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Systemic Banking Crises, Institutional Environment, and Corporate Leverage

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Abstract

This study examines corporate leverage during systemic banking crises in an international setting, including 85 countries from 1987 to 2017. Using the historically determined component of institutions and exogenous variations in institution building, the analyses show that leverage cyclicality varies substantially across institutional settings. Leverage is strongly countercyclical under more binding constraints on the capital supply, suggesting important supply effects of such crises on leverage. Weak institutions are more conducive to crises and uncertainty. Leverage countercyclicality is more pronounced during crises that coincide with higher uncertainty, whereas leverage is procyclical with stronger legal systems and information sharing in capital markets.

I. Introduction

The world economy has experienced many systemic distresses such as the global financial crisis of 2007–2009. Understanding the role of such crises in the behavior of corporate firms is an important research quest for academics. Systemic banking crises are acute shocks to capital supply and provide a unique opportunity to evaluate the role of supply effects on leverage. Do institutions matter for financial stability? Do the effects of systemic banking crises on firm leverage behavior vary with the institutional environment? To answer these questions, this study examines the capital structure of corporate firms during systemic banking crises in a comprehensive international data set covering 85 countries in the period from 1987 to 2017.

Financial theory highlights the importance of financial conditions as viable factors explaining a firm's demand and ability to raise capital. The literature typically studies leverage cyclicality over the business (employment) cycle, by measuring the difference between leverage levels during economic expansions and recessions (e.g., Erel, Brandon, Woojin, and Weisbach (2011), Korajczyk and Levy (2003), and Halling, Yu, and Zechner (2016)). This article defines cyclicality as the difference between leverage levels during normal times and systemic banking crisis times. Systemic banking crises sparkly differ from economic downturns, as they coincide with significant tightening of capital supply.[1] A longstanding question in

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[1]Banking crises are accompanied with a domestic credit crunch, where bank lending is not only stalled for indebted corporations, but also to viable firms (Stone (2000)). Banking crises also lead to deep

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the literature is whether capital supply frictions are relevant for corporate leverage (e.g., Leary (2009)). Systemic banking crises are profound shocks to the supply of capital and allow more direct tests of the role of supply frictions in capital structure decisions. Economic downturns and banking crises may both generate demand and supply effects in leverage changes by simultaneously decreasing investment opportunities and increasing financial frictions.[2] While the demand effects do not remain constant, the supply of capital is likely more affected by a systemic banking crisis as opposed to a recession.[3]

This article leverages a large cross section of international firms over 3 decades to establish the relationship between a country's institutions and the financing choices firms make during systemic banking crises, and it postulates 4 sets of hypotheses. First, during a systemic banking crisis, there is both a significant negative shock to the bank loan supply and a spike in uncertainty and risk with plummeting expected returns, causing both lenders and investors (suppliers of capital) to become hesitant to lock in capital in long-term investments. Put differently, the supply effects of systemic banking crises are not confined to the bank loan market, but also manifest in the capital markets. Thus, both debt and equity supply of capital would decline. If the decline in equity supply is more severe, due to its higher sensitivity to uncertainty and risk, the leverage denominator effect (total assets) could dominate the numerator effect (debt), leading to an increase in leverage. Furthermore, these supply effects would be stronger in countries where the supply of capital is more constrained, resulting in a more intense supply shock to firms. Second, the adverse supply effects of systemic banking crises would be more intense in weak institutional settings with imperfect contractual arrangements and poor investor protections that make economic relationships more susceptible to uncertainty and shocks. Third, the adverse effects of market conditions on firms' financing can be moderated in countries with strong institutions that subject firms to lower uncertainty and higher financial stability. In addition, bond and equity markets may act as spare tires during crisis episodes when bank lending contracts substantially (e.g., De Fiore and Uhlig (2015), Levine, Lin, and Xie (2016), and Fernández, González, and Suárez (2018)). If so, leverage countercyclicality could be moderated in countries with better investor protection and higher quality governance and information sharing. Fourth, real options, risk aversion, and risk premia arguments would indicate that all sources of capital would diminish tremendously during crises that coincide with simultaneous elevation in uncertainty, if this is an important channel through which systemic banking crises affect leverage.

and prolonged asset market collapses (Reinhart and Rogoff (2009)) and supply shortages in the capital markets.

[2]The exogenous adverse shocks that trigger economic downturns or banking problems may also cause a decline in capital demand. Alternatively, these shocks may increase uncertainty, leading firms to delay investment and financing.

[3]Establishing supply-side effects requires evaluating demand conditions. The data do not permit explicit evaluation of capital demand. Empirical strategy helps with this goal by accounting for various firm, industry, and macroeconomic features previously identified as demand factors for different firm capital structures, along with firm, country, and year fixed effects that potentially control for any remaining confounding effects of demand conditions.

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These propositions are tested in a comprehensive international sample spanning 85 countries over 31 years. To assess the impact of systemic banking crises on leverage, the empirical analyses employ partial adjustment models estimated using the system generalized method of moments (SGMM). To account for demand conditions, the models include an extensive set of controls, including firm, industry, and macroeconomic factors, along with firm, year, and country fixed effects. Instrumental variable (IV) regressions address the concerns that the quality of institutions may be measured with error and that institutions could be endogenous. Theory-based instruments are employed to isolate exogenous changes in institutions with respect to economic conditions (Williamson (2000), Roland (2004), and Acemoglu, Johnson, and Robinson (2005)). Institutions are instrumented using the historically determined component of institutions, arising from the colonial experience of former colonies (e.g., Acemoglu, Johnson, and Robinson (2001)). Additional analyses address the time-series endogeneity of institutions using the history of colonial experience, geographical endowment, and natural resource reliance to extract the exogenous component of institution building as alternative instruments (e.g., Beck and Laeven (2006)). The analyses of supply effects rely on 2 broad clusters of country features. One cluster of measures entails the supply of funds available to financial intermediaries and capital markets. These variables are directly related to the supply of capital in an economy and help quantify the direct supply effects of banking crises. Another cluster constitutes property rights and contracting institutions that affect external finance availability and through which indirect capital supply effects could manifest.

Three types of evidence show that systemic banking crises significantly affect leverage of a typical corporation globally. First, consistent with significant supply effects of systemic banking crises, firms in countries with developing and bank-based financial systems that are only conducive to debt capital have stronger leverage countercyclicality. Generally, leverage countercyclicality is stronger in institutional environments with more binding constraints on the capital supply, as measured by the depth of the capital markets, the development of the banking and financial sector, and the availability of private and bank credit.

Second, this article assesses the role of institutions for financial stability by studying their impact on the occurrence of banking crises, as well as on the management of crises and on their outcomes. The findings indicate that the adverse effects of crises are felt more strongly in countries with weaker institutions, both during periods of crisis, as implied by the policy responses, and in the aftermath of crises, as evidenced by greater deterioration in countries' finances and in the balance sheets of financial intermediaries. Policy makers in countries with weak institutions interfere more severely in their financial markets by deploying liquidity support. The restructuring costs resulting from government interventions to stabilize the financial system are higher and deterioration in the quality of financial institution assets as measured by the proportion of non-performing loans is more prevalent in countries with poor institutions. Overall, institutions play an important role for financial stability and represent an important channel through which banking crises exert indirect supply effects on leverage.

Third, having established the link between institutional quality and systemic banking crises, the study tests the (indirect) capital supply effects on leverage by

assessing the degree to which variations in the quality of the countries' institutions can explain the relationships between systemic banking crises and leverage. The findings suggest that the degree of countercyclicality in leverage varies substantially across institutional settings. Firms in countries with weaker legal institutions as indicated by civil law origin have stronger countercyclicality. In contrast, firms in countries with institutions that are able to safeguard the providers of capital and alleviate agency and information asymmetry costs exhibit procyclicality or less pronounced countercyclicality.

Finally, the study provides evidence consistent with the relevance of elevated uncertainty as a potential channel behind the documented effects of systemic banking crises on leverage. Highlighting some new facts and patterns about uncertainty in an international setting, the findings suggest that uncertainty varies heavily across institutional settings and that these fluctuations in uncertainty affect leverage behavior. Specifically, isolating the component of uncertainty shocks that are not related to economic conditions, the analyses suggest that weak institutions are associated with higher uncertainty, resulting in stronger countercyclical leverage dynamics, consistent with the real option, risk aversion, and risk premia arguments.

This article contributes to 3 broad strands of literature: capital structure, crises, and institutions; institutional effects on financing and volatility; and capital structure, uncertainty, and institutions. First, while the impact of macroeconomic conditions on leverage is studied extensively, evidence on the heterogeneous effects of banking crises on leverage dynamics is scarce. Halling et al. (2016) find a small leverage effect for recessions that coincide with banking crises, but they do not evaluate cross-country variations in leverage dynamics. Controlling for economic conditions, I examine how capital supply constraints and institutional factors affect leverage dynamics during systemic banking crises. Demirgüç-Kunt, Peria, and Tressel (2020) examine the short-run evaluation of leverage around the global financial crisis in an international sample over the period 2004–2011. I employ longer time-series and dynamic leverage models to evaluate all systemic banking crises between the years 1987 and 2017. Second, while the impact of institutions on firm financing is well understood (e.g., Booth, Aivazian, Demirgüç-Kunt, and Maksomovic (2001), Fan, Titman, and Twite (2012)), only a handful of studies suggest that institutionally weak countries are more prone to volatility (Acemoglu, Johnson, Robinson, and Thaicharoen (2003)). I show that countries with better institutions are less susceptible to financial volatility and that institutions play an important role in the crisis–leverage relationship. Finally, many studies have demonstrated that uncertainty has material effects on corporate decision making, including firm financing (e.g., Francis, Hasan, and Zhu (2014)). By considering systemic distress as a major exogenous shock to uncertainty, I show that elevated uncertainty is an important economic mechanism behind the documented effects. Weak institutions are associated with significantly higher uncertainty, resulting in stronger countercyclical leverage dynamics.

The rest of the article proceeds as follows: Section II describes the data. Sections III and IV present empirical model specifications and results, respectively. Section V concludes.

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II. Data and Sample

The sample consists of all non-financial and non-utility firms in the Compustat Global database in the period 1987–2017 for which information about country-level features could be located. To alleviate short-panel bias, firms that report information for fewer than 5 consecutive years are deleted. In addition, to attain a reasonable cross-sectional variation within each country, countries that have fewer than 10 firms reporting the required accounting data are eliminated. The sample is an unbalanced panel with 35,369 firms from 85 countries, for about 350,000 firm-years.

Table 1 provides information on the definition, source, construction, and summary statistics of the variables that are used to explain the variation in capital structures. All variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers.

Leverage is defined as total debt (long-term debt plus debt in current liabilities) scaled by total assets. A systemic banking crisis is an event associated with significant signs of financial distress in the form of bank runs, losses, and liquidations and policy intervention measures in the banking system (Laeven and Valencia (2008), (2013), (2014), and (2018)). The sample firms have a mean leverage ratio of 0.25, and 0.12 of the firm-years coincide with a systemic banking crisis.

Several country-level measures reflect the extent to which firms are constrained with respect to the supply of equity and debt capital. The development and efficiency of the financial system is captured using financial development (developing vs. developed) and financial structure (bank- versus market-based) indicators. The depth of capital markets for corporate securities is measured using stock market capitalization, stock value traded, and bond market capitalization. The degree to which financial intermediaries are able to provide external capital raising services is captured using private credit, bank credit, and bank deposits. Several institutional arrangements could indirectly generate capital supply effects by affecting the occurrence, management, and outcomes of systemic banking crises. Binary variables capture the legal (civil versus common) traditions, and the first principal component of institutional indices captures specific institutional dimensions (investor protection, bankruptcy procedures, governance, and information sharing mechanisms).

The uncertainty measure is the continuous news-based country uncertainty index built by Ahir, Bloom, and Furceri (2018). Since news-based proxies of uncertainty could be measured with error and may confound economic conditions with uncertainty (e.g., Jurado, Ludvigson, and Ng (2015)), the analyses also rely on elections as exogenous, pre-scheduled events (e.g., Durnev (2011), Julio and Yook (2012), and Boutchkova, Doshi, Durnev, and Molchanov (2012)). Two binary indicators capture election-driven uncertainty prevalent during the year of national elections and the year prior to national elections.

Analyses account for demand conditions using firm, industry, and macroeconomic controls.

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TABLE 1

Data Description and Summary Statistics

Table 1 provides definitions and summary statistics (mean, median, and standard deviation) for the variables used in the main analysis for the period 1987–2017.

Definition (Source)	Mean	Median	Std. Dev.
LEVERAGE: (Long-term debt + Short-term debt)/Total assets (Global Vantage).	0.2496	0.1887	0.2874
CRISIS: A dummy variable equal to 1 for the systemic crisis years (Laeven and Valencia (2008), (2013), (2014), (2018)).	0.1240	0.0000	0.3296
FINANCIAL_DEVELOPMENT: Dummy variable equal to unity if the financial system is developed, and 0 otherwise (Levine (2002)).	0.8571	1.0000	0.3500
FINANCIAL_STRUCTURE: Dummy variable equal to 1 if the financial structure is market based, and 0 otherwise (Levine (2002)).	0.9124	1.0000	0.2827
STOCK_MARKET_CAPITALIZATION: The value of listed shares divided by GDP (Beck, Demirgüç-Kunt, and Levine (2000), (2009), Čihák, Demirgüç-Kunt, Feyen, and Levine (2012)).	1.1143	0.9233	1.3319
STOCK_VALUE_TRADED: Total shares traded on the stock market exchange to GDP (Beck et al. (2000), (2009), Čihák et al. (2012)).	1.0346	0.7529	0.9658
BOND_MARKET_CAPITALIZATION: Debt securities as a share of GDP (Beck et al. (2000), (2009), Čihák et al. (2012)).	0.9533	0.8735	0.7013
PRIVATE_CREDIT: Private credit by deposit money banks to GDP (Beck et al. (2000), (2009), Čihák et al. (2012)).	0.8411	0.8330	0.3980
BANK_CREDIT: Bank credit to bank deposits (Beck et al. (2000), (2009), Čihák et al. (2012)).	1.6144	0.8060	0.6253
BANK_DEPOSITS: Bank deposits as a share of GDP (Beck et al. (2000), (2009), Čihák et al. (2012)).	0.9537	0.6138	0.6799
LEGAL_ORIGIN: Categorical variables equal to unity if the firm operates under the named legal origin, and 0 otherwise (La Porta et al. (1998)).	0.3701	0.0000	0.4828
SHAREHOLDER_PROTECTION: Principal component of shareholder rights (La Porta et al. (1998)) and their enforcement (Djankov, Hart, McLiesh, and Shleifer (2008)).	0.0000	0.4372	1.0000
CREDITOR_PROTECTION: Principal component of creditor rights (La Porta et al. (1998)) and their enforcement (Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003)).	0.0000	–0.1234	1.0000
BANKRUPTCY_PROCEDURES: Principal component of time, cost, and efficiency to resolve insolvency (Djankov et al. (2008)).	0.0000	0.1678	1.0000
INTERNAL_GOVERNANCE: Principal component of executive constraints (Djankov et al. (2002)) and corporate governance (World Bank).	0.0000	0.4339	1.0000
EXTERNAL_GOVERNANCE: Principal component of corruption, risk of expropriation, and repudiation by government (La Porta et al. (1998)); law and order; and enforceability of contracts (Djankov et al. (2003)).	0.0000	0.5555	1.0000
EQUITY_INFORMATION_SHARING: Principal component of accounting standards (La Porta et al. (1998)), disclosure requirements, liability standards, public enforcement, and the prevalence of insider trading (La Porta, Lopez-de-Silanes, and Shleifer (2006)).	0.0000	0.2925	1.0000
DEBT_INFORMATION_SHARING: Principal component of accounting standards and public credit registry (Djankov, McLiesh, and Shleifer (2007)).	0.0000	0.4630	1.0000
COUNTRY_UNCERTAINTY: The frequency of the word *uncertainty* (or its variants) in Economist Intelligence Unit (EUI) country reports, normalized by total number of words (Ahir et al. (2018)).	0.0573	0.0493	0.0379
ELECTION: A binary variable indicating that there was an election during that year. In the presidential system, it is the presidential election. In the parliamentary system, it is the parliamentary elections (Polity IV).	0.0971	0.0000	0.2961
ELECTION_APPROACHING: A binary variable indicating that there is 1 year left in the term of the chief executive (Polity IV).	0.4298	0.0000	0.4950
PROFIT: (Operating income + Interest and related expense + Current income taxes)/ Total assets (Global Vantage).	–0.0519	0.0492	0.4155
MARKET_TO_BOOK: (Long-term debt + Short-term debt + Preferred capital + Market value of equity)/Total assets (Global Vantage).	1.7546	0.9970	2.5415
DEPRECIATION: Total depreciation and Amortization/Total assets (Global Vantage).	0.0439	0.0355	0.0382
SIZE: Log[Lagged sales]/Sales (Global Vantage).	–0.2650	0.0105	1.9921
TANGIBILITY: Fixed assets/Total assets (Global Vantage).	0.2879	0.2338	0.2375
R&D_DUMMY: A dummy variable equal to 1 if R&D expenditures are not reported, and 0 otherwise (Global Vantage).	0.3889	0.0000	0.4875
R&D_EXPENSES: R&D expense/Total assets (Global Vantage).	0.0351	0.0000	0.0948
MEDIAN_INDUSTRY_LEVERAGE: Median leverage for the firm's industry (Global Vantage).	0.1868	0.1911	0.1029
INFLATION: Annual growth in consumer price index (World Development Indicators, World Bank).	0.0213	0.0219	0.0217
GDP_GROWTH: Annual growth in nominal GDP (World Development Indicators, World Bank).	0.0229	0.0254	0.0202

III. Empirical Methodology

To determine how systemic banking crises affect firms' leverage, a dynamic model of leverage, in which firms adjust their leverage partially due to adjustment costs, is estimated:

$$\text{LEV}_{ij,t+1} - \text{LEV}_{ij,t} = \lambda(\text{LEV}^{*}_{ij,t+1} - \text{LEV}_{ij,t}) + \widetilde{\xi}_{ij,t+1}, \tag{1}$$

where $\text{LEV}^{*}_{ij,t+1}$ is the ith firm's target leverage in the jth country in year $t + 1$, $\text{LEV}_{ij,t}$ is the ith firm's observed leverage in the jth country in year t, λ is the adjustment speed, and $\widetilde{\xi}_{ij,t+1}$ is a random error.

Target leverage is a function of the systemic banking crisis; conditioning variable (capital supply, institutional quality, or uncertainty); interaction term between the systemic banking crisis and conditioning variable; and firm, industry, macroeconomic controls:

$$\text{LEV}^{*}_{ij,t+1} = \alpha C_{j,t} \times \text{CV}_{j,t} + \theta C_{j,t} + \tau \text{CV}_{j,t} + \beta X_{ij,t}. \tag{2}$$

$C_{j,t}$ equals 1 for systemic banking crises and 0 otherwise. $\text{CV}_{j,t} = \{\text{HCS}_j, \text{SI}_j, HU_{j,t}\}$,[4] in which HCS_j equals 1 for the high capital supply portfolio, and 0 otherwise;[5] SI_j equals 1 for strong institutional settings, and 0 otherwise;[6] and $HU_{j,t}$ equals 1 for high uncertainty, and 0 otherwise.[7] $X_{ij,t}$ includes firm, industry, and macroeconomic controls that account for firms' demand for different capital structures (e.g., Korajczyk and Levy (2003), Leary (2009)).[8]

Substituting equation (2) into equation (1) yields an estimable regression:

$$\begin{aligned}\text{LEV}_{ij,t+1} = {} & (\lambda\alpha)(C_{j,t} \times \text{CV}_{j,t}) + (\lambda\theta)C_{j,t} + (\lambda\tau)\text{CV}_{j,t} + (\lambda\beta)X_{ij,t} \\ & + (1-\lambda)\text{LEV}_{ij,t} + \mu F_i + \eta C_j + \gamma Y_t + \tilde{\delta}_{ij,t+1},\end{aligned} \tag{3}$$

where F_i denotes firm fixed effects, C_j denotes country fixed effects, Y_t denotes year fixed effects,[9] and $\widetilde{\delta}_{ij,t+1}$ is a random error.

[4]Using binary interactions allows easier interpretation and helps minimize possible measurement errors in the variables. The inferences are neither sensitive to including continuous indices (and interaction terms) as additional controls nor to replacing the binary measures (and interaction terms) by their continuous versions.

[5]HCS (HIGH_CAPITAL_SUPPLY) includes developed and market-based financial systems and countries with above median values of stock market capitalization, stock value traded, bond market capitalization, private credit, bank credit, and bank deposits.

[6]SI (STRONG_INSTITUTION) includes countries with common law origin and higher scores compared to the median values of shareholder and creditor protection, bankruptcy procedures, internal and external governance, debt, and equity information sharing.

[7]HU (HIGH_UNCERTAINTY) denotes above median values of uncertainty (COUNTRY_UNCERTAINTY) and election years (ELECTION = 1, ELECTION_APPROACHING = 1).

[8]These include lagged leverage, profit, market-to-book, depreciation, size, tangibility, research and development (R&D) dummy, R&D expenses, median industry leverage, inflation, and GDP growth (e.g., Flannery and Rangan (2006), Öztekin (2015)). The results are robust to including additional time-varying country controls such as debt and stock market conditions.

[9]Fixed effects control for time-specific, firm-specific, and country-specific shocks that may affect capital demand.

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To evaluate the heterogeneity in cyclicality of leverage across institutional environments, equation (3) is estimated using the SGMM (Flannery and Hankins (2013)). IV regressions address potential endogeneity of the country-level measures by exploiting their historical cross-sectional variation as well as exogenous variations in institution building, an issue we revisit in Section IV.

IV. Empirical Results

A. Direct Capital Supply Effects of Systemic Banking Crises on Leverage

Banking crises are characterized by a credit crunch leading to contraction in available external funds, heightened asymmetric information, and flight-to-quality whereby investor demand (capital supply) shifts to relatively safer securities (Pástor and Veronesi (2012), (2013), Boutchkova et al. (2012), and Durnev (2011)). While credit rationing would indicate that debt and equity financing are both procyclical, that is, higher in normal times and lower in crisis times, flight-to-quality and information asymmetry arguments could result in dominance of the denominator effect over the numerator effect, due to sharper declines in equity compared to debt. A countercyclical leverage pattern would be consistent with more acute shortages in equity capital than debt capital, with stronger effects in countries where the supply of capital is more constrained.

To assess whether systemic banking crises lead to countercyclical leverage dynamics that are more pronounced when the supply of capital is more constrained, institutions that are directly related to the supply of capital in an economy are considered. This way, both the crisis measure and the conditioning variable directly capture supply effects in leverage changes as opposed to demand effects. By exploiting the differential impact of a shift in capital supply on the capital structures of firms with varying degrees of access to the supply of capital, the goal is to identify the direct impact of supply frictions on leverage. IV analyses address the potential endogeneity of the financial infrastructure quality with respect to economic conditions by exploiting exogenous variations in institution building, in addition to the historical cross-sectional variation.[10] The instruments used for the capital supply variables are log settler mortality in Panel A and predicted values of institution building obtained by regressing institutional building variables (institutional development, executive constraints, and ethnic fragmentation) on log settler mortality, an indicator for landlocked countries, and log wheat–sugar ratio in Panel B (Easterly and Ross (2003)).

Table 2 shows the impact of capital supply constraints on the effects of systemic banking crises on leverage. In Panel A, the overall effect of systemic banking crises on the average firm in this large global sample is to increase leverage, with an economic magnitude up to 63 percentage points. However, the results

[10]The first measure of institution building is based on voice and accountability, government effectiveness, rule of law, regulatory quality, absence of corruption, and political stability (Kaufman, Kraay, and Mastruzzi (2003)). Executive constraints that reflect de facto independence of the executive branch are an alternative measure (Acemoglu and Johnson (2005)). An index of ethnic fragmentation is also used as an impediment to institutional development by lowering support for free-market institutions (e.g., Alesina, Devleevschauwer, Easterly, Kurlat, and Wacziarg (2003)).

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highlight sharp differences in firm's leverage responses to systemic banking crises depending on the degree of capital supply constraints. Specifically, economies that are more conducive to a higher supply of capital are associated with either procyclical or significantly less countercyclical leverage. In contrast, more pronounced countercyclical leverage dynamics are observed in countries with more binding constraints on the capital supply.

In columns 1 and 2, leverage increases substantially during crises, by 22.8 and 64.0 percentage points, in developing and bank-based financial systems that primarily rely on debt capital in general and bank loans in particular. In contrast, firms in developed and market-based financial systems that are conducive to both debt and equity capital raising exhibit much less countercyclical leverage dynamics with a magnitude of 2.5 and −1.1 percentage points only (the latter is insignificant). In columns 3 and 4, leverage increases by 29.8 and 17.7 percentage points during systemic banking crises in countries with more binding constraints on the supply of equity capital, as measured by lower stock market capitalization and stock value traded. In contrast, firms in countries with developed stock markets exhibit procyclical financial leverage dynamics with an economic magnitude of −3.8 and −4.4 percentage points, respectively. In columns 5–8, firms with less binding constraints on their supply of debt capital, as measured by higher bond market capitalization, higher availability of private credit and bank credit, and more developed banking systems, as measured by the amount of bank deposits, have either procyclical or significantly less countercyclical leverage dynamics. In column 5, leverage increases by 16.8 percentage points during systemic banking crises in countries with lower bond market capitalization. In contrast, less pronounced countercyclical leverage dynamics with only a slight increase in leverage by 2.3 percentage points are observed in countries with more developed bond markets. In column 6, qualitative results are similar using private credit. Leverage is procyclical in countries with more developed banking systems. In columns 7 and 8, leverage decreases by 2.1 and 3.3 percentage points during crises (the former is insignificant) in countries with bigger banking systems, as opposed to a corresponding jump by 2.9 and 39.2 percentage points in smaller banking systems. In other words, the negative supply shock of a systemic banking crisis is more profound in countries where access to bank credit is more constrained.

Panel B documents qualitatively similar results using the historically determined exogenous variations in institution building as instruments for the capital supply variables. Thus, the conclusions are not sensitive to the selection of the IVs.

These results collectively indicate strong supply effects of systemic banking crises in leverage changes over the globe. The degree of leverage countercyclicality varies with the severity of the capital supply constraints. Leverage is more countercyclical in countries where the supply of capital is more constrained.

B. Capital Supply Effects of the Institutional Environment

I next analyze the role of institutions for the occurrence, intensity, and outcome of systemic banking crises. Institutionally weak societies are characterized by fewer

TABLE 2

Direct Capital Supply Effects of Systemic Banking Crises on Leverage

In Table 2, capital structure estimations of equation (3) are conducted for leverage using Blundell and Bond's (1998) 2-step SGMM during the sample period 1987–2017. HIGH_CAPITAL_SUPPLY is a binary variable that is 1 for the high capital supply portfolio (developed and market-based financial systems and countries with higher than the median value for the remaining indices), and 0 otherwise. Panel A reports instrumental variable (IV) estimations, where the relevant instrument for each capital supply measure is log settler mortality (Acemoglu et al. (2003)). Panel B documents the results using the predicted values of institution building as instruments for the institutions, where the predictions are obtained by regressing institutional building variables (institutional development, executive constraints, and ethnic fragmentation) on log settler mortality, a dummy variable for landlocked countries, and log wheat–sugar ratio. All models include unreported firm, year, and country fixed effects. Table 1 provides variable definitions. The *p*-values are based on standard errors that are robust to heteroscedasticity, and arbitrary patterns of autocorrelation within firms are reported beneath the coefficient estimates. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Capital Supply Variables	FINANCIAL_ DEVELOPMENT 1	FINANCIAL_ STRUCTURE 2	STOCK_MARKET_ CAPITALIZATION 3	STOCK_VALUE_ TRADED 4	BOND_MARKET_ CAPITALIZATION 5	PRIVATE_ CREDIT 6	BANK_ CREDIT 7	BANK_ DEPOSITS 8
Panel A. Exogenous Variations in the Capital Supply Based on Colonial History as Instruments								
CRISIS × HIGH_CAPITAL_SUPPLY	–0.0192**	–0.0586***	–0.0605***	–0.0397***	–0.0286***	–0.0305***	–0.0071	–0.0743***
	(0.032)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.234)	(0.000)
CRISIS	0.0216**	0.0576***	0.0537***	0.0318***	0.0331***	0.0341***	0.0041*	0.0685***
	(0.015)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.099)	(0.000)
HIGH_CAPITAL_SUPPLY	–0.0014	–0.4807	0.0060***	0.0085***	–0.0108***	–0.0054***	0.0043*	0.0039***
	(0.216)	(1.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.064)	(0.001)
LEVERAGE	0.9051***	0.9100***	0.8198***	0.8201***	0.8031***	0.7964***	0.8595***	0.8252***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PROFIT	0.0561***	0.1907***	–0.0287***	–0.0261***	–0.0441***	–0.0402***	–0.0138	–0.0300***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.626)	(0.000)
MARKET_TO_BOOK	0.0084***	0.0103***	–0.0004	–0.0008	–0.0011*	–0.0014**	0.0032*	0.0003
	(0.000)	(0.000)	(0.563)	(0.209)	(0.077)	(0.036)	(0.083)	(0.630)
DEPRECIATION	–0.2185***	1.0499***	–0.2657***	–0.2583***	–0.2224***	–0.1635***	0.0195	–0.2480***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.913)	(0.000)
SIZE	–0.0095***	–0.0192*	0.0005	0.0013	0.0035***	0.0025**	0.0036	0.0013
	(0.000)	(0.074)	(0.704)	(0.338)	(0.003)	(0.025)	(0.466)	(0.331)
TANGIBILITY	–0.0064	–0.3807***	0.0438***	0.0428***	0.0548***	0.0545***	–0.0175	0.0387***
	(0.214)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.472)	(0.000)
R&D_DUMMY	–0.0256***	–0.0281*	–0.0064***	–0.0067***	–0.0049**	–0.0051**	–0.0476***	–0.0094***
	(0.000)	(0.078)	(0.002)	(0.002)	(0.020)	(0.022)	(0.000)	(0.000)
R&D_EXPENSES	0.3691***	1.4053***	0.0108	0.0003	–0.0361	–0.0212	–0.2661*	0.0328
	(0.000)	(0.000)	(0.701)	(0.992)	(0.192)	(0.452)	(0.081)	(0.238)

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TABLE 2 (continued)

Direct Capital Supply Effects of Systemic Banking Crises on Leverage

Capital Supply Variables	FINANCIAL_ DEVELOPMENT 1	FINANCIAL_ STRUCTURE 2	STOCK_MARKET_ CAPITALIZATION 3	STOCK_VALUE_ TRADED 4	BOND_MARKET_ CAPITALIZATION 5	PRIVATE_ CREDIT 6	BANK_ CREDIT 7	BANK_ DEPOSITS 8
Panel A. Exogenous Variations in the Capital Supply Based on Colonial History as Instruments (continued)								
MEDIAN_INDUSTRY_LEVERAGE	0.0975***	2.0665***	–0.0063	0.0309	0.0118	–0.0235	–0.1413	–0.0528
	(0.000)	(0.000)	(0.899)	(0.543)	(0.824)	(0.644)	(0.123)	(0.312)
INFLATION	–0.0024***	–0.0008	–0.0033***	–0.0027***	–0.0030***	–0.0028***	–0.0004	–0.0041***
	(0.001)	(0.819)	(0.000)	(0.000)	(0.000)	(0.000)	(0.462)	(0.000)
GDP_GROWTH	–0.0774***	–0.1209***	–0.0546***	–0.0550***	–0.0370**	–0.0612***	–0.0081	–0.0403**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.000)	(0.722)	(0.011)
Constant	0.0095***	0.2067	0.0500	0.2678	0.0246***	0.0447***	0.2847	0.0833***
	(0.007)	(1.000)	(0.107)	(0.998)	(0.007)	(0.005)	(0.999)	(0.002)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	356,813	356,813	350,568	350,126	295,952	351,832	332,767	332,273
Crisis effect: Low capital supply	0.2276**	0.6400***	0.2980***	0.1768***	0.1681***	0.1675***	0.0292*	0.3919***
Crisis effect: High capital supply	0.0253*	–0.0111	–0.0377***	–0.0439***	0.0229**	0.0177	–0.0214	–0.0332***
Crisis effect: Total capital supply	0.2529***	0.6289***	0.2603***	0.1329***	0.1910***	0.1852	0.0078	0.3587***
Panel B. Exogenous Variations in Institution Building Based on Colonial History, Geographical Endowment, and Natural Resource Reliance as Instruments for Institutions								
CRISIS × HIGH_CAPITAL_SUPPLY	–0.0873**	–0.0281***	–0.0165***	–0.0128***	–0.0101***	–0.0148***	–0.0268***	–0.0274***
	(0.013)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CRISIS	0.0872**	0.0299***	0.0121***	0.0100***	0.0185***	0.0079**	0.0214***	0.0305***
	(0.012)	(0.000)	(0.000)	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)
HIGH_CAPITAL_SUPPLY	–0.1563**	0.0034***	–0.0005	0.0045***	–0.0067***	0.0104*	0.0075***	0.0020*
	(0.011)	(0.005)	(0.451)	(0.000)	(0.000)	(0.063)	(0.000)	(0.060)
LEVERAGE	0.9155***	0.8954***	0.8317***	0.8319***	0.8126***	0.9236***	0.8258***	0.8391***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PROFIT	0.1827***	0.0478***	–0.0269***	–0.0217***	–0.0203***	0.1520***	–0.0287***	–0.0232***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MARKET_TO_BOOK	0.0100***	0.0111***	0.0022***	0.0016***	0.0019***	0.0097***	–0.0018***	0.0018***
	(0.000)	(0.000)	(0.000)	(0.006)	(0.001)	(0.002)	(0.006)	(0.002)

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TABLE 2 (continued)

Direct Capital Supply Effects of Systemic Banking Crises on Leverage

Capital Supply Variables	FINANCIAL_ DEVELOPMENT 1	FINANCIAL_ STRUCTURE 2	STOCK_MARKET_ CAPITALIZATION 3	STOCK_VALUE_ TRADED 4	BOND_MARKET_ CAPITALIZATION 5	PRIVATE_ CREDIT 6	BANK_ CREDIT 7	BANK_ DEPOSITS 8
Panel B. Exogenous Variations in Institution Building Based on Colonial History, Geographical Endowment, and Natural Resource Reliance as Instruments for Institutions (continued)								
DEPRECIATION	0.9508***	0.0020	–0.2259***	–0.1866***	–0.1384***	1.1680***	–0.0938**	–0.1784***
	(0.000)	(0.971)	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)	(0.000)
SIZE	–0.0109	–0.0030	0.0007	0.0013	0.0024**	0.0106	–0.0003	0.0008
	(0.273)	(0.166)	(0.572)	(0.317)	(0.034)	(0.413)	(0.836)	(0.554)
TANGIBILITY	–0.3553***	–0.0215***	0.0388***	0.0422***	0.0544***	–0.4012***	0.0531***	0.0442***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R&D_DUMMY	–0.0345**	–0.0146***	–0.0078***	–0.0081***	–0.0074***	–0.0157	–0.0048***	–0.0094***
	(0.020)	(0.000)	(0.000)	(0.000)	(0.000)	(0.258)	(0.006)	(0.000)
R&D_EXPENSES	1.1726***	0.1767***	0.0231	0.0002	0.0036	0.1286	–0.0208	0.0146
	(0.000)	(0.010)	(0.338)	(0.994)	(0.887)	(0.753)	(0.432)	(0.560)
MEDIAN_INDUSTRY_LEVERAGE	1.6086***	0.1241***	0.0180	0.0753*	0.0920**	1.6364***	0.0028	0.0509
	(0.000)	(0.000)	(0.678)	(0.087)	(0.027)	(0.001)	(0.955)	(0.250)
INFLATION	–0.0037	–0.0017**	–0.0002	–0.0001	–0.0006	–0.0860*	0.0001	–0.0004
	(0.270)	(0.010)	(0.722)	(0.762)	(0.120)	(0.078)	(0.832)	(0.419)
GDP_GROWTH	–0.1198***	–0.1017***	–0.1340***	–0.1446***	–0.1437***	–0.0271	–0.0901***	–0.1425***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.544)	(0.000)	(0.000)
Constant	0.0757	–0.0076*	0.0281***	0.0168**	0.1279	0.0000	–0.0268***	0.0172*
	(0.550)	(0.059)	(0.001)	(0.040)	(0.999)	(0.999)	(0.000)	(0.053)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	298,545	298,545	350,568	350,126	295,952	351,832	332,767	332,273

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constraints on political power and greater incentives and ability to redistribute assets and income to themselves, leading to financial turbulence (e.g., Acemoglu and Robinson (2001)). Institutional problems may force politicians to pursue unsustainable policies to remain in power and satisfy powerful groups, resulting in further instability (Rodrik (1999), Johnson, Boone, Breach, and Friedman (2000)).

I postulate that countries that inherited weak institutions are more likely to face more frequent and severe crises and are less likely to efficiently deal with shocks to their financial environments, resulting in greater interventions but less successful outcomes. Table 3 presents the results. Panels A and B document the effect of institutions on crisis occurrence and management (liquidity support). Panels C and D document their effect on crisis outcomes (non-performing loans and restructuring costs).[11] The instruments for institutions are log settler mortality in Panels A1, B1, C1, and D1 and predicted values of institution building obtained by regressing institutional building (institutional development, executive constraints, and ethnic fragmentation) on log settler mortality, a dummy variable for landlocked countries, and log wheat–sugar ratio in Panels A2, B2, C2, and D2. Regressions control for (lagged) macroeconomic conditions.

Panel A of Table 3 documents the effect of institutions on crisis occurrence. Weak institutional settings are consistently associated with higher crisis occurrence in both subpanels. Specifically, in civil law–origin countries, firms with weak investor protection, less efficient bankruptcy procedures, poor governance, and worse information environments are confronted with systemic banking crises more frequently. Panel B documents the effect of institutions on crisis management using the liquidity support policy variable. Countries with weak institutions end up providing more liquidity support during systemic banking crises, suggesting that the impact of the crisis is more dramatic, and the economic adjustment is more difficult in such environments. Panels C and D document the effect of institutions on crisis outcomes using non-performing loans and restructuring costs. With the exception of bankruptcy procedures using restructuring costs, bank balance sheets deteriorate more in weaker institutional settings despite more intrusive crisis management in the form of liquidity support, which leads to weaker government finances in the form of higher restructuring costs. Thus, policy intervention is less effective in countries with weak institutions. Standard macroeconomic variables that are often blamed for crises also play a role, but their influences are not consistent across all specifications.

Overall, poor institutions are more conducive to systemic banking crises. In weak institutional settings, the likelihood of crises is higher, there is greater policy intervention during the crises, and the adverse effects from the crises are more pronounced.

[11]Liquidity support measures central bank claims on other depository institutions and liquidity support provided by a country's treasury to total deposits and bank liabilities to non-residents. Bank restructuring costs are gross fiscal outlays directed to the restructuring of the financial sector (Laeven and Valencia (2013), (2014)).

TABLE 3

Capital Supply Effects of the Institutional Environment: Crisis Occurrence, Crisis Management, and Crisis Outcomes

Table 3 reports the effects of the institutional environment on systemic banking crisis occurrence and crisis management (liquidity support) in Panels A and B and crisis outcomes, as measured by non-performing loans and restructuring costs, in Panels C and D, respectively. All regressions rely on instrumental variable (IV) estimations. Panels A1, B1, C1, and D1 document the results using log settler mortality as the instrument for the institutions. Panels A2, B2, C2, and D2 document the results using the predicted values of institution building as instruments for the institutions, where the predictions are obtained by regressing institutional building variables (institutional development, executive constraints, and ethnic fragmentation) on log settler mortality, a dummy variable for landlocked countries, and log wheat–sugar ratio. Liquidity support is measured as the ratio of central bank claims on deposit money banks and liquidity support from the country's treasury to total deposits and liabilities to non–residents (Laeven and Valencia (2013), (2014)). Restructuring costs refer to outlays directly related to the restructuring of the financial sector (Laeven and Valencia). Table 1 provides variable definitions. The *p*-values are based on standard errors that are robust to heteroscedasticity, and arbitrary patterns of autocorrelation within firms are reported beneath the coefficient estimates. *** indicates significance at the 1% levels.

Panel A. Crisis Occurrence

Institution	LEGAL_ ORIGIN 1	SHAREHOLDER_ PROTECTION 2	CREDITOR_ PROTECTION 3	BANKRUPTCY_ PROCEDURES 4	INTERNAL_ GOVERNANCE 5	EXTERNAL_ GOVERNANCE 6	EQUITY_INFORMATION_ SHARING 7	DEBT_INFORMATION_ SHARING 8
Panel A1. Historically Determined Exogenous Component of Institutions Based on Colonial History								
INSTITUTION	0.0029***	–0.6016***	–0.0058***	–0.0171***	–0.0239***	–0.0213***	–0.0131***	–0.0092***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	0.0540***	20.0468***	0.0542***	0.0660***	0.0653***	0.0637***	0.0535***	0.0691***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	–2.8380***	–81.6158***	–2.8306***	–3.6408***	–3.7430***	–3.8275***	–2.9120***	–3.5862***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.2005***	3.1134***	0.2000***	0.2102***	0.2117***	0.2143***	0.2023***	0.2086***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel A2. Exogenous Variations in Institution Building Based on Colonial History, Geographical Endowment, and Natural Resource Reliance as Instruments for Institutions								
INSTITUTION	0.0077***	–0.1515***	–0.0392***	–0.0271***	–0.0242***	–0.0183***	–0.0028***	–0.0143***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	0.0542***	0.0465***	0.0538***	0.0475***	0.0506***	0.0499***	0.0540***	0.0520***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	–2.8313***	–2.8303***	–2.8704***	–3.2603***	–3.2688***	–3.2832***	–2.8611***	–3.0575***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.1986***	0.4565***	0.2011***	0.2132***	0.2153***	0.2164***	0.2016***	0.2059***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

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TABLE 3 (continued)

Capital Supply Effects of the Institutional Environment: Crisis Occurrence, Crisis Management, and Crisis Outcomes

Institution	LEGAL_ ORIGIN 1	SHAREHOLDER_ PROTECTION 2	CREDITOR_ PROTECTION 3	BANKRUPTCY_ PROCEDURES 4	INTERNAL_ GOVERNANCE 5	EXTERNAL_ GOVERNANCE 6	EQUITY_INFORMATION_ SHARING 7	DEBT_INFORMATION_ SHARING 8
Panel B. Crisis Management: Liquidity Support								
Panel B1. Historically Determined Exogenous Component of Institutions Based on Colonial History								
INSTITUTION	7.4615***	−2.4131***	−10.1846***	−8.3829***	−12.0413***	−16.9493***	−4.0562***	−3.8672***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	42.3233***	23.9489***	18.7085***	2.4982*	−10.5693***	−80.0433***	40.2031***	−12.7771***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	−36.3604***	−43.7555***	−46.6179***	−46.3444***	−22.7328***	−35.7543***	−30.9581***	−56.9415***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	4.2091***	6.9220***	7.8263***	8.5008***	9.0497***	−80.0433***	6.8881***	8.6908***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel B2. Exogenous Variations in Institution Building Based on Colonial History, Geographical Endowment, and Natural Resource Reliance as Instruments for Institutions								
INSTITUTION	3.4032***	−2.5380***	−8.5477***	−8.7260***	−11.4011***	−19.1748***	−3.7027***	−4.0951***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	55.2924***	38.8481***	1.4132	26.0446***	23.3563***	−1.6170***	57.6959***	14.9103***
	(0.000)	(0.000)	(0.135)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	−22.6068***	−30.7264***	−51.4358***	−27.3290***	−4.8166***	8.2021***	−22.9341***	−45.0039***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	6.2725***	6.1970***	6.9478***	8.2104***	9.5087***	16.7726***	6.8638***	8.4021***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel C. Crisis Outcomes: Non-Performing Loans								
Panel C1. Historically Determined Exogenous Component of Institutions Based on Colonial History								
INSTITUTION	1.8513***	−0.8098***	−3.9578***	−3.9148***	−6.5631***	−10.2316***	−1.7001***	−2.0163***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	31.6795***	32.5441***	32.4249***	29.3584***	21.1994***	21.7659***	47.5165***	29.7380***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	−13.0632***	−12.8881***	−14.6245***	−10.3754***	0.4629	14.9455***	−21.9356***	−30.7881***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.219)	(0.000)	(0.000)	(0.000)
Constant	31.6795***	5.0758***	5.4345***	5.6377***	6.1025***	9.2853***	5.0698***	5.8120***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

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TABLE 3 (continued)

Capital Supply Effects of the Institutional Environment: Crisis Occurrence, Crisis Management, and Crisis Outcomes

Institution	LEGAL_ ORIGIN 1	SHAREHOLDER_ PROTECTION 2	CREDITOR_ PROTECTION 3	BANKRUPTCY_ PROCEDURES 4	INTERNAL_ GOVERNANCE 5	EXTERNAL_ GOVERNANCE 6	EQUITY_INFORMATION_ SHARING 7	DEBT_INFORMATION_ SHARING 8
Panel C. Crisis Outcomes:Non-PerformingLoans (continued)								
Panel C2. Exogenous Variations in Institution Building Based on Colonial History, Geographical Endowment, and Natural Resource Reliance as Instruments for Institutions								
INSTITUTION	1.8879***	−0.8158***	−3.4167***	−4.0212***	−5.9485***	−10.9780***	−1.4299***	−1.9767***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	31.4499***	32.0360***	21.3818***	33.8094***	34.9804***	22.6909***	47.4470***	33.6686***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	−13.1770***	−13.1308***	−19.5127***	−8.1889***	5.2395***	15.2379***	−22.3163***	−28.6321***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	4.5032***	5.0545***	5.2234***	5.7487***	6.4467***	10.6884***	5.2851***	5.9154***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel D. Crisis Outcomes: Restructuring Costs								
Panel D1. Historically Determined Exogenous Component of Institutions Based on Colonial History								
INSTITUTION	0.7361***	−0.0551***	−0.2410***	1.6991***	−2.0089***	−2.5259***	−0.7046***	−0.2264***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	1.1416**	−4.5133***	−4.6514***	−12.2706***	−3.6532***	−13.4347***	11.7354***	1.4062***
	(0.022)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	2.5844***	0.0084	−0.1550	−5.1131***	6.0057***	3.2672***	−14.0161***	−20.3696***
	(0.000)	(0.980)	(0.635)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.3248***	1.7086***	1.7342***	1.7246***	1.8997***	2.6553***	1.6135***	1.8975***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel D2. Exogenous Variations in Institution Building Based on Colonial History, Geographical Endowment, and Natural Resource Reliance as Instruments for Institutions								
INSTITUTION	0.6478***	−0.0172***	−0.4375***	1.1493***	−2.4646***	−4.5225***	−0.7307***	−0.4396***
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	0.1183	−5.3799***	0.8255***	−11.3170***	2.7989***	−2.3126***	14.3621***	3.3590***
	(0.813)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	2.1175***	−0.3742	0.5266***	−4.1758***	10.2988***	14.3560***	−12.4984***	−18.9121***
	(0.000)	(0.258)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.3698***	1.7325***	0.8255***	1.6995***	2.0974***	3.8428***	1.6594***	1.9291***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

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C. Indirect Capital Supply Effects of Systemic Banking Crises on Leverage

Having established the link between institutional quality and banking crises, I proceed to test the (indirect) capital supply effects on leverage. One reasonable interpretation of such a link between weak institutions and systemic banking crises is the existence of (indirect) institutional supply effects, as the supply of capital would be significantly reduced during such episodes, particularly in settings where property rights and contractual arrangements are less conducive to external finance (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)). I test how systemic banking crises affect leverage differently based on variations in the quality of a country's institutions and the degree of uncertainty. In countries where property rights and contractual institutions are weaker, I expect the countercyclical effect of crises to be felt more strongly. However, I expect less pronounced leverage countercyclicality in countries with relatively stronger institutions, where equity and bond financing will likely remain viable external financing sources when the banking system is in crisis (De Fiore and Uhlig (2015), Levine et al. (2016)).

Table 4 shows the impact of institutions on the effects of systemic banking crises on leverage. The instruments used for the institutions are log settler mortality in Panel A and the predicted values of institution building obtained by regressing institutional building variables (institutional development, executive constraints, and ethnic fragmentation) on log settler mortality, a dummy variable for landlocked countries, and log wheat–sugar ratio in Panel B.

In Panel A, the overall effect of systemic banking crises on the average firm in this large global sample is to increase financial leverage, with an economic magnitude ranging from 19 to 57 percentage points. However, the results highlight sharp differences in the firms' responses to systemic banking crises across different institutional settings. Specifically, stronger institutions are associated with either procyclical or less countercyclical leverage dynamics. In contrast, more pronounced countercyclical leverage dynamics are observed in countries with weaker institutions. For example, in column 1, leverage increases by 22.2 percentage points during systemic banking crises in civil law–origin countries with weaker legal institutions. In contrast, firms in common law–originated countries exhibit procyclical leverage dynamics with an economic magnitude of −2.9 percentage points. I also find that leverage is either procyclical or less countercyclical in institutional environments that are more protective of the providers of capital: stronger shareholder protection (an insignificant −2.1 versus 25.8 percentage points), stronger creditor protection (1.4 versus 26.9 percentage points), and more efficient bankruptcy procedures (an insignificant 0.28 versus 56.4 percentage points) in columns 2–4, respectively. The results indicate that institutional settings with lower agency and information asymmetry costs are also characterized by less countercyclical or procyclical leverage dynamics. In columns 5 and 7, leverage either does not change significantly or decreases by 2.9 percentage points during systemic banking crises in countries with better internal governance and information sharing in equity markets, respectively, as opposed to a corresponding jump by 46.3 and 48.0 percentage points in lower quality institutional settings. Similarly, in columns 6 and 8, leverage does not change significantly or decreases by 2.7 percentage points in response to systemic banking crises for firms in countries with

TABLE 4

Indirect Capital Supply Effects of Systemic Banking Crises on Leverage: The Impact of the Institutional Environment

In Table 4, capital structure estimations of equation (3) are conducted for leverage using Blundell and Bond's (1998) 2-step SGMM during the sample period 1987–2017. STRONG_INSTITUTION is a binary variable that equals 1 for the strong institution portfolio (common law origin and countries with higher scores than the median value for the remaining institutional indices), and 0 otherwise. Panel A documents the results using log settler mortality as the instrument for the institutions. Panel B documents the results using the predicted values of institution building as instruments for the institutions, where the predictions are obtained by regressing institutional building variables (institutional development, executive constraints, and ethnic fragmentation) on log settler mortality, a dummy variable for landlocked countries, and log wheat–sugar ratio. All models include unreported firm, year, and country fixed effects. The economic impact of the systemic banking crisis is calculated as the raw coefficient estimate divided by 1 minus the coefficient on lagged leverage. Table 1 provides variable definitions. The *p*-values are based on standard errors that are robust to heteroscedasticity, and arbitrary patterns of autocorrelation within firms are reported beneath the coefficient estimates. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Institutional Feature	LEGAL_ ORIGIN 1	SHAREHOLDER_ PROTECTION 2	CREDITOR_ PROTECTION 3	BANKRUPTCY_ PROCEDURES 4	INTERNAL_ GOVERNANCE 5	EXTERNAL_ GOVERNANCE 6	EQUITY_INFORMATION_ SHARING 7	DEBT_INFORMATION_ SHARING 8
Panel A. Historically Determined Exogenous Component of Institutions Based on Colonial History								
CRISIS × STRONG_INSTITUTION	–0.0428***	–0.0237**	–0.0335***	–0.0604***	–0.0439***	–0.0415***	–0.0498***	–0.0395***
	(0.000)	(0.020)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CRISIS	0.0378***	0.0219**	0.0354***	0.0607***	0.0437***	0.0422***	0.0470***	0.0369***
	(0.000)	(0.027)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STRONG_INSTITUTION	–0.2047	–0.7809	0.0050***	0.0056***	0.0058***	–0.0029***	0.0047***	0.0018**
	(0.999)	(1.000)	(0.000)	(0.000)	(0.000)	(0.010)	(0.000)	(0.042)
LEVERAGE	0.8290***	0.9150***	0.8684***	0.8924***	0.9056***	0.8986***	0.9021***	0.9039***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PROFIT	–0.0285***	0.1774***	–0.0132***	0.0580***	0.0537***	0.0529***	0.0499***	0.0498***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MARKET_TO_BOOK	0.0008	0.0107***	0.0054***	0.0075***	0.0076***	0.0094***	0.0083***	0.0093***
	(0.176)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DEPRECIATION	–0.2077***	1.0694***	–0.0676***	–0.3134***	–0.3572***	–0.2020***	–0.3732***	–0.3935***
	(0.000)	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.0006	–0.0467**	–0.0022**	–0.0081***	–0.0074***	–0.0089***	–0.0069***	–0.0067***
	(0.626)	(0.014)	(0.016)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TANGIBILITY	0.0262***	–0.4446***	0.0092**	–0.0022	0.0012	–0.0119**	0.0056	0.0086
	(0.001)	(0.000)	(0.017)	(0.668)	(0.829)	(0.036)	(0.306)	(0.157)
R&D_DUMMY	–0.0096***	–0.0197	–0.0163***	–0.0332***	–0.0329***	–0.0215***	–0.0302***	–0.0284***
	(0.000)	(0.234)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R&D_EXPENSES	0.0120	1.3437***	0.1611***	0.4481***	0.4262***	0.3543***	0.4231***	0.4087***
	(0.613)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

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TABLE 4 (continued)

Indirect Capital Supply Effects of Systemic Banking Crises on Leverage: The Impact of the Institutional Environment

Institutional Feature	LEGAL_ ORIGIN 1	SHAREHOLDER_ PROTECTION 2	CREDITOR_ PROTECTION 3	BANKRUPTCY_ PROCEDURES 4	INTERNAL_ GOVERNANCE 5	EXTERNAL_ GOVERNANCE 6	EQUITY_INFORMATION_ SHARING 7	DEBT_INFORMATION_ SHARING 8
Panel A. Historically Determined Exogenous Component of Institutions Based on Colonial History (continued)								
MEDIAN_INDUSTRY_LEVERAGE	−0.0506	2.7791***	0.1087***	0.0845***	0.0857***	0.0893***	0.0891***	0.0846***
	(0.274)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	−0.0010**	0.0149	0.0047***	−0.0038***	−0.0028***	−0.0030***	−0.0033***	−0.0029***
	(0.019)	(0.683)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	−0.0922***	−0.1763***	−0.0515***	−0.1184***	−0.0793***	−0.0861***	−0.0644***	−0.0595***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.2441	0.6017	0.0047**	0.0149***	0.0120***	0.0126***	0.0105***	0.0117***
	(0.999)	(1.000)	(0.015)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	356,813	319,379	355,126	334,624	307,008	305,722	320,598	321,075
Crisis effect: Poor institutions	0.2221***	0.2576**	0.2690***	0.5641***	0.4629***	0.4162***	0.4801***	0.3840***
Crisis effect: Strong institutions	−0.0292***	−0.0212	0.0144*	0.0028	−0.0021	0.0069	−0.0286**	−0.0271*
Crisis effect: All institutions	0.1918***	0.2365**	0.2834***	0.5669***	0.4608***	0.4231***	0.4515***	0.3569***
Panel B. Exogenous Variations in Institution Building Based on Colonial History, Geographical Endowment, and Natural Resource Reliance as Instruments for Institutions								
CRISIS × STRONG_INSTITUTION	−0.0357***	−0.0320***	−0.0302***	−0.0732***	−0.0386***	−0.0556***	−0.0480***	−0.0321***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CRISIS	0.0312***	0.0315***	0.0333***	0.0742***	0.0398***	0.0573***	0.0466***	0.0311***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STRONG_INSTITUTION	−0.0533***	0.0003	0.0016	0.0032**	−0.0039**	−0.0028***	0.0015	−0.0000
	(0.000)	(0.813)	(0.132)	(0.018)	(0.047)	(0.002)	(0.335)	(0.911)
LEVERAGE	0.8314***	0.8924***	0.8633***	0.8802***	0.9062***	0.8880***	0.8943***	0.8874***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PROFIT	−0.0258***	0.0325***	−0.0149***	0.0323***	0.0568***	0.0427***	0.0321***	0.0213**
	(0.000)	(0.006)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.034)

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TABLE 4 (continued)

Indirect Capital Supply Effects of Systemic Banking Crises on Leverage: The Impact of the Institutional Environment

Institutional Feature	LEGAL_ ORIGIN 1	SHAREHOLDER_ PROTECTION 2	CREDITOR_ PROTECTION 3	BANKRUPTCY_ PROCEDURES 4	INTERNAL_ GOVERNANCE 5	EXTERNAL_ GOVERNANCE 6	EQUITY_INFORMATION_ SHARING 7	DEBT_INFORMATION_ SHARING 8
Panel B. Exogenous Variations in Institution Building Based on Colonial History, Geographical Endowment, and Natural Resource Reliance as Instruments for Institutions (continued)								
MARKET_TO_BOOK	0.0017***	0.0130***	0.0037***	0.0090***	0.0085***	0.0126***	0.0096***	0.0119***
	(0.009)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DEPRECIATION	–0.1880***	–0.0738	–0.0432*	–0.2097***	–0.1856***	–0.0232	–0.2188***	–0.2779***
	(0.000)	(0.184)	(0.081)	(0.000)	(0.002)	(0.685)	(0.000)	(0.000)
SIZE	0.0015	–0.0033	0.0020**	–0.0011	–0.0032	0.0004	–0.0013	0.0010
	(0.226)	(0.134)	(0.034)	(0.552)	(0.125)	(0.877)	(0.510)	(0.613)
TANGIBILITY	0.0290***	–0.0161**	–0.0023	–0.0159***	–0.0220***	–0.0256***	–0.0135**	0.0080
	(0.000)	(0.015)	(0.575)	(0.006)	(0.001)	(0.000)	(0.040)	(0.277)
R&D_DUMMY	–0.0090***	–0.0122***	–0.0139***	–0.0279***	–0.0213***	–0.0128***	–0.0188***	–0.0179***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R&D_EXPENSES	0.0143	0.0750	0.0604***	0.1864***	0.2990***	0.1460**	0.1775***	0.1705***
	(0.546)	(0.249)	(0.004)	(0.000)	(0.000)	(0.039)	(0.006)	(0.007)
MEDIAN_INDUSTRY_LEVERAGE	–0.0164	0.1225***	0.1110***	0.1134***	0.0985***	0.1077***	0.0997***	0.1026***
	(0.721)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFLATION	–0.0012***	0.0185*	0.0026**	–0.0044***	–0.0030***	–0.0036***	–0.0034***	–0.0028***
	(0.004)	(0.099)	(0.020)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_GROWTH	–0.1062***	–0.1002***	–0.0618***	–0.1138***	–0.0844***	–0.0949***	–0.0680***	–0.0784***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.0549***	–0.0032	0.0109***	0.0138***	0.0127***	–0.0061	0.0098***	0.0074**
	(0.000)	(0.366)	(0.000)	(0.000)	(0.003)	(0.157)	(0.006)	(0.022)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	329,786	319,379	355,126	334,624	307,008	305,722	320,598	321,075

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better external governance and more information sharing in debt markets, whereas leverage goes up by 41.6 and 38.4 percentage points during systemic banking crises in poor institutional environments.

Deteriorating economic conditions may undermine the quality of institutions, or alternatively, countries may be better able to advance their institutional infrastructure under better economic conditions. I address potential time-series endogeneity of institution building with respect to economic conditions in Panel B where I use history of colonial experience, geographical endowment, and natural resource reliance to extract the exogenous component of institution building. I use the predicted values of institution building as additional instruments for the institutional quality (e.g., Beck and Laeven (2006)). As previously done, I obtain institution building instruments by regressing institutional development, executive constraints, or ethnic fragmentation on log settler mortality, a dummy variable for landlocked countries, and log wheat–sugar ratio. The results show that countries that inherited poor institutions and that were slow to transition to market-compatible institutions had stronger countercyclical leverage dynamics and confirm that the role of institutions in the crisis-leverage relationship is not driven by reverse causation or simultaneity bias. In unreported analyses, I also control for the country-level time-varying capital supply variables in the regressions and obtain similar conclusions.

While it is less clear to what extent these results reflect demand or supply effects in leverage changes over the globe, in conjunction with the prominent role of institutions in the occurrence, intensity, and outcome of systemic banking crises documented earlier (Section IV.B), the results seem to indicate that selected institutions have indirect but important supply effects on leverage.

Overall, leverage is more countercyclical in countries with poor governance and institutions that are less protective of the providers of capital, whereas it is procyclical in countries with better legal systems and information sharing in the capital markets.

D. Uncertainty, Systemic Banking Crises, Institutions, and Leverage

To better understand why systemic banking crises influence leverage, I test how crises affect leverage behavior differently based on variations in uncertainty. First, I establish a relationship between country institutional features and measures of uncertainty. Next, I examine how uncertainty affects the crisis–leverage association. Considering the jump in uncertainty that has triggered academic and policy attention to the topic during the recent global financial crisis, I evaluate uncertainty as a potential economic channel behind the crisis–leverage relation.

Financial markets become more volatile under uncertainty (e.g., Boutchkova et al. (2012)). I postulate that poor institutions are likely to be associated with less diversified economies, with greater fluctuations in the prices of financial assets, more domestic political shocks, and less effective fiscal and monetary stabilization policies, leading to higher uncertainty (Bloom (2014)).

Table 5 presents evidence linking institutional quality with uncertainty. Country uncertainty is higher in the portfolios with weaker institutional features. Specifically, firms in civil law–origin countries are exposed to 0.59-percentage-point

TABLE 5

The Impact of the Institutional Environment on Uncertainty

Table 5 reports the impact of the institutional environment on uncertainty. Countries are allocated into portfolios based on legal origin (common or civil) and the sample median of the remaining institutional indices; pairwise comparisons of the mean uncertainty (COUNTRY_UNCERTAINTY) of the 2 portfolios are then conducted with *t*-tests during the sample period 1987–2017. Table 1 provides variable definitions. *** indicates significance at the 1% level.

Institutional Quality Measures	Institutional Quality Group	Uncertainty	Absolute Difference (Poor–Strong)	Relative Difference (Poor/Strong–1)
LEGAL_ORIGIN	Civil	0.0483***	0.0059***	0.1392***
	Common	0.0424		
SHAREHOLDER_PROTECTION	Poor	0.0504***	0.0059***	0.1326***
	Strong	0.0445		
CREDITOR_PROTECTION	Poor	0.0470***	0.0054***	0.1298***
	Strong	0.0416		
BANKRUPTCY_PROCEDURES	Poor	0.0475***	0.0042***	0.0970***
	Strong	0.0433		
INTERNAL_GOVERNANCE	Poor	0.0540***	0.0132***	0.3235***
	Strong	0.0408		
EXTERNAL_GOVERNANCE	Poor	0.0559***	0.0149***	0.3634***
	Strong	0.0410		
EQUITY_INFORMATION_SHARING	Poor	0.0560***	0.0155***	0.3827***
	Strong	0.0405		
DEBT_INFORMATION_SHARING	Poor	0.0518***	0.0083***	0.1908***
	Strong	0.0435		

higher uncertainty compared to common law–origin countries (4.83% versus 4.24%), representing a 13.92% jump in the level of uncertainty. Moreover, firms in countries with weaker creditor and shareholder protection (12.98% and 13.26%), less efficient bankruptcy procedures (9.70%), weaker internal and external governance (32.35% and 36.34%), and poor debt and equity information sharing (19.08% and 38.27%) are subject to more elevated uncertainty. Thus, differences in institutional quality highly correlate with differences in the level of uncertainty around the world.

How do the fluctuations in uncertainty during systemic banking crises affect firms' financing? The risk aversion and risk premia arguments suggest that greater uncertainty leads to increasing risk aversion and premia, raising external financing costs (e.g., Francis et al. (2014), Brogaard and Detzel (2015)). I predict stronger countercyclical effects during crises that coincide with more uncertainty due to greater declines in information-sensitive supply of capital.

Table 6 evaluates the impact of uncertainty on the effects of systemic banking crises on leverage using various measures of uncertainty. Systemic banking crises continue to have a significantly positive impact on leverage, suggesting countercyclical leverage dynamics with an economic magnitude ranging from 4 to 19 percentage points. More importantly, regardless of the uncertainty measure used, CRISIS × HIGH_UNCERTAINTY carries a positive and significant coefficient, suggesting that the impact of the systemic banking crisis on leverage is stronger under higher uncertainty. Using COUNTRY_UNCERTAINTY, while the systemic banking crisis results in an up to 2.6-percentage-point increase in leverage under low uncertainty, the corresponding increase is by 4.2 percentage points under high uncertainty. Similarly, using elections, the crisis effect is not significant under low uncertainty, but there is a significant increase in leverage with

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TABLE 6

The Impact of Uncertainty on the Effects of the Systemic Banking Crises on Leverage

In Table 6, capital structure estimations of equation (3) are conducted for leverage using Blundell and Bond's (1998) 2-step SGMM during the sample period 1987–2017. HIGH_UNCERTAINTY denotes above median values of uncertainty (COUNTRY_UNCERTAINTY) and the election years (ELECTION = 1, ELECTION_APPROACHING = 1). The economic impact of the coefficient estimates of interest is calculated as the raw coefficient estimate divided by 1 minus the coefficient on lagged leverage. Table 1 provides variable definitions. The *p*-values are based on standard errors that are robust to heteroscedasticity, and arbitrary patterns of autocorrelation within firms are reported beneath the coefficient estimates. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Uncertainty Measures	COUNTRY_UNCERTAINTY	ELECTION	ELECTION_APPROACHING
CRISIS × HIGH_UNCERTAINTY	0.0029**	0.0307***	0.0098***
	(0.050)	(0.000)	(0.000)
CRISIS	0.0045**	0.0016	–0.0011
	(0.012)	(0.151)	(0.364)
HIGH_UNCERTAINTY	–0.0042***	–0.0071***	–0.0014**
	(0.000)	(0.000)	(0.014)
LEVERAGE	0.8242***	0.8226***	0.8191***
	(0.000)	(0.000)	(0.000)
PROFIT	–0.0286***	–0.0188***	–0.0197***
	(0.000)	(0.000)	(0.000)
MARKET_TO_BOOK	0.0016***	0.0029***	0.0031***
	(0.009)	(0.000)	(0.000)
DEPRECIATION	–0.2402***	–0.1966***	–0.2138***
	(0.000)	(0.000)	(0.000)
SIZE	0.0010	0.0017	0.0014
	(0.470)	(0.210)	(0.304)
TANGIBILITY	0.0389***	0.0454***	0.0473***
	(0.000)	(0.000)	(0.000)
R&D_DUMMY	–0.0084***	–0.0103***	–0.0105***
	(0.000)	(0.000)	(0.000)
R&D_EXPENSES	0.0039	0.0187	0.0168
	(0.873)	(0.452)	(0.498)
MEDIAN_INDUSTRY_LEVERAGE	0.0230	0.0591	0.0610
	(0.630)	(0.201)	(0.188)
INFLATION	–0.0004	–0.0026***	–0.0007
	(0.370)	(0.000)	(0.144)
GDP_GROWTH	–0.1444***	–0.1383***	–0.1598***
	(0.000)	(0.000)	(0.000)
Constant	0.2824	0.0182*	0.0198**
	(0.997)	(0.068)	(0.048)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
No. of obs.	356,987	312,662	309,537
Crisis effect under low uncertainty	0.0256**	0.0090	–0.0061
Crisis effect under high uncertainty	0.0421**	0.1821***	0.0481***
Total crisis effect	0.0677***	0.1911***	0.0420***

an economic magnitude ranging from 5 to 18 percentage points under high uncertainty. Thus, regardless of the uncertainty measure chosen, leverage is more countercyclical with elevated uncertainty, confirming that uncertainty is an important channel through which systemic banking crises affect financial leverage.

Table 7 presents robustness analyses for the impact of uncertainty on the effects of systemic banking crises on leverage using the IV approach in columns 1 and 2 and a placebo test in column 3. In the first 2 columns, I use ELECTION and ELECTION_APPROACHING as IVs for COUNTRY_UNCERTAINTY. Elections are considered as plausibly exogenous instruments for news-based measures of uncertainty in many studies (e.g., Julio and Yook (2012), Gulen and Ion (2016), and Bonaime, Gulen, and Ion (2018)). Both specifications pass weak instrument

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TABLE 7

The Impact of Uncertainty on the Effects of the Systemic Banking Crises on Leverage: Robustness

Table 7 presents robustness analyses for the impact of uncertainty on the effects of systemic banking crises on leverage using the instrumental variable (IV) approach in columns 1 and 2 and a placebo test in column 3. ELECTION and ELECTION_APPROACHING are used as IVs for COUNTRY_UNCERTAINTY. Random uncertainty reflects fictitious years of uncertainty occurrences. Table 1 provides variable definitions. The *p*-values are based on standard errors that are robust to heteroscedasticity, and arbitrary patterns of autocorrelation within firms are reported beneath the coefficient estimates. ** and *** indicate significance at the 5% and 1% levels, respectively.

	IVs		Placebo Test
	ELECTION	ELECTION_APPROACHING	Random Uncertainty
Uncertainty Instrument or Random Uncertainty	1	2	3
CRISIS × HIGH_UNCERTAINTY	0.2538***	0.3707***	–0.0100
	(0.000)	(0.003)	(0.135)
CRISIS	–0.1901***	–0.2645***	0.0090**
	(0.000)	(0.003)	(0.011)
HIGH_UNCERTAINTY	–0.0009	–0.1437**	0.0102
	(0.944)	(0.022)	(0.112)
LEVERAGE	0.6510***	0.6511***	0.8388***
	(0.000)	(0.000)	(0.000)
PROFIT	–0.0316***	–0.0411***	–0.0235***
	(0.000)	(0.000)	(0.000)
MARKET_TO_BOOK	–0.0023***	–0.0040***	0.0023***
	(0.000)	(0.000)	(0.000)
DEPRECIATION	–0.0729***	–0.0054	–0.2031***
	(0.005)	(0.889)	(0.000)
SIZE	0.0002	0.0003	0.0010
	(0.734)	(0.728)	(0.442)
TANGIBILITY	0.0335***	0.0056	0.0407***
	(0.000)	(0.663)	(0.000)
R&D_DUMMY	–0.0204***	–0.0121***	–0.0085***
	(0.000)	(0.000)	(0.000)
R&D_EXPENSES	0.0140	0.0033	0.0190
	(0.432)	(0.855)	(0.425)
MEDIAN_INDUSTRY_LEVERAGE	0.0871**	0.0959**	0.0573
	(0.022)	(0.021)	(0.188)
INFLATION	–0.0071***	–0.0117***	–0.0006
	(0.000)	(0.001)	(0.211)
GDP_GROWTH	–0.0494	–0.5648***	–0.1367***
	(0.180)	(0.007)	(0.000)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
No. of obs.	309,549	306,438	357,993

and orthogonality tests. In each case, CRISIS × HIGH_UNCERTAINTY continues to carry a positive and significant coefficient, even after controlling for possible endogeneity of the news-based uncertainty measure. In column 3, I assign random uncertainty years throughout the sample. CRISIS × HIGH_UNCERTAINTY is no longer significant using random uncertainty. Overall, IV analyses and the placebo test collectively provide strong evidence that the results are not likely driven by an endogeneity bias from omitted variables, reverse causality, or measurement error.

These results offer important insights into the economic mechanism driving leverage dynamics by highlighting uncertainty as a viable factor behind the documented effects. Poor institutions are associated with higher uncertainty. Consistent with uncertainty being a relevant channel through which systemic banking crises

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and a country's institutions affect leverage, leverage is more countercyclical when such crises are associated with more uncertainty.

V. Conclusion

Surprisingly, little is known about the role of institutions on the effect of systemic banking crises on corporate financing behavior around the world. This article helps to fill this gap by evaluating leverage behavior of corporate firms globally during systemic banking crises conditional on the institutional environment. Consistent with important supply effects of systemic banking crises, findings indicate that firms in countries with more binding constraints on their capital supply, as measured by the depth of the capital markets, the development of the banking and financial sector, and the availability of private and bank credit, have stronger leverage countercyclicality. Leverage countercyclicality is similarly more pronounced in countries with weaker legal systems, while it is attenuated in countries with better investor protection, governance, and information sharing. The findings imply that systemic banking crises have institutional causes, as countries with poor institutions are more prone to crises, and that elevated uncertainty is a viable factor behind the documented effects. Poor institutions are associated with higher uncertainty and leverage is more countercyclical when crises coincide with more uncertainty in the financial markets. These findings improve our understanding of the effect of systemic banking crises on leverage and the cross-country variation of leverage dynamics during such crises.

Using the historically determined component of institutions and exogenous variations in institution building, the analyses suggest that countries that inherited poor institutions and that had negative repercussions in the development of market-compatible institutions due to ethnic fragmentation, geographical endowment, and natural resource dependence exhibit stronger financial leverage countercyclicality and are more likely to experience systemic banking crises, to poorly manage the crisis episodes, and to suffer more from the crises' financial and real consequences.

The evidence strongly suggests that the overall institutional quality matters in explaining the cross-sectional heterogeneity in leverage cyclicality around the world. However, there is potentially ample overlap among institutions. It is, therefore, difficult to disentangle the separate effects of institutions without additional instruments. Thus, unbundling the broad cluster of institutions to learn more about their distinct dimensions and their relative importance in the context of firm financing decisions caters a promising avenue for future research.

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