ECR	−0.665 (0.229)***	—	−0.517 (0.290)*	—	−0.808 (0.269)***	—
External shock* CL	—	−3.198 (1.717)*	—	−4.989 (2.990)*	—	−3.785 (2.275)*
External shock* developed	−1.035 (1.824)	−3.814 (1.534)**	5.046 (2.044)**	2.784 (1.971)	−0.093 (1.949)	−4.242 (1.803)**
Systemic crisis dummy variable	−0.062 (0.016)***	−0.062 (0.016)***	—	—	—	—
Financial liberalization 1	—	—	0.053 (0.028)*	0.054 (0.028)*	—	—
Financial liberalization 2	—	—	—	—	0.001 (0.035)	0.002 (0.035)
Number of observations	1.022	1.022	309	309	654	654
Number of countries	79	79	27	27	63	63
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.16	0.16	0.23	0.23	0.17	0.17
Sample	1990–2004		1990–2001		1990–2000	

*Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level.

Note: Numbers in parentheses are robust standard errors.

Source: Authors' analysis is based on the data noted in table A-1.

TABLE 6. Alternative Shock Measures

Dependent variable: Δ log(Credit/GDP)			
	(1)	(2)	(3)
Export prices shock	0.849 (0.181)***	—	—
Export prices_shock* CL	−0.692 (0.257)***	—	—
Export prices_shock* developed	−0.327 (0.313)	—	—
Import prices_shock	—	0.620 (0.192)***	—
Import prices_shock* CL	—	−0.726 (0.286)**	—
Import prices_shock* developed	—	−0.033 (0.3520	—
Composite shock	—	—	2.931 (0.563)***
Composite shock* CL	—	—	−4.206 (1.892)**
Composite shock* developed	—	—	−1.615 (1.977)
Number of observations	976	976	976
Number of countries	77	77	77
Country-fixed effects	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes
R-squared	0.15	0.14	0.15
Sample 1990–2004			

*Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level.

Note: Numbers in parentheses are robust standard errors.

Source: Authors' analysis is based on the data noted in table A-1.

labeled *Dum_Neg_Shock*, interacts with the external shock measure, the external shock measure multiplied by the legal protection variable, and the legal protection variable. Significant estimates of these interactions would suggest an asymmetric response of credit to negative shocks. Results show that these interactions are not significant, suggesting that there is no evidence of asymmetries in the response of credit to external shocks.

Vector Autoregression Evidence

The empirical exercise described above and its various robust extensions assume no dynamic relationship between the variables in the empirical model.[21] To circumvent this restriction, the following panel vector autoregression is estimated,

$$x_{it} = C(L)x_{it} + \eta_i + d_t + \varepsilon_{it} \quad (2)$$

21. The previous analysis assumed that the external shock measure is exogenous. As pointed out by an anonymous referee, there is a possibility of endogeneity if a credit contraction in one country (possibly associated with a financial crisis) leads to a negative shock to exports in other countries due to financial contagion, and so affects the external shock to some degree. We believe that this source of endogeneity is small, and in the vector autoregression exercises it would be accounted and controlled for.

TABLE 7. Testing For Asymmetries

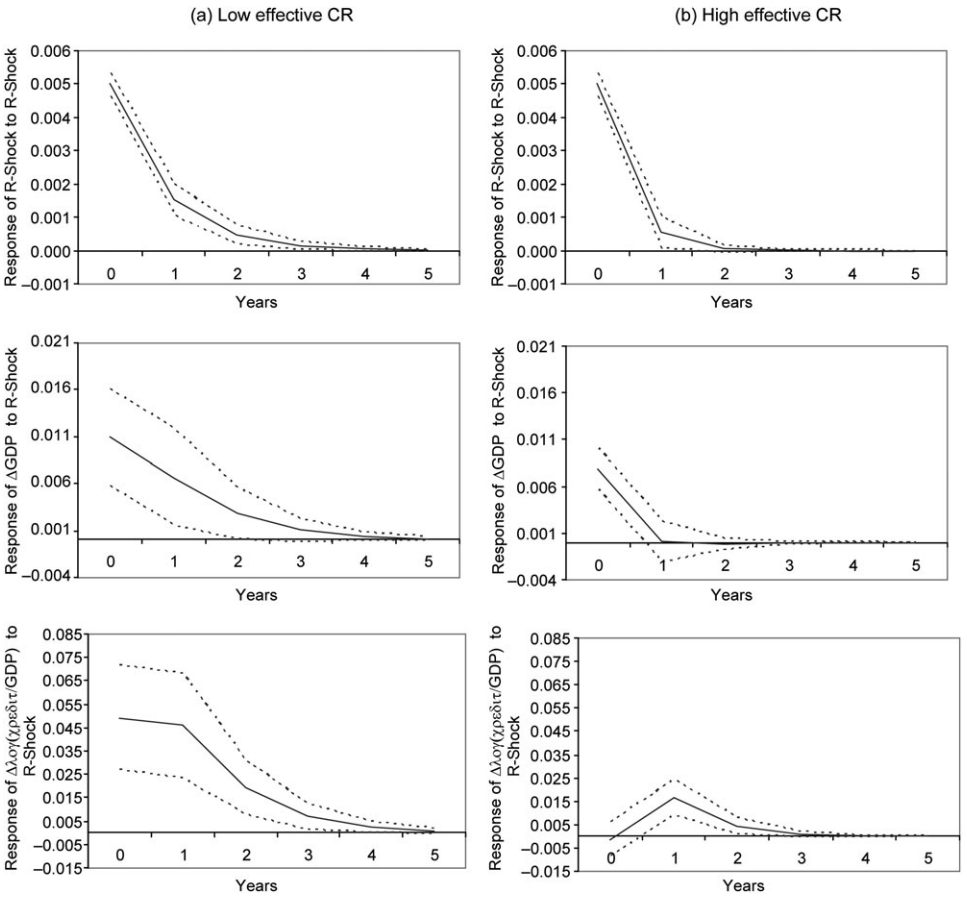
Dependent variable: Δ log(Credit/GDP)				
	(1)	(2)	(3)	(4)
	Dum_Size = 1 If External Shock < 10th Percentile		Dum_Size = 1 If External Shock < 25th Percentile	
	(1)	(2)	(3)	(4)
External shock	6.602 (1.672)***	6.750 (2.312)***	6.009 (1.704)***	5.448 (2.180)**
External shock* *Dum_Neg_Shock*	−2.754 (6.541)	−2.562 (8.726)	−4.324 (5.498)	−4.918 (7.281)
External shock* ECR	−0.867 (0.228)***	—	−0.742 (0.224)***	—
External shock* *Dum_Neg_Shock** ECR	−1.211 (1.328)	—	0.043 (1.030)	—
External shock* CL	—	−5.102 (2.288)**	—	−3.931 (2.265)*
External shock* *Dum_Neg_Shock** CL	—	−8.387 (11.773)	—	1.167 (10.068)
Dum_Neg_Shock	0.006 (0.017)	0.010 (0.025)	−0.000 (0.018)	−0.017 (0.021)
*Dum_Neg_Shock** ECR	−0.006 (0.004)	—	−0.000 (0.004)	—
*Dum_Neg_Shock** CL	—	−0.001 (0.034)	—	0.033 (0.037)
Number of observations	1.022	1.022	1.022	1.022
Number of countries	79	79	79	79
Country-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes
R-squared	0.15	0.14	0.15	0.14
Sample 1990–2004				

*Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level.

Note: Numbers in parentheses are robust standard errors.

Source: Authors' analysis is based on the data noted in table A-1.

FIGURE 2. Impulse Response Functions, Low vs. High Effective Creditor Rights

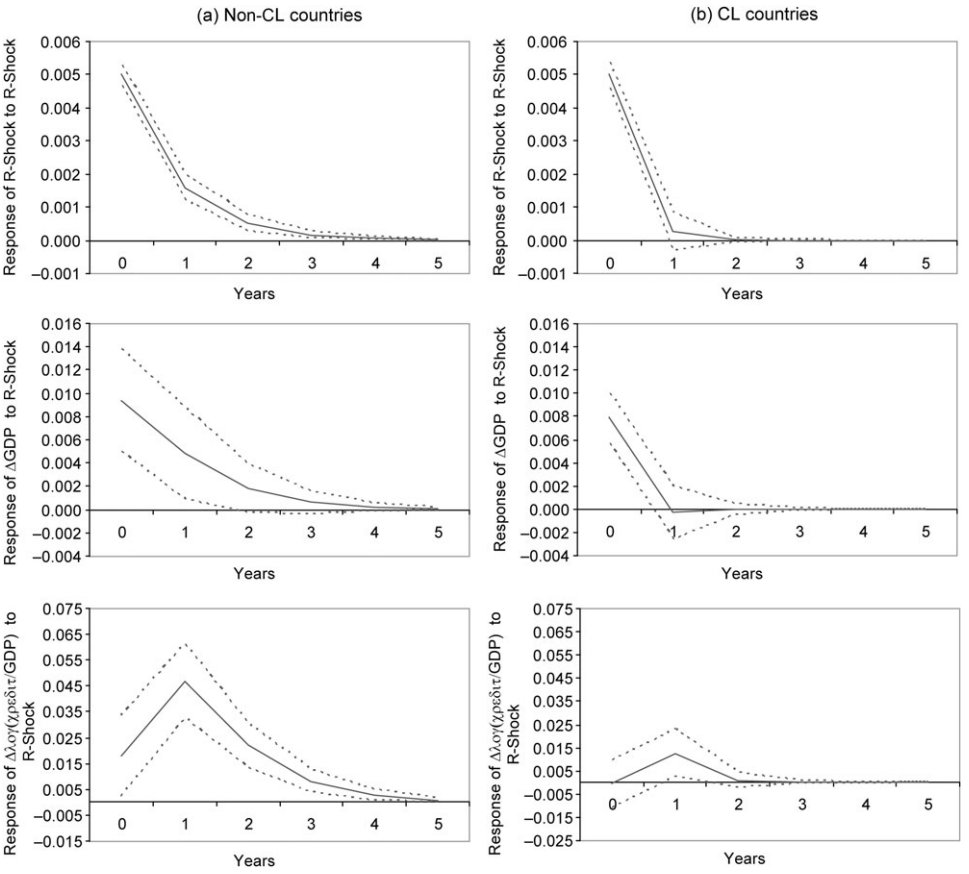


Source: Authors' analysis is based on the data noted in table A-1.

where x_{it}'= (Δlog(Credit/GDP), Δlog(GDP), R-Shock), C is a matrix of polynomials in the lag operator L, η_i is a country-specific effect, and d is a time-specific effect. This exercise identifies whether the response of credit/GDP to an external shock (R-Shock) depends on the institutional setup. As with the empirical results reported above, countries with weak institutional setups would be expected to be more responsive to a similar external shock than would countries where creditors are strongly protected.

Estimating equation (2) uses one lag of information, and imposes the restriction that R-Shock lagged is exogenous. The variables in the vector autoregression are ordered so that Δlog(Credit/GDP) is the most endogenous. To assess differences in institutional setups the sample is split according to different criteria, and the system is estimated for each subsample. After estimating the system, impulse

FIGURE 3. Impulse Response Functions, CL vs. Non-CL Countries



Source: Authors' analysis is based on the data noted in table A-1.

response functions are computed for an equal highlight to R-Shock for each subsample. Figures 2 and 3 report the impulse response functions (and their 5 percent standard deviation). Figure 2 splits the sample, taking as a threshold the sample median of effective creditor rights.[22] Figure 3 splits the sample between CL and non-CL countries.

In both figures, when hit with a shock (R-Shock) of the same size, the response of Δlog(Credit/GDP) is significantly larger in the country with low creditor protection (low ECR or non-CL country). Moreover, the duration of the shock is longer in the countries with weak creditor protection, in up to four or five periods, nearly twice that in countries with a strong institutional setup.

22. Results are very similar if the sample is split according to the average value of effective creditor rights.

IV. Conclusions

This article studies the relationship between creditor protection and the responses of credit to external shocks. It finds empirical support for the idea that weak creditor protection makes credit markets more volatile.

Theory provides conflicting views on how credit should respond to shocks under different creditor protection arrangements. The article tests these views using a data set of legal determinants of finance in a panel of aggregate credit growth data for a sample of up to 79 countries during 1990–2004. It finds support for the claim that better legal protection significantly reduces credit volatility.

The results suggest that the impact of exogenous shocks on credit markets is larger in institutional environments characterized by poor creditor protection. The results are both statistically and economically significant. For example, in CL countries, characterized by high creditor protection and good contract enforcement, the elasticity of credit to external shocks is half that in other nations. These results are robust to alternative measures of creditor protection, to the inclusion of variables that reflect different stages of economic development, to the restriction of the sample to developing economies, to controlling for systemic crises and financial liberalization, to alternative shock measures, to possible asymmetric responses, and to vector autoregression dynamic specifications.

Poor creditor protections induce an overreaction of credit markets to exogenous shocks. Overall, there is strong evidence of what explicit CR and efficient enforcement can do to promote stability in credit markets.

Appendix

Table A-1. Descriptive Statistics

Variable	Observed	Mean	Standard deviation	Minimum	Maximum
Credit/GDP (log change)	1.022	0.016	0.133	−0.93	0.92
External shock	1.022	0.010	0.012	−0.01	0.10
		Country (time invariant)			
CL	79	0.342	0.477	0	1
CR	79	0.010	1.132	−1.97	2.03
RL	79	−0.007	0.990	−1.69	1.71
CE	79	0.010	0.750	−1.62	2.37
TD	79	0.005	0.794	−1.67	3.29
ECR	79	0.004	3.820	−4.99	11.02

Source: CL, CR (average 1978–2002), and contract enforceability, Djankov, McLiesh, and Shleifer (2007); RL (average 1996–2004), Kaufmann, Kraay, and Mastruzzi (2005); total duration to collect a bounced check, Djankov *et al.* (2003).

TABLE A-2. Correlation Matrix

	CL	CR	RL	Contract enforceability	Total duration	Developed
CL	1	—	—	—	—	—
CR	0.3477 (0.0017)	1	—	—	—	—
RL	0.0083 (0.942)	0.1806 (0.1111)	1	—	—	—
Contract enforceability	0.0865 (0.4485)	0.0974 (0.3933)	0.5184 (0.0000)	1	—	—
Total duration	0.2387 (0.0341)	0.172 (0.1295)	0.2364 (0.036)	0.7397 (0.0000)	1	—
Developed	0.0065 (0.95490)	0.1777 (0.1171)	0.8416 (0.0000)	0.4811 (0.0000)	0.1917 (0.0906)	1

Note: All correlations are computed with 79 countries. Numbers in parentheses are significant level of each correlation.

Source: CL, CR (average 1978–2002), and contract enforceability, Djankov, McLiesh, and Shleifer (2007); RL (average 1996–2004), Kaufmann, Kraay, and Mastruzzi (2005); total time to collect a bounced check, Djankov *et al.* (2003); developed economies, World Bank (2006).

TABLE A-3. Country-Specific Data

Country	CL	CR	RL	CE	TD	Developed economies
Argentina	0	−0.971	−0.602	−0.588	−0.467	0
Australia	1	1.029	1.468	0.609	−0.530	1
Austria	0	1.029	1.530	−0.259	−0.836	1
Bangladesh	1	0.029	−1.158	−0.234	−0.362	0
Belgium	0	0.029	1.070	0.947	0.449	1
Bolivia	0	0.029	−0.974	−0.716	−0.903	0
Botswana	1	1.029	0.280	0.629	0.893	0
Brazil	0	−0.971	−0.634	−0.673	0.044	0
Bulgaria	0	−0.686	−0.504	−0.421	−0.780	0
Canada	1	−0.828	1.444	−0.181	−0.806	1
Chile	0	0.029	0.820	−0.055	−0.062	0
Colombia	0	−1.971	−1.086	−0.229	−1.031	0
Costa Rica	0	−0.971	0.284	−0.644	−0.677	0
Côte d'Ivoire	0	−1.971	−1.316	−0.598	0.226	0
Croatia	0	1.029	−0.482	−0.363	−0.563	0
Czech Republic	0	1.029	0.218	−0.038	−0.362	0
Denmark	0	1.029	1.534	1.247	0.818	1
Dominican Republic	0	0.029	−0.776	−0.698	−0.134	0
Ecuador	0	−1.971	−1.046	−0.296	−0.570	0
Egypt	0	0.029	−0.300	−0.351	−0.072	0
El Salvador	0	1.029	−0.798	0.049	1.142	0
Finland	0	−0.543	1.608	0.185	−0.244	1
France	0	−1.971	1.010	1.348	0.038	1
Germany	0	1.029	1.384	0.451	0.200	1
Ghana	1	−0.971	−0.544	0.367	0.737	0
Greece	0	−0.971	0.310	0.648	−0.516	1
Guatemala	0	−0.971	−1.210	−1.620	−0.157	0
Honduras	0	0.029	−1.164	−0.635	−0.180	0
Hong Kong, China	1	2.029	1.114	0.314	1.126	1
Hungary	0	−0.971	0.366	−0.234	−0.663	0
India	1	0.243	−0.354	−0.387	0.573	0
Indonesia	0	0.600	−1.240	−0.680	−0.180	0
Ireland	1	−0.971	1.316	0.286	0.369	1
Israel	1	1.457	0.572	−0.706	−0.516	1
Italy	0	0.029	0.456	−1.572	−1.233	1
Jamaica	1	0.029	−0.704	0.357	−0.072	0
Japan	0	0.529	1.148	1.571	1.142	1
Kazakhstan	0	−0.555	−1.268	−0.326	0.449	0
Kenya	1	2.029	−1.376	−0.221	−0.305	0
Kuwait	0	1.029	0.458	−0.301	−0.641	1
Latvia	0	1.029	−0.146	0.424	−0.003	0
Lithuania	0	−0.388	−0.160	0.629	0.226	0
Malawi	1	0.743	−0.808	0.041	0.554	0
Malaysia	1	1.029	0.220	−0.038	0.737	0
Mexico	0	−1.971	−0.718	−0.377	−0.409	0
Morocco	0	−0.971	−0.220	0.185	−0.021	0
Mozambique	0	0.029	−1.248	−0.698	−1.055	0
Namibia	1	0.029	0.214	0.067	0.470	0

(Continued)

TABLE A-3. Continued

Country	CL	CR	RL	CE	TD	Developed economies
Netherlands	0	1.029	1.470	1.794	1.573	1
New Zealand	1	2.029	1.574	1.753	1.142	1
Nigeria	1	2.029	−1.694	−0.928	−0.248	0
Norway	0	0.029	1.606	1.200	0.771	1
Pakistan	1	−0.971	−1.082	−0.313	−0.663	0
Panama	0	2.029	−0.404	−0.207	−0.047	0
Paraguay	0	−0.971	−1.294	0.013	−0.166	0
Peru	0	−1.971	−0.926	−0.424	−0.852	0
Philippines	0	−0.971	−0.794	−0.275	0.137	0
Poland	0	−0.971	0.120	−1.242	−1.671	0
Portugal	0	−0.971	0.814	−0.103	−0.804	1
Korea, Rep. of	0	1.029	0.326	1.348	0.919	1
Senegal	0	−1.971	−0.668	−0.519	−0.578	0
Singapore	1	1.029	1.572	1.431	1.397	1
Slovenia	0	1.029	0.430	−1.245	−1.674	0
South Africa	1	1.029	−0.174	0.041	0.806	0
Spain	0	0.029	0.808	0.536	0.246	1
Sri Lanka	1	0.029	−0.388	−0.421	−0.850	0
Sweden	0	−0.543	1.506	0.328	−0.010	1
Switzerland	0	−0.971	1.710	0.530	−0.173	1
Tanzania	1	0.029	−0.870	0.177	0.392	0
Thailand	1	0.672	−0.132	−0.301	−0.111	0
Tunisia	0	−1.971	−0.134	2.370	3.291	0
Turkey	0	0.029	−0.376	−0.134	0.583	0
Uganda	1	0.029	−1.052	0.323	0.641	0
United Kingdom	1	2.029	1.446	0.003	0.621	1
United States	1	−0.971	1.304	0.144	1.248	1
Uruguay	0	0.172	0.108	−0.764	−0.650	0
Venezuela, R. B.	0	1.029	−1.284	−0.433	−0.650	0
Zambia	1	−0.971	−0.866	0.052	0.000	0
Zimbabwe	1	2.029	−1.208	−0.192	−0.047	0

Note: All indicators have been demeaned. Contract enforceability and total duration to collect a bounced check are in logs.

Source: CL, CR (average 1978–2002), and contract enforceability, Djankov, McLiesh, and Shleifer (2007); RL (average 1996–2004), Kaufmann, Kraay, and Mastruzzi (2005); total duration to collect a bounced check, Djankov *et al.* (2003); developed economies, World Bank (2006).

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