INSTITUTIONS AND FINANCIAL CRISES

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Abstract

This paper examines how institutional quality affects the probability of banking and twin crises using a panel of 138 countries from 1996 to 2017. We find that better institutions mitigate the probability of financial distress. Such a shielding effect occurs unambiguously only when a synthetic index is extracted from different proxies of institutional quality aspects. On the contrary, specific measures of institutional quality show some heterogeneities. In particular, dimensions more closely related to regulatory quality and corruption mitigation decrease the probability of financial instability, while measures oriented toward social capital may have null or perverse effects. Financial structure, cultural differences, and international agreements do not affect our findings. Results are robust to several econometric exercises.

JEL Classification: G01, G21, G28.

Keywords: crises, banks, institutions, governance

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1. INTRODUCTION

This paper empirically tests the nexus between institutional quality and financial instability, revealing an overall positive but heterogeneous effect of good institutions on the probability of a financial crisis.

Historically, the economic literature has used institutions as an exogenous variable and found a positive impact on trade, development, and economic growth. In the wake of the financial crises occurring in developing countries in the 1980s and 1990s, scholars have started thinking of institutions as a buffer mechanism against financial distress. The theoretical relationships between institutional quality and financial stability are straightforward: sound financial systems develop in countries with (i) institutions that limit arbitrary actions of the government and rent-seeking activities of interest groups (Calomiris and Haber, 2014), and (ii) legal systems that protect investors, persecute frauds, and enforce effective financial supervision (Demirgüç-Kunt and Detragiache, 1998).

However, while the general intuition of the literature is that institutional quality is beneficial to financial stability, the empirical evidence is much more controversial, and several papers have found perverse or non-significant impacts in both developed and developing countries (Klomp, 2010; Bermpei et al. 2018; Canh et al., 2021). There are two possible explanations for this unexpected outcome. The first is that regardless of the proxy used, measuring institutional quality is complicated, and the mixed evidence results from relatively large measurement errors. The second is that institutional quality is a multi-faceted phenomenon, and each measure captures a different dimension. In this context, measuring the effect of institutional quality is even more complex because proxies are imprecise and overlap.

In line with the literature, we initially assume that institutions are exogenous and provide new evidence on the role of institutional quality as a mitigating factor of financial instability. First, we check the heterogeneity in institutional dimensions and if third factors drive the results

through a spurious relationship. We also study in detail multicollinearity patterns affecting the variables that capture different aspects of institutional quality. Multicollinearity is responsible for ambiguous outcomes, so addressing it is essential to correctly interpret empirical results (Kalnins, 2018, 2022). Second, we employ a Principal Component Analysis (PCA henceforth) to extract the institutional quality factor from different institutional dimension proxies and avoid the side effects of multicollinearity. Finally, we consider institutions endogenous, like in Acemoglu et al. (2001), and employ econometric exercises to control endogeneity empirically.

Our panel data includes 138 countries, and the sample period extends from 1996 to 2017, thus covering the main recent financial turmoils. The empirical analysis reveals that good institutions considerably reduce the probability of financial instability. However, such a shielding effect unambiguously emerges only when we use a synthetic measure of institutional quality to avoid the multicollinearity between different institutional dimensions. On the contrary, when we consider the single aspects of institutional quality, results are heterogeneous, with institutional measures oriented to social capital presenting perverse or no effects. Third factors (i.e. spurious regression) do not drive our results.

The article proceeds as follows. We review the related literature in Section 2. Data and descriptive statistics are reported in Sections 3 and 4, respectively. Section 5 presents the multivariate empirical strategy, and Section 6 our main results. Section 7 provides some robustness checks to test the reliability of our findings. Concluding remarks are in Section 8.

2. LITERATURE REVIEW

The importance of institutions in economics is long-dated and high. In his seminal paper on "The institutional approach to economic theory", Hamilton (1919) argues that institutional economics derives from Smith's account of mercantilism. Economists have typically used institutions to unfold controversial historical patterns. For example, Greif (1992) argued that

the coordination role of merchant guilds originated the commercial revolution of the 11th-14th centuries. Institutions have also been called to explain missing phenomena. For instance, trade-enhancing institutions such as common colonial origins (Acemoglu et al., 2001) or custom unions (Viner, 1950), or regional trade agreements (Grossman and Helpman, 1995) can solve Trefler's (1995) "mystery of missing trade".

More than trade, institutions have long monopolized the debate on economic development. Not only has this literature adopted countries as the preferred unit of analysis because their borders determine where institutions begin and end, but it has also included institutions in the rank of growth determinants by policy implications. The result is that institutions promote much more growth than integration and geography (Rodrik et al., 2004) but a bit less than human capital and good policies (Glaeser et al., 2004). In updating the Kaldor facts, Jones and Romer (2010) shortlisted institutions as an element to include in the next growth models, thus definitely recognizing their essential role in economics.

More recently, institutional quality has also received attention in financial economics because of its mitigating effect on financial instability. This strand of research has long investigated the predictors of banking crises and the characteristics shielding countries from financial turmoil. As main determining factors, most of the studies have identified macroeconomic and monetary elements (Demirguc-Kunt and Detragiache, 1998; Kumhof et al., 2015; Cecchetti et al., 2017; Cesa-Bianchi et al., 2018), the financial micro-structure (Copelovitch and Singer, 2017; Martín-Oliver et al., 2017), and the regulatory and supervisory framework (Barth et al., 2004; Kaminsky and Schmukler, 2008; Levine, 2012). In this setting, institutions are thought to directly affect financial stability and indirectly promote a stabler financial system by interacting with the other determining factors. In theory, countries develop sound banking systems when political institutions limit the arbitrary actions of the parties controlling the government and the rent-seeking activities of interest groups and lobbies. This

occurs because good institutions reduce risk-taking by mitigating bank credit misallocation (Calomiris and Haber, 2014). Anecdotal cross-country evidence also supports the idea that institutional quality promotes financial stability. For instance, Canada and Italy are economically similar (e.g. both G7 countries), but institutionally different (e.g. common law vs civil law). During both the Great Depression of the 1930s and the Great Recession of 2008-2009, Italy faced large banking crises, while Canada did not experience banking instability.[1]

While the causal nexus between institutional quality and financial stability is straightforward, the empirical evidence is ambiguous. Several papers showed that good institutions play an essential role in diminishing financial risk. Demirgüç-Kunt and Detragiache (1998) find that banking crises are more likely in countries with less effective legal systems, i.e. countries where frauds or violations of contractual covenants, corporate charters, and prudential regulation tend to go unpunished. Also, advanced institutions improve the outcome of financial reforms (Delis, 2012) and mitigate the impact of banking crises on the economy (Furceri and Zdzienicka, 2012). For instance, post-liberalization banking crises are less frequent where the institutional environment is stronger (Demirguc-Kunt and Detragiache, 1998). Copelovitch and Singer (2017) show that the 1980s and 1990s liberalization benefited only countries with mature regulatory institutions. At the same time, in the aftermath of a crisis episode, the fiscal position of countries with less developed institutions deteriorates more than that of economies with a higher quality of institutions (Furceri and Zdzienicka, 2012). Finally, better institutions mitigate the adverse impact of economic policy uncertainty on bank stability (Shabir et al., 2021).

[1] Canada and Italy are members of large regional agreements (i.e. NAFTA-USMCA and EU), are the main partner/competitor of the regional leader country (i.e. US and Germany), and according to the World Bank data, are comparable in term of GDP (i.e. 1.85tn and 2.08tn in 2012). However, Canada has better institutions than Italy in terms of control of corruption (1.93 vs 0.06 respectively in 2012), political stability (1.11 vs 0.51), regulatory quality (1.71 vs 0.75), rule of law (1.76 vs 0.40), government effectiveness (1.76 vs 0.42) and voice and accountability (1.44 vs 0.92). See World Bank dataset.

Although the general conclusion of the literature is that institutional quality is beneficial to stability, a number of recent papers has shown opposite or non-significant results. For instance, Klomp (2010) finds that neither political institutions nor the quality of legal systems significantly impact the stability of banking sectors worldwide. The latter variable seems to influence financial stability only in developing countries. Moreover, better institutions might offset the benefits and effectiveness of policies aimed at maintaining financial stability. For instance, Van Duuren et al. (2020) claim that communication about financial stability by central banks (so-called financial stability transparency) is effective only in countries with low institutional quality. Also, some regulatory instruments may be impaired by excessively high institutional quality. Bermpei et al. (2018) show that while institutional quality should intuitively be positively related to the implementation capacity of regulators, in some cases, it has a substitution effect with bank regulations and supervision. The authors find a non-uniform impact of institutional quality on the relationship between bank regulation and stability. On the one hand, political stability and control of corruption amplify the benefits of bank regulation on stability. On the other hand, institutional dimensions correlated with the propensity to repay loans (i.e. strong creditor rights and rule of law), weaken the positive effect of capital regulation and private monitoring on bank stability.

Results are inconclusive even when the analysis moves to emerging economies that, in theory, should benefit the most from an investment in institutional quality. For instance, Nguyen and Ha (2021) find that better institutional quality improves financial inclusion in ASEAN (Association of South-East Asian Nations) countries. Financial inclusion promotes better risk-sharing that, in turn, makes the financial system more resilient (Michie, 2011). Similarly, Rachdi et al. (2018) show that good institutions and governance practices reduce banking crises in Middle Eastern and African countries and promote financial development in developing ones, respectively. However, more recent papers contrast with these findings. Canh

et al. (2021) document that better institutions cause higher default and credit risks in low-income and middle-income countries. In Boulanouara et al. (2021), regulatory quality, government effectiveness, and corruption perception indexes increase the financial stability of the Gulf Cooperation Council banking sector as expected, but the rule of law has a perverse effect.

In brief, empirical evidence is mixed and has not fully disentangled whether some dimensions of institutional quality are more important than others.

3. DATA

Our final balanced panel consists of 3,608 observations (down from 4,818 in the original unbalanced sample) covering 138 countries from 1996 to 2017. This two-decade period covers the three most recent financial crises: the 2000-2001 dot.com crisis, the 2007-2008 subprime crisis, and the 2010-2011 sovereign debt crisis. The starting point is determined to exclude the currency crises in emerging countries during the 80s and the first half of the 90s because these episodes were highly concentrated in specific regions, where they combined with other issues. They could bias our results. The selected endpoint of the period circumvents the negative consequences of the US trade conflict with China, the disruptions caused by the Covid-19 pandemic, and the indirect consequences of the ongoing Ukraine-Russia war. Due to their non-financial nature, these shocks are more susceptible to external factors like geopolitical tensions than internal ones like institutional quality, thus potentially leading to empirical identification problems (e.g. spurious regression). Data availability (particularly for the control variables used in the regressions) limits the countries included in our sample. Since less developed countries are more frequently subject to missing data, a selection bias could still affect our longitudinal data through the cross-sectional dimension. However, our number of countries aligns with the

samples used in the main literature and all non-included countries are geographically small, economically marginal, and demographically irrelevant.

We collect data from different sources. Data on banking crises come from Laeven and Valencia (2018). These authors define systemic banking crises as events showing "significant signs of financial distress in the banking system" (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations) and "significant banking policy intervention measures in response to significant losses in the banking system" (p.4).[2] A crisis starts the first year in which both criteria are met and ends "the year before both real GDP growth and real credit growth are positive for at least two consecutive years" but "in all cases, the duration of the crisis is truncated at five years from the starting year of the crisis" (p.21-22).[3] This definition excludes individual bank default episodes and identifies precisely systemic banking crises. Laeven and Valencia (2018) provide the most accurate dataset on banking crises (Chaudron and de Haan 2014).[4] Since their cross-country data cover banking, currency, and sovereign debt crises from 1970 to 2017, our analysis ends in 2017 as well.[5]

We create two crisis variables: *BANK_CRISIS*, our main dependent variable, is a dummy equal to one during banking crisis episodes, zero otherwise; *CRISIS* is a dummy that takes value one if a banking crisis, a sovereign debt crisis, or a twin crisis takes place, zero otherwise. We use *CRISIS* as robustness to consider the possibility of a sovereign debt crisis

[2] The second condition is met whenever the government has used three out of the six following measures: (i) deposit freezes and/or bank holidays, (ii) significant bank nationalizations, (iii) bank restructuring gross cost amounting to at least 3% of GDP, (iv) extensive liquidity support amounting to at least 5% of deposits and liabilities to nonresidents, (v) significant guarantees put in place, and (vi) significant asset purchase amounting to at least 5% of GDP (Laeven and Valencia, 2018).

[3] In particular, "when credit data are not available, the end date is determined as the first year before GDP growth is positive for at least two years" (Laeven and Valencia, 2018, p.21).

[4] The main source of banking crisis data is Laeven and Valencia (2018). However as the latter employed the same methodology to update their dataset in 2018, the same conclusion can be translated to the latest release of the dataset.

[5] There are no relevant banking crises in 2018 and 2019 and interventions against the COVID-19 pandemic largely affected banks' risk-taking from 2020 on. So, as mentioned previously, excluding more recent years removes irrelevant or biased observations, thus making our results more (not less) precise.

spilling over into a banking crisis (Beker and Moro, 2016).[6] Our sample includes 219 banking crisis years and 46 sovereign debt episodes from 76 countries. The presence of several countries that have never experienced crises stabilizes the control group that would otherwise consist only of countries that were or will be affected by a crisis. Leveraging on Laeven and Valencia's (2018) extensive dataset, we also include the specific variables used to identify the crises: Deposit insurance (*DINS*), Deposit Freeze or Bank holiday (*DFBH*), Significant Bank Liabilities Guarantees (*SBLG*), Bank restructuring (*BARE*), Nationalizations (NATI), Asset Purchases and Transfers (*APTR*), Recapitalization (*RCAP*) and Peak support (in % of deposits) (*PSDE*). Figure 1 provides a visual representation of the countries included in our sample. The number of crisis years is reported on a grayscale, and countries not included due to the lack of data are in white. The latter mainly consists of irrelevant remote regions. They do not affect our findings.

Mixed empirical results on institutional quality can come from the difficulty of observing the phenomenon (measurement errors) or its multi-faceted nature (multicollinearity). At first, we select six measures of institutional quality from the Worldwide Governance Indicators (WGI, henceforth) database by the World Bank (2019c): Control Corruption (*CC*), Political Stability (*PS*), Rule of Law (*RL*), Voice and Accountability (*VA*), Government Effectiveness (*GE*), and Regulatory Quality (*RQ*). They reflect the perception of citizens, enterprises, and experts about different institutional dimensions. Values range approximately from -2.5 to 2.5. To remove any cross-variable discrepancy, we normalize values between 0 and 1, with higher values corresponding to better governance.[7]

[6] The European sovereign debt crisis unveiled a perverse sovereign-banking feedback loop deriving from the double interconnection between the sovereign and the banking sector: domestic banks hold a considerable part of the national sovereign debt and the fiscal cost of government rescuing plans are huge due to the large size of the national banking sectors. If financial turbulences question the sovereign solvency, the distress affects the balance sheets of the creditor banks; see Fratianni and Marchionne (2017).

[7] Given the observable variable x between -2.5 and 2.5, the normalized variable is $x'_i = \frac{(x_i - \min x)}{(\max x - \min x)}$.

Under the assumption that the six institutional variables are imprecise measures of the same phenomenon, every proxy shows a similar statistically significant impact because they replace each other. However, measurement errors produce larger residuals that lower R^2. If all proxies are jointly added to the specification to improve fitness, they lose significance because of high multicollinearity. In this case, a synthetic index of these proxies improves accuracy and precision, but it does not permit the identification of the underlying mechanisms at work.

If institutional quality is a multi-faceted phenomenon, different institutional measures could capture distinct dimensions. While we generally expect that institutional quality improves with sounder financial systems, some heterogeneities among the dimensions may be at work and generate discrepancies. When multiple proxies of one variable are jointly added to the same specification, they tend to capture similar information. This overlapping de-emphasizes the statistical relevance of the common component of institutional quality in favor of its specific dimensions. Statistically, R^2 increases even if each coefficient becomes less significant due to the dominance of the common component over the specific dimension. This approach is inefficient, but it lets us disentangle the different impacts of institutional dimensions and unveil potential heterogeneous mechanisms at work.

Since there is no direct test to identify the underlying model, we prefer to extract the common factor from the six institutional dimensions statistically. This approach isolates the common institutional quality from other elements, avoids multicollinearity issues arising from using multiple proxies of the same variable, and allows for managing measurement errors econometrically. We first simultaneously include all six institutional dimensions in our main specification to show the heterogeneity. Then, since they tend to be multicollinear, we replace them with a synthetic index obtained from a Principal Component Analysis (PCA henceforth) to capture the overall effect of an indirectly observed institutional quality on financial instability. By identifying orthogonal components, this method maintains only significant

dimensions (one in our case), thus removing multicollinearity. Unlike the average, the median, or other synthetic measures, this index isolates and extracts the common information in the overlapping institutional dimensions and leaves variability in the error term, thus allowing a statistical treatment of measurement errors during the estimates.

The WGI institutional variables by World Bank (2019c) cover many countries for a long period, but they could not be fully suited for our empirical analysis. They suffer from "(i) deficient institutional quality indicators; (ii) problems stemming from endogenous variables [with the level of economic development and income distribution]; (iii) collinearity among the potentially explanatory variables preventing them from being considered independent factors and (iv) the possible presence of omitted variables that can bias the parameters estimated" (Alonso and Garcimartin 2013, p.207). So, we also select eight other measures of institutional quality from the International Country Risk Guide (*ICRG*) Historical Database by the PRS Group (2020): Socioeconomic Conditions (*SC*), Investment Profile (*IP*), Internal Conflict (*IC*), Corruption (*CO*), Military in Politics (*MP*), Law and Order (*LO*), Democratic Accountability (*DA*), and Bureaucracy Quality (*BQ*). We create another synthetic institutional index applying the same methodology to ICRG variables.[8] Further, for additional comparison, we also collect a synthetic *ICRG* indicator built using different criteria included in the QoG Database (2024).

The World Bank is the source for macroeconomic and banking sector variables. We use per-capita income *GDPpc* as a proxy for economic development, Consumer Price Index growth rate *INF* as a measure of inflation, and current account balance to GDP ratio *CAB* as a country competitiveness index. These data come from the World Development Indicators database (World Bank, 2019b). Our proxy for bank concentration is the assets share of the five largest banks, *TOP5*. The measure for the size of the banking sector, *BAS*, is the ratio of deposit money bank assets over GDP. The last two variables come from the Global Financial Development

[8] To remove any cross-variable discrepancy, we again normalize values between 0 and 1.

database (World Bank, 2019a). Data are available for all the countries, but smaller ones show many missing values.

We account for the specificity of Europe and the Great Financial Crisis (GFC henceforth) through four dummies. *EU* and *EURO* take values one if the country is a member of the EU or the Eurozone, respectively, thus reflecting the year of the formal affiliation to the European (Monetary) Union. The third variable, *PERIOD*, is equal to one from 2009 onward. It represents a structural break dummy, not a proxy for the great financial crisis. Finally, we include a proxy variable for contagion (*CONTAGION*), a dummy equal to 1 when another country in the same region is affected by a crisis.

Also, regulation affects the probability of a banking crisis. We use the Financial Freedom Index (*FFI*) by Heritage Foundation (2019) as an inverted proxy for regulation. The index has been published since 1995 and is available for 180 countries. The overall score ranges from 0 to 100: the higher the score, the freer the financial sector.

Finally, we include country-specific cultural variables from La Porta et al.'s (1999) database: the country's legal origin dummy *ENGLISH* takes value one if the country adopts a common law system, zero otherwise, whereas *MUSLIM*, the percentage of Muslim citizens in the overall population in 1980, captures the cultural distance.[9] We use these variables in the robustness analysis, where we also utilize Settler Mortality rate *SMRT* from Quality of Government Dataset (2024) by the University of Gothenburg, and Latitude (*LATI*) and Longitude (*LONG*). Table A.1 in Appendix A lists variable definitions and sources.

[9] We group legal frameworks other than the common law system to reduce the number of dummy regressors, increase the probability of convergence in our regressions, and improve the efficiency of the estimates. We use *MUSLIM* as a proxy of cultural distance for three reasons. The first is that Islamic culture is strongly based on traditions. It implies that Islam is resilient to the process of globalization affecting other cultures and it is a better candidate to capture *within* country heterogeneity. The second is that the cultural distance between Islam and other religions is higher than the differences among other religions. The third is that using the percentage of citizens in place of a dummy variable is a more precise measure of the cultural distance within a country.

4. DESCRIPTIVE STATISTICS

Table 1 reports descriptive statistics. The top panel shows bank crises, our dependent variable, and the sub-components used to identify them. We collect macroeconomic, regulatory, cultural, and dummy variables used as controls in the central panel. On the bottom, we report institutional variables by World Bank and ICRG, our variables of interest. Banking crisis episodes represent 6.1 percent of the observations and the variable *CRISIS* is 0.9 percentage points higher.[10] It confirms a strict correlation between banking and sovereign debt crises. On the other hand, our six WGI dimensions of institutional quality by World Bank show similar statistics, thus suggesting an information overlap and redundancy. Unexpectedly, their volatility is slightly higher than that of ICRG variables (on average 0.212 vs 0.207 for the variance and 0.405 vs 0.40 for the coefficient of variation). It suggests smaller measurement errors and qualifies ICRG variables for robustness analysis even if the number of observations drops to 3,017 (from 3,813). Table B.1 in Appendix B exhibits the correlation matrix among all the predictors of banking crises.

[Insert here Table 1]

Table 2 reports the correlation matrix among all institutional quality variables to check for potential collinearity. As expected, WGI institutional variables by World Bank are highly cross-correlated, ranging from 0.655 to 0.940 (top left). It could raise empirical issues, so we investigate multicollinearity in detail in Appendix C. We find that it marginally affects estimates.[11] On the other hand, institutional quality variables obtained from the PRS Group (2020) database and QoG (2024) show a lower cross-correlation (bottom right) compared to the six World Bank components (on average, 0.316 vs 0.895).

[10] The value, 6.65%, is rounded to 7% in Table 1.

[11] Multicollinearity inflates the variance of the estimates and leads to erroneous inference (Chandrasekhar et al. 2016). It typically produces implausible large values and/or unexpected wrong signs for the estimated parameters, high R^2 also in the presence of statistically insignificant coefficients, and high sensitivity of results to small changes in the data.

[Insert here Table 2]

Table 3 presents the results from univariate analysis across different sub-samples. To better analyze our data, we create four country-period sub-samples combining *EU* and *PERIOD*: pre-crisis non-EU, pre-crisis EU, post-crisis non-EU, and post-crisis EU countries. One-sample mean-comparison (and Wilcoxon rank-sum) tests compare variable means (and medians) between EU and extra-EU countries during the pre-crisis period in Panel A (columns 1-2 vs 3-4) and crisis period in panel B (columns 5-6 vs 7-8), and between pre- and crisis period within the EU in Panel C (columns 3-4 vs 7-8). Although banking concentration (*TOP5*) is similar, EU countries have better institutions and a lower level of financial regulation (higher *FFI*) than non-EU countries in both periods; see Panel A and B. Panel C reveals that the structural break caused by the GFC is more intense in the rest of the world than in the EU: *FFI* is not statistically different across periods in the EU whereas, after 2009, the *FFI* mean lowers in non-EU countries more than other regions due to a larger increase in regulation (statistical significance not reported). The average banking sector-to-GDP ratio (*BAS*) has increased after 2009 in both sub-samples for two reasons. The first is a larger GDP fall than the collapse of the banking sector. The second is the implicit mutual protection pact regime between the sovereign and the banking sector: banks increase their asset size by buying government securities because they receive government protection against default (Fratianni and Marchionne, 2017).

[Insert here Table 3]

5. EMPIRICAL STRATEGY

In line with the discussion in the previous sections, we investigate whether better institutions translate into a sounder financial sector in a multivariate empirical framework similar to Barth et al. (2001) and Marchionne et al. (2022). To test our hypothesis, we estimate the following equation:

$$CRISIS_{i,t} = f\left(\alpha + \gamma INST_{i,t} + \partial Controls_{i,t-1} + \varepsilon_{i,t}\right) \qquad (1)$$

where *f(.)* is a (Probit) transformation function, and ε is an error term. We recall that the dependent variable is a dummy that takes value one during banking crises, zero otherwise. On the right-hand side, *INST*, the vector of our variables of interest, consists of the six WGI institutional dimensions by the World Bank (2019c) previously mentioned and captures the country-specific quality of institutions.[12] We also add to the specification a set of one-year lagged macroeconomics variables, *Controls*, including per-capita income in current US dollars (*GDPpc*) as a standard measure of development and performance of the economy, the level of financial regulation (*FFI*), the concentration in the banking sector (*TOP5*), a dummy for the membership to the European Union (or Eurozone) (*EU* or *EURO*), and a dummy for the post-Great Financial Crisis period (*PERIOD*). We further expand *Controls* with (a) proxies of economic risk and international competitiveness (*INF* and *CAB*) to control for macroeconomic issues, (b) the size of the banking sector (*BAS*) to control for the bank dependence of the economy, and (c) cultural factors (*ENGLISH* and *MUSLIM*) to consider other potential determinants of a crisis. All such variables are commonly used as predictors of financial crises.

We expect a higher income (*GDPpc*) to increase the probability of a crisis for two reasons. The first is that developing countries do not save enough to develop complex financial markets and, hence, they are subject to fewer and/or less intense crises. This is in line with the evidence from the GFC that directly affected the US and the EU, indirectly Asian and Latin American countries, and only marginally the financially less developed regions of the world such as Africa. The second reason is technical. As per-capita income falls during a crisis and increases after the shock, one-year lagged income captures this negative serial correlation, translating into a positive correlation between a banking crisis and the previous year's income.

[12] We opt for the World Bank data because of their broader coverage. We will use ICRG data as robustness.

Regarding sector-specific variables, the traditional charter value paradigm suggests that banking concentration improves financial stability because it guarantees a rent to incumbent banks, increases their charter value, and reduces incentives to risk-taking (Keeley 1990). According to this theory, a less competitive sector increases the bank charter values, leading banks to limit risk-taking to avoid failure and enjoy high profits (OECD, 2011). Consequently, banking concentration (*TOP5*) should reduce the probability of a crisis.

We enter financial regulation (*FFI*) into equation (1) in a linear and quadratic form to capture the non-linearities between regulation and stability, in line with previous contributions in the financial literature (Kaminsky and Schmukler, 2008; Angkinand et al., 2010; Hamdaoui et al. 2016; Marchionne et al., 2022). The empirical literature also finds greater financial instability in Europe after the collapse of Lehman Brothers (September 2008) than in other regions and periods (Fratianni and Marchionne, 2009). Hence, *EU* and *EURO* dummies should positively affect *CRISIS,* and we should observe a structural break in 2009.

Finally, we expect financial fragility to increase with higher inflation (*INF*) and lower trade competitiveness (*CAB*). A high inflation rate indicates a mismanagement of macroeconomic policy (Demirguc-Kunt and Detragiache, 1998). Deficits in the trade balance signal a deteriorated competitiveness that, in turn, may lead to a sovereign debt crisis. Beker and Moro (2016) provide evidence of this effect on the EU.[13] Note that the implicit government subsidy and/or guarantee provided to oversized banking sectors should create moral hazard problems and increase bank risk-taking. Hence, the larger the share of the banking sector in the economy, the higher the probability of a crisis (Fratianni and Marchionne, 2017).

Moving to our variables of interest, better institutions could improve financial soundness because superior governance ensures a more efficient monitoring of the financial sector and a cheaper resolution of crisis episodes. Moreover, countries where institutions are

[13] See Section 4 for a discussion on the possibility of a sovereign debt crisis spilling over to a banking one.

better equipped to face the inherent conflict of interests between the government and the banking sectors achieve greater bank stability (Calomiris and Haber, 2014). For instance, higher institutional quality may reflect liberal democracies, the latter being more prone to develop a sound banking sector than autocracies and populist democracies. Consistently with this, our main hypothesis is $\gamma<0$, i.e. against recent findings and in line with the traditional literature.

Since the six WGI institutional variables by the World Bank (2019c) are related to specific aspects of institutions, some heterogeneity may be in place. Our secondary hypothesis is that the impact of institutional variables capturing regulatory aspects is larger than the effect related to other generic features. For example, *RQ* or *CC*, two dimensions associated with the quality of political and regulatory institutions, will probably affect the probability of a crisis more than *RL*, a dimension more linked to the generic concept of social capital. As a counterfactual, in the robustness, we check if the impact of institutional quality is independent of other persistent or pervasive factors. In other words, we do not want our results to arise from a spurious relationship in which third factors such as financial structure, cultural difference, or international agreements simultaneously drive the probability of a crisis and the institutional quality. We expect a direct causal link from the former to the latter.

When dealing with a binary dependent variable, a number of econometric issues arise. Due to the incidental parameter problem, the Probit fixed-effects estimator is severely biased with a limited time dimension.[14] Furthermore, a Logit fixed-effects model, although viable, omits countries never affected by a crisis. The selection would create a bias because the observations used in the estimates are not randomly sampled. A Probit random-effects model does not suffer from these shortcomings, but the assumption of country effects uncorrelated

[14] The incidental parameters problem can occur in non-linear models which do not have the property of being unbiased estimators. As the ratio of the number of observations to number of parameters increases, the parameter estimates will converge onto their true values as standard errors become arbitrarily small. With fixed effects, this does not happen because the number of parameters grows with the number of observations. Monte Carlo exercises show that the resulting estimator remains biased even with 20 periods (Greene, 2004).

with the independent variables is incompatible with our dataset. Panel alternatives are the *Correlated Random Effects Model* (*CREM*) that extends the Chamberlain-Mundlak approach (Wooldridge, 2010), and a linear probability model that, although inferior to pure binary models, allows for including country fixed effects. Overall, we apply a pooled Probit regression as our benchmark model to infer how the quality of institutions affects the probability of a banking crisis, given a set of macroeconomic controls. To handle country-specific omitted variables, we implement a *CREM* and a linear probability model (*OLS fixed effects*), among others, as robustness checks. We also apply the *Instrumental Variable Probit Model (IV-Probit)* estimator to control for potential endogeneity issues.

6. FINDINGS

Table 4 develops our benchmark specification. Observations progressively fall due to attrition problems. Column 1 reports our base specification. It includes the six WGI institutional dimensions by the World Bank, $GDPpc_{t-1}$, $TOP5_{t-1}$, $PERIOD_t$, and EU_t. The last two regressors (i.e. $PERIOD_t$ and EU_t) control for structural breaks and regional differences. We then include FFI_t in its linear (column 2) and squared form (column 3). Finally, since adding fixed or random effects produces biased estimates, we introduce INF_{t-1} and CAB_{t-1} to control potential omitted (macroeconomic) variables (columns 4-6). Given the completeness of the specification, the significance of the coefficients, Pseudo R^2, and other regression statistics, we take column 5 as our benchmark specification. In the last column, we replace *BANK_CRISIS* with *CRISIS* as the dependent variable to check the sensitivity of our findings to the definition of crisis.

The probability of a crisis increases with INF_{t-1} and $GDPpc_{t-1}$: they capture the country investment risk and the positive serial correlation between a banking crisis and the previous year's income, respectively. The beneficial effect of banking concentration ($TOP5_{t-1}$) confirms the charter value paradigm. $PERIOD_t$ is highly significant and negative because, apart from a

short initial period, crisis episodes from 2009 to 2017 are relatively rare and country-specific. Results corroborate the previous evidence of an inverted U-shaped relationship between FFI_{t-1} and the probability of a crisis. Interestingly, EU members are more likely to be affected by a crisis.

[Insert here Table 4]

Moving to our variables of interest, the impact of the six WGI institutional proxies is mixed. Increases in GE_t, RQ_t, CC_t, and PS_t ensure a lower probability of suffering from major financial turmoil as expected, whereas RL_t and VA_t show highly significant positive effects. This result holds once we introduce FFI_t (columns 2-3), control for macroeconomic instability factors (column 4), or both (column 5), and it is also confirmed using *CRISIS* as the dependent variable (column 6).

However, multicollinearity could affect our six WGI institutional variables and undermine estimates (Kalnins, 2018, 2022). Since the multicollinearity analysis is inconclusive (see Table C.1 in Appendix C), we check its impact in Table 5, which presents stepwise regressions starting from our benchmark model (column 5 of Table 4), and adding each institutional quality variable individually. The coefficient signs of institutional variables are stable, but their values are sensitive to the presence of other highly correlated institutional proxies (columns 2 and 4), a result consistent with the borderline multicollinearity found in Appendix C. Referring to a narrower measure of institutional quality, a greater control of corruption (CC_t) and political stability (PS_t) seems to lower the probability of a banking crisis. On the contrary, RL_t and VA_t coefficients remain strongly positive in all the specifications (columns 3-6), in line with the documented perverse effect of a higher rule of law on bank stability (Boulanouara et al., 2021).

[Insert Table 5 here]

This pattern is inconsistent with the assumption of a one-dimensional institutional quality variable reported with measurement errors. Measurement errors can explain the unexpected RL_t coefficient but not the VA_t one. The alternative justification is that institutional quality proxies capture different dimensions as perceived by citizens, enterprises, and experts. Hence, they are noisy measures for institutional quality: CC_t, and PS_t focus on the public institutions as a whole and refer to institutional quality in a narrow sense, whereas RL_t and VA_t measure the quality of the interactions among citizens, a concept similar to social capital. Misperception could be intense for RL_t and VA_t because social interaction measures are related to personal experience more than institutional effectiveness. Also, as individual interactions are limited (e.g. friends), RL_t and VA_t could be biased due to incomplete information. This pattern implies high but not critical multicollinearity.

Misperception could have a much more relevant role in our analysis. It could lead to financial problems in countries or periods with high perceived institutional and social quality. The higher the expected confidence in the rule of society, the larger the moral hazard problems because banks could rely on a stricter rule of law to minimize screening and monitoring costs, thus increasing the probability of a crisis. Mistrulli and Vacca (2015) and Galardo et al. (2019) provide evidence that the rise in the loan spreads and the decline in their approval probability after Lehman's default were less pronounced for firms headquartered in high-social capital Italian provinces, in particular for more opaque and unsecured borrowers. Should financial distress occur, banks could also rely on government help due to the high reputation and large capability of good public institutions. At the same time, a higher perceived rule of law weakens customer incentives to monitor their banks (Bermpei et al., 2018). In addition, a larger social capital might produce narrower social networks and too tight connections between the local banking system and their firms (Battistin et al. 2012), thus distorting credit allocation. This result aligns with previous studies that recognize several side effects of social capital, even

though it is generally associated with positive economic outcomes (Rostila, 2011). The reported positive RL_t and VA_t coefficients could be ascribed to a deadly combination of misperception, expectations, and moral hazard. Consequently, the coefficient interpretation is difficult. Finally, note that GE_t and RQ_t coefficients are negative but statistically insignificant: these variables are probably more related to the effectiveness of government and regulation than institutional quality in the narrow sense, thus capturing other phenomena.

Our empirical approach addresses both the concerns about institutional quality variables raised by the previous analysis, i.e. measurement errors emerged from Table 4 and multicollinearity from Table 5. In particular, there are four typical remedies to (multi)collinearity. Removing the most collinear variables, i.e. RL_t in our case, is common, but: (i) it sweeps the problem under the rug rather than solving it, (ii) it forces to re-specify the model, and (iii) it could omit essential variables to keep marginal ones. The second solution is to average institutional variables into a single index (Langbein and Knack, 2010). The benefit of using an aggregate measure increases with highly correlated variables and decreases with highly correlated errors (Kaufmann et al., 2007). When there is a correlation, researchers usually attribute it entirely to the regressors. However, as measurement errors in institutional proxies could be highly correlated, this approach sounds inappropriate in our case. The last two remedies are more sophisticated. The third, a ridge regression, tweaks the variance-covariance matrix, thus making it invertible. But, it also shrinks coefficients towards zero. Since a Probit transformation exacerbates this bias, estimates would need further correction. Hence, this approach is inconvenient, given our level of multicollinearity. The last remedy, the PCA, removes multicollinearity by reducing the number of institutional dimensions. Its weakness is the economic interpretation of the components, but it is a very effective method.

In this paper, we apply the PCA to avoid multicollinearity collateral effects. We exploit the fact that pair correlations among the six observable WGI institutional proxies are higher

than 0.65 to extract one single factor capturing the unobservable institutional quality. The first component, renamed *ISQU*, easily passes the rule of thumb of an eigenvalue larger than one (5.08) and accounts for almost 85 percent of the variance. Being evenly correlated with all the institutional proxies, *ISQU* is easily interpretable as the unobservable general level of institutional quality. Appendix C provides details about the PCA. Given the ambiguous results of the six WGI institutional quality variables in Tables 4 and 5, we replace them with synthetic index $ISQU_t$ and rerun the estimates in Table 6. Avoiding multicollinearity reduces noise and allows a clearer understanding of the impact of institutional quality on our results. Table 6 presents the estimates using the parsimonious specification with $ISQU_t$, the common component of the six WGI proxies capturing the institutional quality. Its negative coefficient unambiguously suggests that better institutions reduce the probability of a banking crisis. Results become more intense using a more complete specification.

[Insert Table 6 here]

7. ROBUSTNESS ANALYSIS

We run four main robustness exercises to (i) check the sensitivity of our results to different model specifications by adding potentially disturbing control variables (see Table 7 for continuous variables and Table 8 for dummy variables), (ii) use alternative estimators to control for unobservable effects (see Table 9 for fixed-effect linear probability model and Table 10 for Correlated Random Effect Model), (iii) use IV-Probit to address potential endogeneity issues (see Table 11 for the IV estimates), and (iv) test the robustness of our results to continuous indexes of financial instability, our dependent variable, and institutional quality, our variable of interest, obtained from separate PCAs (see Table 12).

Our first exercise on omitted variables tests if our results are due to a spurious regression, thus undermining the actual relevance of institutional quality. In general, financial

structure changes slowly, cultural traditions are persistent, and international agreements are binding. These factors could shape institutions. If this is the case, the estimated effects of institutional quality should weaken when we add these omitted (and possibly related) factors to the specification. For convenience, column 1 of Table 7 reports the benchmark model (column 5 of Table 4). We first include BAS_{t-1} to test whether the size of the domestic banking sector matters and *ENGLISH* and *MUSLIM* to control for potential omitted cultural variables (column 2). Legal origin (*ENGLISH*) and religious composition (*MUSLIM*) are variables widely used in previous papers as cultural determinants of financial development and stability; see La Porta et al. (1999) and Beck et al. (2003). Then, we use *CRISIS* as the dependent variable to check the stability of our results to a broader definition of crisis (columns 3-5). Finally, we substitute EU_t with $EURO_t$ dummy in the parsimonious specification (columns 4 and 5) to determine whether EU issues depend on the common currency.

[Insert here Table 7]

The new control variables are significant except for *ENGLISH*. Legal differences seem captured through institutions or the financial structure, not the other way around. The positive sign of BAS_{t-1} suggests that *ceteris paribus*, banking crises are more likely in countries with a larger banking sector and/or underdeveloped capital markets. In these countries, the banking sector is probably oversized due to an implicit government subsidy/protection that has encouraged bank risk-taking, thus increasing financial fragility. Countries with a substantial Muslim population are financially stabler than others, probably thanks to Islamic commercial law. In all the estimates, FFI_{t-1} and FFI^2_{t-1} coefficients confirm the inverted U-shaped link between financial liberalization and crisis probability. We find again that higher GE_t, RQ_t, CC_t, and PS_t reduce the fragility of the financial system, while the opposite happens for higher values of RL_t and VA_t (columns 1-3). Overall, although GE_t loses some explanatory power compared to previous estimates, the impact of institutional quality remains strong.

To better assess the overall effect of institutional quality on crisis probability, we replace the six WGI measures with $ISQU_t$, the synthetic PCA-based index (columns 4 and 5). Since $ISQU_t$ extracts institutional quality from six noisy proxies, it is superior to include different multicollinear variables and preferred over averaging imprecise measures. Its negative coefficient aligns with our expectations (results are similar using *BANK_CRISIS* as the dependent variable). The impact of $EURO_t$ is like that of EU_t in Table 4: international agreements do not change the effect of institutional quality on the probability of a crisis.

As an additional robustness test, in Table 8 we first add $CONTAGION_t$ in columns 1 and 2 where year and region dummies are not included yet and then control for region- and year-specific effects in columns 3-8 by alternatively including year and region dummies in our main specification with $ISQU_t$ as the only institutional proxy. After controlling for such idiosyncratic effects, institutional quality still appears to be a significant factor in mitigating the probability of financial instability. Results hold for both *BANK_CRISIS* and *CRISIS* and controlling for region- or/and year-fixed effects.

[Insert here Table 8]

Since region fixed effects might not entirely capture time-invariant characteristics affecting financial stability, we run a second robustness exercise. We apply two alternative binary estimators that allow for the inclusion of country-specific effects, i.e. *Fixed Effects Linear Probability Model* (Table 9) and *Correlated Random Effects Model* (Table 10) by Wooldridge (2010). The first is a classic OLS with country fixed effects that treats our binary dependent variable like a continuous one. The second is a random-effects model allowing for unobserved heterogeneity correlated with observed covariates. Using these estimators, we control for potential omitted variables through country-specific (fixed or random) effects. Results from the linear probability model are in line with previous findings. Different aspects of institutional quality have heterogenous effects on the probability of a crisis, with dimensions

more related to social capital, such as RL_t, increasing the probability of financial distress. Note that VA_t has turned negative but is not significant now.

[Insert here Table 9]

To implement the *Correlated Random Effects Model* (*CREM*), we add the within-country Mundlak-correction means of all the covariates as independent variables**.** They mitigate the multicollinearity among institutional quality proxies. The signs of their coefficients are unchanged. However, while GE_t, RL_t, CC_t and PS_t appear highly significant, the same pattern does not hold for RQ_t and VA_t. This outcome does not seem related to multicollinearity but to the low variability of these two specific proxies. Overall, previous findings are corroborated.

[Insert here Table 10]

In the third exercise, we run an *Instrumental Variable Probit Model* (*IV-Probit*) to test the soundness of our previous findings to the endogeneity of institutional quality. Although long considered exogenous, some economic development papers have recently considered institutional quality endogenous because country characteristics such as the respect of property rights, the legal system, democracy, the type of government, and the electoral system can capture institutional quality (Hall and Jones, 1999, Acemoglu et al., 2001; Rodrik et al., 2004). We perform an IV-Probit to address this concern. From the broad set of potential instruments for institutional quality identified in the literature, we shortlist Settler Mortality rate (*SMRT*) from the Quality of Government dataset (2024) by the University of Gothenburg (QoG henceforth), Latitude (*LATI*) and Longitude (*LONG*). They are unquestionably exogenous variables: *SMRT* is at least 80 years lagged to financial crises because colonialism ended with World War 2, and it refers to a much earlier period for most ex-colonial countries (Acemoglu et al., 2001); *LATI* and *LONG* are country geographical coordinates and, hence, constant over time (Hall and Jones, 1999; Rodrik et al., 2004). By construction, they cannot be correlated with the recent probability of a crisis.

Table 11 shows IV estimates. We add the three instruments individually in columns 1-3, in pairs in columns 4-6, and all together in column 7. Good instruments should be not only exogenous (i.e. uncorrelated with the error term), but also strong (i.e. correlated with explanatory variables). The Cragg-Donald Wald F-test checks if the instruments are (statistically) not weak. To identify strong instruments, in a first-stage joint significance test on instruments, we prefer the more accurate critical values estimated by Stock and Yogo (2005) over the rule of thumb of a larger-than-10 F-test statistic proposed by Staiger and Stock (1997). Panel B reports selected results from the first stage, including these test statistics. All selected instruments are statistically *not weak* because they are highly correlated with our synthetic institutional quality index and pass the Cragg-Donald Wald F-test at the Stock-Yogo critical values. However, *SMRT* is only available for ex-colonial countries, meaning its coverage is limited (around 50 percent), and results are less reliable.

In addition, since estimates in columns 4-7 show more instruments than the number of potentially endogenous variables, they could be overidentified. So, after identifying good instruments, we check if they are necessary by running the Sargan-Hansen overidentification test. All our estimates are well-identified (no overidentification) because the null hypothesis of valid instruments cannot be rejected.

Last but not least, we run the Wald test of endogeneity to check if $ISQU_t$ is endogeneous and we need to instrument it. The null hypothesis is that $ISQU_t$ is exogenous; if it is not rejected, IV estimates are unnecessary. Based on this test, $ISQU_t$ is exogenous in columns 2-4 and 6-7, and endogenous in columns 1 and 5. Mixed outcomes imply that $ISQU_t$ is borderline exogenous: most of the time, it is exogenous and IV estimates are unnecessary, but when not, we can rely on good instruments correlated to $ISQU_t$ and unrelated to the error term and reasonably apply IV estimates on a smaller sample. If exogenous or endogenous, institutional quality negatively affects the probability of a banking crisis in all specifications except for column (3) ($ISQU_t$ not

significant). Results are similar using *CRISIS* as the dependent variable (not reported for brevity).

[Insert here Table 11]

In the final exercise, we test the robustness of our findings to alternative measures of institutional quality (Panel A), our variable of interest, and a continuous index of financial instability (Panel B), a finer definition of our dependent variable. Column 1 of Table 12 reports our benchmark specification using $ISQU_t$. In column 2, we replace $ISQU_t$ with $ICRG_t$, a composite index of institutional quality coming directly from the *QoG* dataset. Finally, since the six WGI institutional quality variables are highly correlated, we replace them with eight variables collected from the International Country Risk Guide (*ICRG*) Historical Database by the PRS Group (2020) and rerun the multicollinearity and PCA analysis to extract an alternative synthetic institutional quality index, *QUIC* (see Tables D.1 and D.2 in Appendix D respectively for details). Since the first PCA component explains 63 percent of the overall variance, is related to all the eight institutional proxies, and is the only component with an eigenvalue larger than one (5.03), we interpret the first PCA component as a synthetic index of institutional quality (see Table D.2 and Figure D.1 in Appendix D for details). So, in Column 3, we replace $ISQU_t$ with $QUIC_t$. We get a relatively smaller and potentially more volatile common factor because ICRG institutional data are fewer and less collinear. It theoretically reduces the significance of the synthetic institutional index and works against our hypotheses. While the negative estimated built-in $ICRG_t$ coefficient is statistically not different from zero, $QUIC_t$ shows a significant impact similar to $ISQU_t$, thus corroborating our results when the same procedure is applied.

[Insert here Table 12]

Panel B of Table 12 addresses the concerns of using a dummy dependent variable. Even if Laeven and Valencia (2018) build *BANK_CRISIS* and *CRISIS* on multiple criteria, they ultimately must set a threshold to create a dummy, making the variable sensitive to these criteria

around the threshold. Klomp and de Haan (2009) highlight that "there are several drawbacks in using banking crises as an indicator of financial instability. First, it identifies crises only when they are severe enough to trigger market events. […] Second, the identification of the exact timing of crises is rather subjective […]. Third, it only takes banking crises into account, therefore neglecting instability in other parts of the financial system. Finally, this indicator is dichotomous while financial instability is not" (p.323).

To deal with this issue, we run a PCA on the variables used by Laeven and Valencia (2018) to identify banking crises, i.e. Deposit insurance (*DINS*), Deposit Freeze or Bank holiday (*DFBH*), Significant Bank Liabilities Guarantees (*SBLG*), Bank Restructuring (*BARE*), Nationalizations (*NATI*), Asset Purchases and Transfers (*APTR*), Recapitalization (*RCAP*) and Peak support (in % of deposits) (*PSDE*). Again, since the first component explains most of the 70 percent of the overall variance and is the only one with a significant eigenvalue (5.61), we label it *CRISIS_INDEX* and use it as a continuous proxy for financial instability in place of dummy *BANK_CRISIS* (see Appendix E for details). Panel B shows the estimates of using $ISQU_t$, $ICRG_t$, and $QUIC_t$ as proxies for institutional quality and *CRISIS_INDEX* as a measure of financial instability. All control variables do not switch signs, confirming the validity of our empirical strategy. Results confirm one more time the beneficial effect of institution quality on financial stability.

In sum, the mitigating effect of institutional quality on the probability of financial instability is robust to alternative measures of institutional quality, potentially omitted regressors such as financial structure, cultural differences, and region-, year- and country-specific unobservable factors, endogeneity issues, and a finer continuous measure of financial instability.

8. CONCLUDING REMARKS

We examine how the probability of a systemic banking crisis is affected by the level of institutional quality. Applying a Probit model to a panel of 138 countries over the period 1996-2017, we show that countries endowed with better institutions enjoy a lower probability of financial distress as identified in Laeven and Valencia's (2018) dataset. This result is against recent papers, but in line with older literature.

However, this positive shielding effect of institutional quality emerges unambiguously only when we employ an index that captures the common factor present in different institutional quality proxies. Impacts are heterogeneous when single dimensions are considered separately in place of one synthetic measure. Variables measuring institutional aspects close to social capital seem to have a perverse or no effect on financial stability. Even if these estimates suffer from mild multicollinearity issues, this result more likely arises from side effects of social capital, as emphasized in other contributions (Mistrulli and Vacca, 2015; Galardo et al., 2019).

Our main findings are consistent with several robustness checks. In particular, we apply a *Fixed-Effects Linear Probability Model* and a *Correlated Random Effects Model* to control for potential unobservable variables at the country level. Even after changing the specification, our main results are fully corroborated. They are also robust to the potential endogeneity of the synthetic index(es) of institutional quality, our variable(s) of interest, and to using continuous measures for banking crises, our dependent variable.

Our policy recommendation is that countries should focus on improving their governance since more mature and sound institutions decrease the probability of major financial turmoil. Financial structure, cultural differences, and international agreements have marginal effects, if any.

Competing interests

The authors have no relevant financial or non-financial interests to disclose.

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Table 1. Descriptive statistics.

	VARIABLE	OBS.	MEAN	STD. DEV.	MIN	MEDIAN	MAX	COEFF. VAR.
Financial Crises	Main dependent variables (by Laeven and Valencia, 2018)							
	BANK_CRISIS	3,608	0.06	0.24	0	0	1	3.93
	CRISIS	3,608	0.07	0.25	0	0	1	3.66
	Sub-Components (by Laeven and Valencia, 2018)							
	DINS	3,608	0.01	0.10	0	0	1	9.45
	DFBH	4,818	0.00	0.04	0	0	1	26.22
	SBLG	3,608	0.01	0.09	0	0	1	10.74
	BARE	3,608	0.01	0.11	0	0	1	8.80
	NATI	3,608	0.01	0.09	0	0	1	10.92
	APTR	3,608	0.01	0.08	0	0	1	11.74
	RCAP	3,608	0.01	0.11	0	0	1	9.33
	PSDE	3,608	0.00	0.02	0	0	0.65	10.72
Control Variables	Macroeconomics (by World Bank, 2019a,b)							
	GDPpc	4,388	1.27	2.07	0.01	0.39	18.52	1.63
	BAS	3,709	53.06	47.83	0.27	40.36	840.09	0.90
	INF	3,832	8.68	72.12	-18.11	3.67	4145.11	8.31
	CAB	3,621	-3.10	11.38	-148.00	-3.18	53.44	-3.67
	TOP5	2,652	80.49	16.39	27.51	83.21	100	0.20
	Regulation (by Heritage Foundation, 2019)							
	FFI	3,617	49.85	20.11	0	50	90	0.40
	Culture (by La Porta et al., 1999)							
	MUSLIM	4,422	22.00	35.29	0	1	99.90	1.60
	ENGLISH	4,422	0.35	0.48	0	0	1	1.37
	Dummies (our elaboration)							
	EU	4,818	0.10	0.30	0	0	1	2.95
	EURO	4,818	0.06	0.23	0	0	1	4.03
	PERIOD	4,818	0.41	0.49	0	0	1	1.20
	CONTAGION	4,818	0.34	0.47	0	0	1	1.40
Institutions	World Bank Variables (by World Bank, 2019c)							
	CC	3,827	0.43	0.23	0	0.37	1	0.54
	PS	3,838	0.63	0.19	0	0.65	1	0.30
	RL	3,885	0.55	0.21	0	0.52	1	0.38
	VA	3,875	0.56	0.24	0	0.57	1	0.43
	GE	3,813	0.50	0.20	0	0.47	1	0.40
	RQ	3,813	0.54	0.20	0	0.51	1	0.38
	ICRG Variables (by QoG, 2024, and The PRS Group, 2020)							
	ICRG	2,945	0.55	0.21	0.06	0.50	1	0.38
	SC	3,017	0.51	0.23	0	0.48	1	0.45
	IP	3,017	0.69	0.19	0	0.67	1	0.28
	IC	3,017	0.76	0.16	0	0.78	1	0.21
	CO	3,017	0.46	0.20	0	0.42	1	0.45
	MP	3,017	0.64	0.29	0	0.67	1	0.46
	LO	3,017	0.32	0.13	0	0.34	1	0.40
	DA	3,017	0.61	0.26	0	0.62	1	0.43
	BQ	3,017	0.38	0.20	0	0.33	1	0.52
	Instrumental Variable (by QoG, 2024)							
	SMRT	1,864	4.60	1.28	0.94	4.44	7.99	0.28
	LATI	4,686	19.06	23.72	-40.90	18.11	71.71	1.24
	LONG	4,686	17.76	71.07	-175.20	19.50	179.41	4.00

NOTES: Period:1996-2017. *BANK_CRISIS* = 1 for systemic banking crises, 0 otherwise. *CRISIS* = 1 for systemic banking, sovereign debt crises or twin crises, 0 otherwise. *DINS* = Deposit insurance. *DFBH* = Deposit Freeze or Bank holiday. *SBLG* = Significant Bank Liabilities Guarantees. *BARE* = Bank restructuring. *NATI* = Nationalizations. *APTR* = Asset Purchases and Transfers. *RCAP* = Recapitalization. *PSDE* = Peak support (in % of deposits). *GDPpc* = GDP per capita in current US$ (divided by 10,000). *BAS* = Total assets held by deposit money banks as a share of GDP. *INF* = Inflation, consumer price index (annual %). CAB = Current account balance (% of GDP). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *FFI* = Financial Freedom Index. *MUSLIM* = percentage of Muslim citizens in the overall population in 1980. *ENGLISH* = 1 if the country adopts a common law system, 0 otherwise. *EU* = 1 for European Union member countries, 0 otherwise. *EURO* = 1 for Eurozone members, 0 otherwise. *PERIOD* = 1 for year > 2008, 0 otherwise. *CONTAGION* = 1 if another Country in the same region is affected by a crisis, 0 otherwise. *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. *ICRG* = International Country Risk Guide. *SC* = Socioeconomic Conditions. *IP* = Investment Profile. *IC* = Internal Conflict. *CO* = Corruption. *MP* = Military in Politics. *LO* = Law and Order. *DA* = Democratic Accountability. *BQ* = Bureaucracy Quality. *SMRT* = Settler Mortality. *LATI* = Latitude. *LONG* = Longitude. See Appendix A for detailed definitions and sources of the variables of interest.

Table 2. Correlation matrix of independent variables.

	CC	*PS*	*RL*	*VA*	*GE*	*RQ*	*ICRG*	*SC*	*IP*	*IC*	*CO*	*MP*	*LO*	*DA*	*BQ*
CC	**1**														
PS	**0.741***	**1**													
RL	**0.940***	**0.781***	**1**												
VA	**0.772***	**0.681***	**0.825***	**1**											
GE	**0.925***	**0.700***	**0.931***	**0.756***	**1**										
RQ	**0.867***	**0.655***	**0.901***	**0.777***	**0.934***	**1**									
ICRG	0.915*	0.720*	0.920*	0.725*	0.922*	0.851*	1								
SC	0.804*	0.679*	0.818*	0.581*	0.849*	0.800*	0.804*	**1**							
IP	0.690*	0.607*	0.735*	0.601*	0.729*	0.786*	0.619*	**0.681***	**1**						
IC	0.581*	0.831*	0.602*	0.525*	0.582*	0.570*	0.586*	**0.559***	**0.484***	**1**					
CO	0.868*	0.650*	0.824*	0.711*	0.808*	0.761*	0.881*	**0.641***	**0.516***	**0.492***	**1**				
MP	0.723*	0.742*	0.761*	0.724*	0.764*	0.757*	0.732*	**0.662***	**0.609***	**0.652***	**0.606***	**1**			
LO	0.733*	0.662*	0.772*	0.481*	0.720*	0.661*	0.860*	**0.699***	**0.511***	**0.581***	**0.654***	**0.626***	**1**		
DA	0.543*	0.406*	0.593*	0.848*	0.578*	0.621*	0.544*	**0.383***	**0.465***	**0.347***	**0.521***	**0.570***	**0.316***	**1**	
BQ	0.799*	0.604*	0.807*	0.703*	0.859*	0.780*	0.895*	**0.745***	**0.543***	**0.509***	**0.716***	**0.673***	**0.636***	**0.559***	**1**

NOTES: Period: 1996-2017. *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. *ICRG* = International Country Risk Guide. *SC* = Socioeconomic Conditions. *IP* = Investment Profile. *IC* = Internal Conflict. *CO* = Corruption. *MP* = Military in Politics. *LO* = Law and Order. *DA* = Democratic Accountability. *BQ* = Bureaucracy Quality. See Appendix A for detailed definitions and sources of the variables of interest. * $p<0.05$.

Table 3. Univariate analysis.

	Panel A: Pre-Crisis				Panel B: Crisis				Panel C: EU Countries	
	Non-EU countries		EU countries		Non-EU countries		EU countries		Pre-Crisis vs Crisis Period	
VARIABLES	**Mean**	**Median**	**Mean (a)**	**Median (b)**	**Mean**	**Median**	**Mean (a)**	**Median (b)**	**Mean (a)**	**Median (b)**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CC	0.392	0.348	0.740***	0.747***	0.390	0.339	0.666***	0.651***	***	***
PS	0.606	0.625	0.805***	0.814***	0.603	0.615	0.766***	0.777***	***	***
RL	0.519	0.490	0.838***	0.856***	0.512	0.477	0.799***	0.795***	***	***
VA	0.526	0.524	0.871***	0.883***	0.517	0.528	0.832***	0.831***	***	***
GE	0.469	0.435	0.787***	0.823***	0.465	0.436	0.735***	0.731***	***	***
RQ	0.504	0.483	0.814***	0.804***	0.498	0.479	0.783***	0.775***	***	***
GDPpc	0.854	0.221	2.920***	2.662***	1.318	0.434	3.299***	2.669***	**	
BAS	42.701	30.899	95.404***	94.579***	53.453	42.159	102.349***	98.965***	*	
INF	12.611	5.033	2.820***	2.365***	5.585	3.474	1.366***	1.200***	***	***
CAB	-2.962	-3.320	-1.706**	-0.919***	-4.227	-4.178	0.783***	0.652***	***	***
TOP5	81.739	85.865	81.250	85.229	78.308	80.344	81.245***	83.080*		
FFI	48.152	50.000	69.960***	70.000***	44.923	50.000	68.750***	70.000***		

NOTES: Period considered:1996-2017. Sample is divided according to the variables *PERIOD* and *EU*. Variable *PERIOD* identifies the period since the emergence of the Great Financial Crisis (2009). *EU* equals 1 stands for European Union member countries. *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *BAS* = Total assets held by deposit money banks as a share of GDP. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *FFI* = Financial Freedom Index. See Appendix A for detailed definitions and sources of the variables of interest. (a) Mean-comparison test against the previous sub-sample for mean; (b) Wilcoxon rank-sum test against the previous sub-sample for medians. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Benchmark specifications using six institutional quality proxies by World Bank.

VARIABLES	BANK_CRISIS (1)	BANK_CRISIS (2)	BANK_CRISIS (3)	BANK_CRISIS (4)	BANK_CRISIS (5)	CRISIS (6)
CC_t	**-3.5349*** **	**-3.4898*** **	**-3.2995*** **	**-3.2876*** **	**-3.0836*** **	**-2.8938*** **
PS_t	**-1.1234** **	**-1.1885** **	**-1.3574*** **	**-1.2320*** **	**-1.4007*** **	**-1.3933*** **
RL_t	**4.1366*** **	**4.2374*** **	**4.4425*** **	**4.3846*** **	**4.5860*** **	**3.3052*** **
VA_t	**2.2062*** **	**2.2023*** **	**2.0624*** **	**1.7448*** **	**1.5838** **	**2.0762*** **
GE_t	**-1.8233#**	**-1.8072#**	**-1.8112#**	**-1.5193**	**-1.5289**	**-0.7623**
RQ_t	**-0.6732**	**-1.1319**	**-1.5210**	**-1.3224**	**-1.7262**	**-2.3751** **
$GDPpc_{t-1}$	0.1855***	0.1864***	0.1975***	0.2032***	0.2153***	0.2214***
$TOP5_{t-1}$	-0.0087***	-0.0085***	-0.0090***	-0.0080***	-0.0085***	-0.0069**
$PERIOD_t$	-0.2840***	-0.2908***	-0.3213***	-0.3072***	-0.3389***	-0.3300***
EU_t	0.5962***	0.6055***	0.6336***	0.6334***	0.6607***	0.6575***
INF_{t-1}				0.0022*	0.0022*	0.0023**
CAB_{t-1}				-0.0122#	-0.0130*	-0.0088
FFI_{t-1}		0.0033	0.0427**	0.0019	0.0396**	0.0433**
FFI^2_{t-1}			-0.0003**		-0.0003**	-0.0003**
Constant	-1.2868***	-1.2499***	-2.0715***	-1.1711***	-1.9336***	-1.8372***
Observations	2,081	2,028	2,028	1,890	1,890	1,890
PseudoR^2	0.158	0.156	0.161	0.160	0.164	0.147
LL Model	-425.1	-423.1	-420.5	-404.3	-402.1	-430.2
AIC	872.3	870.2	867.0	836.7	834.1	890.4
BIC	934.3	937.6	940.0	914.3	917.3	973.5
F^{ALL}	70.730	68.470	66.320	62.430	4.346	5.863
Prob(F^{ALL})>F	0.000	0.000	0.000	0.000	0.114	0.053

NOTES: Estimator: Pooled Probit. Period: 1996-2017. Dependent variable: *BANK_CRISIS* = 1 for banking crises, 0 otherwise (columns 1-5); *CRISIS* = 1 for banking and/or sovereign debt crises, 0 otherwise (column 6). Independent variables: *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *PERIOD* = 1 for year > 2008, 0 otherwise. *EU* = 1 for European Union member countries, 0 otherwise. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *FFI* = Financial Freedom Index. Subscript t-1 indicates a one-year lagged variable. See Appendix A for detailed definitions and sources of the variables of interest. Statistics: Pseudo R^2 and LL Model report McFadden's R^2 and the log-likelihood function of the model. AIC and BIC refer to Akaike and Bayesian Information Criterion. F^{ALL} is the statistics of the full specification F-test. *** p<0.01, ** p<0.05, * p<0.10, # p<0.15

Table 5. Stepwise regressions starting from the benchmark specification.

VARIABLES	BANK_CRISIS (1)	BANK_CRISIS (2)	BANK_CRISIS (3)	BANK_CRISIS (4)	BANK_CRISIS (5)	BANK_CRISIS (6)
CC_t	**-1.1612*** **	**-0.8728** **	**-3.3693*** **	**-3.6624*** **	**-3.0237*** **	**-3.0836*** **
PS_t		**-0.6797#**	**-1.1219** **	**-1.3147*** **	**-1.3971*** **	**-1.4007*** **
RL_t			**3.5433*** **	**2.9570*** **	**4.1780*** **	**4.5860*** **
VA_t				**1.3531** **	**1.4180** **	**1.5838** **
GE_t					**-2.2487** **	**-1.5289**
RQ_t						**-1.7262**
$GDPpc_{t-1}$	0.2204***	0.2227***	0.2169***	0.2163***	0.2122***	0.2153***
$TOP5_{t-1}$	-0.0099***	-0.0096***	-0.0083***	-0.0076**	-0.0083***	-0.0085***
$PERIOD_t$	-0.2984***	-0.3115***	-0.3426***	-0.3284***	-0.3313***	-0.3389***
EU_t	0.7551***	0.7924***	0.6802***	0.6014***	0.6209***	0.6607***
INF_{t-1}	0.0022**	0.0023**	0.0024**	0.0023**	0.0022*	0.0022*
CAB_{t-1}	-0.0165**	-0.0170**	-0.0161**	-0.0135*	-0.0118#	-0.0130*
FFI_{t-1}	0.0358**	0.0404**	0.0360**	0.0284#	0.0327*	0.0396**
FFI^2_{t-1}	-0.0003**	-0.0003**	-0.0003**	-0.0003*	-0.0003*	-0.0003**
Constant	-1.5969***	-1.4798***	-2.0670***	-2.1256***	-1.9799***	-1.9336***
Observations	1,890	1,890	1,890	1,890	1,890	1,890
Pseudo R^2	0.137	0.140	0.153	0.158	0.162	0.164
LL Model	-415.1	-414.0.	-407.8	-405.3	-403.1	-402.1
AIC	850.3	849.9	839.6	836.5	834.2	834.1
BIC	905.7	910.9	906.1	908.6	911.8	917.3
F^{ALL}	5.112	5.984	4.733	3.211	3.523	4.346
Prob(F^{ALL})>F	0.078	0.050	0.094	0.201	0.172	0.114

NOTES: Estimator: Pooled Probit. Period: 1996-2017. Dependent variable: *BANK_CRISIS* = 1 for banking crises, 0 otherwise. Independent variables: *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *PERIOD* = 1 for year > 2008, 0 otherwise. *EU* = 1 for European Union member countries, 0 otherwise. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *FFI* = Financial Freedom Index. Subscript t-1 indicates a one-year lagged variable. See Appendix A for detailed definitions and sources of the variables of interest. Statistics: Pseudo R^2 and LL Model report McFadden's R^2 and the log-likelihood function of the model. AIC and BIC refer to Akaike and Bayesian Information Criterion. F^{ALL} is the statistics of the full specification F-test. *** p<0.01, ** p<0.05, * p<0.10, # p<0.15.

Table 6. Benchmark specifications using a synthetic institutional quality index.

VARIABLES	BANK_CRISIS (1)	BANK_CRISIS (2)	BANK_CRISIS (3)	BANK_CRISIS (4)	BANK_CRISIS (5)	CRISIS (6)
$ISQU_t$	**-0.0677***	**-0.0959****	**-0.1131****	**-0.0932****	**-0.1100****	**-0.1437*****
$GDPpc_{t-1}$	0.1334***	0.1383***	0.1654***	0.1756***	0.2003***	0.2030***
$TOP5_{t-1}$	-0.0120***	-0.0117***	-0.0118***	-0.0106***	-0.0106***	-0.0092***
$PERIOD_t$	-0.2070**	-0.2134**	-0.2528***	-0.2506**	-0.2843***	-0.2884***
EU_t	0.7834***	0.7846***	0.7942***	0.7739***	0.7786***	0.7741***
INF_{t-1}				0.0023**	0.0022**	0.0024**
CAB_{t-1}				-0.0174**	-0.0176**	-0.0132*
FFI_{t-1}		0.0032	0.0476***	0.0007	0.0404**	0.0447***
FFI^2_{t-1}			-0.0004***		-0.0003**	-0.0004***
Constant	-0.8907***	-1.0804***	-2.2348***	-1.0864***	-2.1297***	-2.3153***
Observations	2,081	2,028	2,028	1,890	1,890	1,890
Pseudo R^2	0.118	0.116	0.125	0.127	0.134	0.117
LL Model	-445.7	-443.4	-438.7	-420.3	-416.7	-445.0
AIC	903.4	900.7	893.4	858.5	853.5	910.0
BIC	937.2	940.0	938.3	908.4	908.9	965.4
F^{ALL}	41.330	38.850	40.060	38.230	6.340	8.020
Prob(F^{ALL})>F	0.000	0.000	0.000	0.000	0.042	0.018

NOTES: Estimator: Pooled Probit. Period: 1996-2017. Dependent variable: *BANK_CRISIS* = 1 for banking crises, 0 otherwise (columns 1-5); *CRISIS* = 1 for banking and/or sovereign debt crises, 0 otherwise (column 6). Independent variables: *ISQU* = institutional quality as the first component from Principal Component Analysis. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *PERIOD* = 1 for year > 2008, 0 otherwise. *EU* = 1 for European Union member countries, 0 otherwise. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *FFI* = Financial Freedom Index. Subscript t-1 indicates a one-year lagged variable. See Appendix A for detailed definitions and sources of the variables of interest. Statistics: Pseudo R^2 and LL Model report McFadden's R^2 and the log-likelihood function of the model. AIC and BIC refer to Akaike and Bayesian Information Criterion. F^{ALL} is the statistics of the full specification F-test. *** p<0.01, ** p<0.05, * p<0.10, # p<0.15.

Table 7. Different specifications.

VARIABLES	BANK_CRISIS (1)	BANK_CRISIS (2)	CRISIS (3)	CRISIS (4)	CRISIS (5)
CC_t	**-3.0836*** **	**-2.9378*** **	**-2.7956*** **		
PS_t	**-1.4007*** **	**-1.5773*** **	**-1.5535*** **		
RL_t	**4.5860*** **	**4.9541*** **	**3.6530*** **		
VA_t	**1.5838** **	**0.9357**	**1.4165** **		
GE_t	**-1.5289**	**-2.1676***	**-1.3193**		
RQ_t	**-1.7262**	**-1.8941#**	**-2.5392** **		
$ISQU_t$				**-0.0858** **	**-0.1782*** **
$GDPpc_{t-1}$	0.2153***	0.2100***	0.2168***	0.1554***	0.1645***
$TOP5_{t-1}$	-0.0085***	-0.0074**	-0.0056*	-0.0099***	-0.0083***
$PERIOD_t$	-0.3389***	-0.3934***	-0.3829***	-0.2460**	-0.3131***
EU_t	0.6607***	0.5875***	0.5946***		
$EURO_t$				0.7324***	0.6944***
BAS_{t-1}		0.0048***	0.0046***		0.0045***
ENGLISH		-0.0768	-0.0298		0.0208
MUSLIM		-0.0087***	-0.0090***		-0.0092***
INF_{t-1}	0.0022*	0.0023**	0.0024**	0.0023**	0.0024**
CAB_{t-1}	-0.0130*	-0.0150*	-0.0102	-0.0139**	-0.0158**
FFI_{t-1}	0.0396**	0.0383**	0.0417**	0.0350**	0.0370**
FFI^2_{t-1}	-0.0003**	-0.0003**	-0.0003**	-0.0003*	-0.0003**
Constant	-1.9336***	-1.3969**	-1.3157**	-1.9835***	-2.2430***
Observations	1,890	1,841	1,841	1,890	1,841
Pseudo R^2	0.164	0.185	0.167	0.110	0.137
LL Model	-402.1	-387.0	-414.9	-448.6	-429.5
AIC	834.1	810.0	865.7	917.2	885.0
BIC	917.3	909.3	965.0	972.6	956.8
F^{ALL}	4.346	3.973	5.186	5.729	5.388
Prob(F^{ALL})>F	0.114	0.137	0.075	0.057	0.068

NOTES: Estimator: Pooled Probit. Period: 1996-2017. Dependent variables: *BANK_CRISIS* = 1 for banking crises, 0 otherwise (columns 1 and 2); *CRISIS* = 1 for banking and/or sovereign debt crises, 0 otherwise (columns 3, 4, and 5). Independent variables: *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. *ISQU* = institutional quality as the first component from Principal Component Analysis. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *PERIOD* = 1 for year > 2008, 0 otherwise. *EU* = 1 for European Union member countries, 0 otherwise. *EURO* = 1 for Eurozone members, 0 otherwise. *BAS* = Total assets held by deposit money banks as a share of GDP. *ENGLISH* = 1 if the country adopts a common law system, 0 otherwise. *MUSLIM* = percentage of Muslim citizens in the overall population in 1980. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *FFI* = Financial Freedom Index. Subscript t-1 indicates a one-year lagged variable. See Appendix A for detailed definitions and sources of the variables of interest. Statistics: Pseudo R^2 and LL Model report McFadden's R^2 and the log-likelihood function of the model. AIC and BIC refer to Akaike and Bayesian Information Criterion. F^{ALL} is the statistics of the full specification F-test. *** p<0.01, ** p<0.05, * p<0.10, # p<0.

Table 8. Alternative Specifications: year dummies, contagion, and region dummies.

VARIABLES	BANK_CRISIS (1)	CRISIS (2)	BANK_CRISIS (3)	CRISIS (4)	BANK_CRISIS (5)	CRISIS (6)	BANK_CRISIS (7)	CRISIS (8)
$ISQU_t$	**-0.0922***	**-0.1408*****	**-0.1388*****	**-0.1735*****	**-0.1671*****	**-0.2038*****	**-0.2012*****	**-0.2400*****
$GDPpc_{t-1}$	0.1826***	0.1857***	0.2122***	0.2154***	0.2000***	0.2055***	0.2044***	0.2114***
$TOP5_{t-1}$	-0.0104***	-0.0077**	-0.0131***	-0.0113***	-0.0083***	-0.0064**	-0.0104***	-0.0080**
$PERIOD_t$	-0.4016***	-0.3740***	-1.7867***	-1.7653***	-0.2697**	-0.2700***	-1.8838***	-1.8648***
EU_t	0.4027***	0.4178***	0.9573***	0.9367***	0.6361***	0.6671***	0.7971***	0.8242***
INF_{t-1}	0.0009	0.0011	0.0011	0.0013	0.0017#	0.0019*	0.0003	0.0005
CAB_{t-1}	-0.0177**	-0.0112#	-0.0126#	-0.0090	-0.0154*	-0.0104	-0.0060	-0.0020
FFI_{t-1}	0.0124	0.0224	0.0326*	0.0377**	0.0375**	0.0407**	0.0271#	0.0312*
FFI^2_{t-1}	-0.0001	-0.0002	-0.0003*	-0.0003**	-0.0003**	-0.0003**	-0.0002#	-0.0003*
$CONTAGION_t$	1.3808***	1.2000***						
Constant	-1.8939***	-2.2167***	-0.9165#	-1.2080**	-1.9989***	-2.1962***	-0.7701	-1.0680*
Year dummies	No	No	Yes	Yes	No	No	Yes	Yes
Region dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	1,890	1,890	1,788	1,788	1,656	1,656	1,568	1,568
Pseudo R^2	0.287	0.243	0.272	0.246	0.136	0.121	0.283	0.261
LL Model	-343.2	-381.7	-344.9	-373.7	-399.8	-425.8	-326.3	-351.9
AIC	708.4	785.5	739.8	797.4	827.7	879.5	710.6	761.9
BIC	769.4	846.5	877.0	934.6	903.5	955.3	865.9	917.2
F^{ALL}	136.300	135.500	60.450	60.190	20.970	25.870	42.660	46.970
Prob(F^{ALL})>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

NOTES: Estimator: Pooled Probit. Period: 1996-2017. Dependent variables: *BANK_CRISIS* = 1 for banking crises, 0 otherwise (columns 1, 3, 5, and 7); *CRISIS* = 1 for banking crises, sovereign debt crises, or twin crises, 0 otherwise (columns 2, 4, 6, and 8). Independent variables: *ISQU* = institutional quality as the first component from Principal Component Analysis. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *PERIOD* = 1 for year > 2008, 0 otherwise. *EU* = 1 for European Union member countries, 0 otherwise. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *FFI* = Financial Freedom Index. *CONTAGION* = 1 if another country in the same region is affected by a crisis, 0 otherwise. *Year* and *Region dummies* are included. Subscript t-1 indicates a one-year lagged variable. See Appendix A for detailed definitions and sources of the variables of interest. Statistics: Pseudo R^2 and LL Model report McFadden's R^2 and the log-likelihood function of the model. AIC and BIC refer to Akaike and Bayesian Information Criterion. F^{ALL} is the statistics of the full specification F-test. *** p<0.01, ** p<0.05, * p<0.10, # p<0.15.

Table 9. Alternative Estimator: Country Fixed Effect Linear Probability Model.

VARIABLES	BANK_CRISIS (1)	BANK_CRISIS (2)	BANK_CRISIS (3)	BANK_CRISIS (4)	BANK_CRISIS (5)	CRISIS (6)
CC_t	**-0.3750****	**-0.3710****	**-0.3704****	**-0.2920#**	**-0.3018#**	**-0.2748**
PS_t	**-0.2045****	**-0.2083****	**-0.2154****	**-0.2142****	**-0.2283****	**-0.2504****
RL_t	**0.8390*****	**0.8385*****	**0.8352*****	**0.8691*****	**0.8729*****	**0.7341*****
VA_t	**-0.0173**	**-0.0155**	**-0.0249**	**-0.1562**	**-0.1641**	**-0.1576**
GE_t	**-0.8858*****	**-0.9008*****	**-0.8981*****	**-0.9282*****	**-0.9250*****	**-0.9297*****
RQ_t	**0.0673**	**-0.0388**	**-0.0404**	**-0.0862**	**-0.0668**	**-0.1610**
$GDPpc_{t-1}$	0.0644***	0.0631***	0.0639***	0.0588***	0.0592***	0.0574***
$TOP5_{t-1}$	-0.0013**	-0.0013**	-0.0013**	-0.0009	-0.0009	-0.0006
$PERIOD_t$	-0.0423***	-0.0410***	-0.0444***	-0.0385***	-0.0425***	-0.0409***
EU_t	-0.0398	-0.0439	-0.0406	-0.0277	-0.0244	-0.0179
INF_{t-1}				0.0004*	0.0004#	0.0004*
CAB_{t-1}				-0.0030***	-0.0031***	-0.0025**
FFI_{t-1}		0.0017**	0.0061**	0.0015**	0.0064**	0.0066**
FFI^2_{t-1}			-0.0000*		-0.0000*	-0.0000#
Constant	0.3648**	0.3070**	0.2174	0.3418**	0.2278	0.3042#
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,081	2,028	2,028	1,890	1,890	1,890
R^2	0.210	0.213	0.214	0.226	0.227	0.226
Number of countries	139	138	138	134	134	134
LL Model	194.2	169.0	170.7	137.3	138.9	80.13
AIC	-366.3	-314.1	-315.4	-246.6	-247.8	-130.3
BIC	-304.3	-246.7	-242.4	-169.0	-164.6	-47.1
F^{ALL}	9.798	9.491	8.966	7.118	6.827	6.568
Prob(F^{ALL})>F	0.000	0.000	0.000	0.000	0.000	0.000

NOTES: Estimator: Fixed effects linear probability model in the full sample. Period: 1996-2017. Dependent variables: *BANK_CRISIS* = 1 for banking crises, 0 otherwise (columns 1-5); *CRISIS* = 1 for banking, sovereign debt or twin crises, 0 otherwise (column 6). Independent variables: *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *PERIOD* = 1 for year > 2008, 0 otherwise. *EU* = 1 for EU member countries, 0 otherwise. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *FFI* = Financial Freedom Index. *Country Fixed Effects* are included. Subscript *t-1* indicates a one-year lagged variable. See Appendix A for detailed definitions and sources of the variables of interest. Statistics: R^2 and LL Model report McFadden's R^2 and the log-likelihood function of the model. AIC and BIC refer to Akaike and Bayesian Information Criterion. F^{ALL} is the statistics of the full specification F-test. *** p<0.01, ** p<0.05, * p<0.10, # p<0.15.

Table 10. Alternative Estimator: Correlated Random Effects Model (CREM).

VARIABLES	CREM (1)	CREM (2)	CREM (3)	CREM (4)	CREM (5)	CREM (6)
CC_t	**-5.3583*** **	**-5.0384*** **	**-4.9810*** **	**-4.6583*** **	**-4.5778*** **	**-4.2408*** **
PS_t	**-1.9271** **	**-2.2019*** **	**-2.0594** **	**-2.3410*** **	**-1.7386** **	**-2.0190** **
RL_t	**7.4624*** **	**7.5523*** **	**8.0159*** **	**8.1265*** **	**6.4209*** **	**6.5026*** **
VA_t	**2.4798** **	**2.3374** **	**1.6044**	**1.4078**	**1.9730** *	**1.7485**
GE_t	**-4.4604*** **	**-4.3113** **	**-3.9064** **	**-3.7759** **	**-4.8431*** **	**-4.7449** **
RQ_t	**-1.0202**	**-1.4224**	**-1.3973**	**-1.7871**	**-1.0393**	**-1.3957**
$GDPpc_{t-1}$	0.3894***	0.4023***	0.3983***	0.4152***	0.3788***	0.3977***
$TOP5_{t-1}$	-0.0108**	-0.0112**	-0.0086*	-0.0090*	-0.0070	-0.0074
$PERIOD_t$	-0.4674***	-0.5196***	-0.4749***	-0.5284***	-0.5662***	-0.6244***
EU_t	0.4122*	0.4452*	0.4534*	0.4833*	0.4472*	0.4735*
BAS_{t-1}					0.0092***	0.0095***
INF_{t-1}			0.0032**	0.0032**	0.0033**	0.0033**
CAB_{t-1}			-0.0208*	-0.0230**	-0.0228**	-0.0250**
FFI_{t-1}	0.0121**	0.0765***	0.0100	0.0723**	0.0076	0.0733**
FFI^2_{t-1}		-0.0006**		-0.0005**		-0.0006**
Constant	-1.5064**	-2.9536***	-1.6057**	-2.9884***	-1.5014**	-2.9630***
Within-Country Means	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,028	2,028	1,890	1,890	1,848	1,848
Number of countries	138	138	134	134	134	134
Pseudo R^2	0.057	0.059	0.062	0.064	0.066	0.068
LL Model	-398.8	-395.5	-379.2	-376.4	-368.7	-365.6
AIC	823.7	819.1	788.5	784.7	769.4	765.2
BIC	896.7	897.7	871.7	873.4	857.7	859.0
F^{ALL}	43.900	44.020	38.870	39.440	42.280	43.030
Prob(F^{ALL})>F	0.000	0.000	0.000	0.000	0.000	0.000

NOTES: Estimator: CREM = Correlated Random Effects Model. Period: 1996-2017. Dependent variable: *BANK_CRISIS* = 1 for banking crises, 0 otherwise. Independent variables: *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *PERIOD* = 1 for year > 2008, 0 otherwise. *EU* = 1 for EU member countries, 0 otherwise. *BAS* = Total assets held by deposit money banks as a share of GDP. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *FFI* = Financial Freedom Index. *Within-Country Means* of the control variables are included. Subscript *t-1* indicates a one-year lagged variable. See See Appendix A for detailed definitions and sources of the variables of interest. Statistics: Pseudo R^2 and LL Model report McFadden's R^2 and the log-likelihood function of the model. AIC and BIC refer to Akaike and Bayesian Information Criterion. F^{ALL} is the statistics of the full specification. *** p<0.01, ** p<0.05, * p<0.10, # p<0.15.

Table 11. IV-probit estimation using settler mortality, latitude and longitude as instruments for ISQU.

PANEL A: SECOND STAGE							
VARIABLES	**BANK_CRISIS**	**BANK_CRISIS**	**BANK_CRISIS**	**BANK_CRISIS**	**BANK_CRISIS**	**BANK_CRISIS**	**BANK_CRISIS**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
$ISQU_t$	**-0.9905*** **	**-0.8840***	**0.1083**	**-0.5431****	**-0.6854****	**-0.4602**	**-0.4548***
$GDPpc_{t-1}$	1.2716***	0.6977**	0.0615	0.7536**	0.9203**	0.4242*	0.6587**
$TOP5_{t-1}$	-0.0224***	-0.0071*	-0.0118***	-0.0220***	-0.0206***	-0.0089***	-0.0206***
$PERIOD_t$	-1.2654***	-0.6599**	-0.1839	-0.9497***	-1.0131***	-0.4539**	-0.8673***
EU_t	0.8097**	1.5093***	0.5779	0.8745**	0.7950**	1.1139***	0.8228**
INF_{t-1}	0.0451***	0.0014	0.0025**	0.0545***	0.0501***	0.0019#	0.0558***
CAB_{t-1}	-0.0002	-0.0223***	-0.0163**	0.0106	0.0056	-0.0197***	0.0113
FFI_{t-1}	0.1936***	0.0915**	0.0261	0.1425***	0.1549***	0.0637**	0.1292***
$FFI2_{t-1}$	-0.0014***	-0.0005***	-0.0003#	-0.0011***	-0.0011***	-0.0004***	-0.0010**
Constant	-7.3209***	-4.8789***	-1.3478	-5.3485***	-5.9777***	-3.3752**	-4.9741***
Observations	971	1,890	1,890	971	971	1,890	971
Wald Exogeneity Test statistiscs (χ^2)	6.314	2.692	0.192	2.707	3.174	1.018	1.880
Prob(Wald test)>χ^2	0.012	0.101	0.661	0.100	0.075	0.313	0.170
PANEL B: FIRST STAGE							
VARIABLES (only instruments)	**ISQU**	**ISQU**	**ISQU**	**ISQU**	**ISQU**	**ISQU**	**ISQU**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
SMRT	-0.3121***			-0.2822***	-0.3048***		-0.2794***
LATI		-0.0057***		-0.0137***		-0.0062***	-0.0132***
LONG			0.0018***		0.0015***	0.0021***	0.0008*
Cragg-Donald Wald statistics (F)	79.365*	22.640*	18.590*	75.830*	45.130*	22.990*	51.730*
Stock-Yogo 10% critical F values:	16.38	16.38	16.38	19.93	19.93	19.93	22.30
Sargan–Hansen statistic (χ^2)				1.705	0.661	0.013	1.856
Prob(Sargan–Hansen)>χ^2				0.192	0.416	0.909	0.395

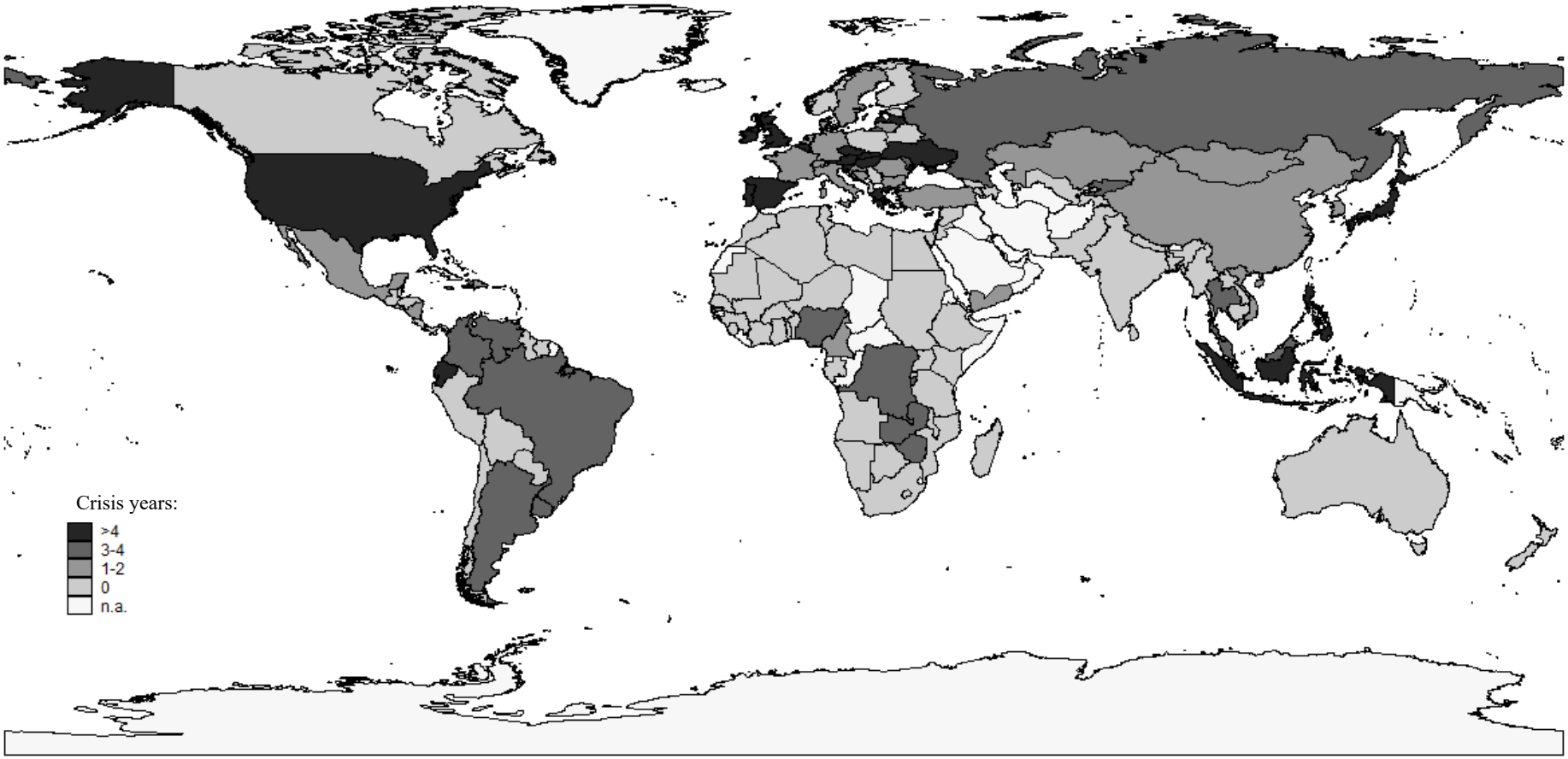
NOTES: Estimator: Pooled IV-Probit: *First Stage* and *Second Stage* report the first and second stage regressions of the *IV-Probit*. Period: 1996-2017. Dependent variable: *BANK_CRISIS* = 1 for banking crises, 0 otherwise (second stage). *ISQU* = institutional quality as the first component from Principal Component Analysis (first stage). Independent variables: *GDPpc* = GDP per capita in current US$ (divided by 10,000); *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets; *PERIOD* = 1 for year > 2008, 0 otherwise; *EU* = 1 for European Union member countries, 0 otherwise; *INF* = Inflation, consumer price index (annual %); *CAB* = Current account balance (% of GDP); *FFI* = Financial Freedom Index; *SMRT* = Settler Mortality; *LATI* = Latitude; *LONG* = Longitude. Statistics: χ^2 refers to the Wald exogeneity test for *ISQU* (the null hypothesis is that the variable is exogenous and hence IV is unnecessary). Cragg-Donald Wald F-stat is the underidentification test statistic (the null hypothesis of not weak instruments is not rejected for the rule of thumb F>10): Stock-Yogo critical values report the 10 percent adjusted confidence critical values for Cragg-Donald Wald test. Sargan–Hansen statistic (χ^2) is the overidentification test statistic (the null hypothesis is that instruments are uncorrelated with the error term and hence valid). Subscript *t-1* indicates a one-year lagged variable. See Appendix A for detailed definitions and sources of the variables of interest. *** p<0.01, ** p<0.05, * p<0.10, # p<0.15.

Table 12. Alternative Dependent Variable using PCA.

	Panel A: BANK_CRISIS			Panel B: CRISIS_INDEX		
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
ISQU$_t$	**-0.1100****			**-0.2018*****		
ICRG$_t$		**-0.0408**			**-2.1342*****	
QUIC$_t$			**-0.0711***			**-0.1789*****
GDPpc$_{t-1}$	0.2003***	0.1359***	0.1763***	0.3278***	0.3597***	0.3307***
TOP5$_{t-1}$	-0.0106***	-0.0112***	-0.0110***	-0.0062	-0.0076*	-0.0088**
PERIOD$_t$	-0.2843***	-0.2558***	-0.3198***	-0.9355***	-1.0286***	-1.0274***
EU$_t$	0.7786***	0.4640***	0.5414***	0.5587**	0.5386**	0.4920**
INF$_{t-1}$	0.0022**	0.0027***	0.0027***	0.0014	0.0015	0.0010
CAB$_{t-1}$	-0.0176**	-0.0191***	-0.0196***	-0.0229***	-0.0315***	-0.0326***
FFI$_{t-1}$	0.0404**	0.0370**	0.0430***	0.0226*	0.0240*	0.0290**
FFI2$_{t-1}$	-0.0003**	-0.0003***	-0.0004***	-0.0002#	-0.0002*	-0.0003**
Constant	-2.1297***	-1.7216***	-1.9723***	0.0111	1.9584***	0.7545
Observations	1,890	1,936	1,952	1,890	1,936	1,952
R^2				0.045	0.042	0.042
PseudoR^2	0.134	0.094	0.098			
LL Model	-416.7	-496.0	-497.3			
AIC	853.5	1012.0	1015.0			
BIC	908.9	1068.0	1070.0			
F^{ALL}	39.070	23.510	27.180	11.960	13.260	13.830
Prob(F^{ALL})>F	0.000	0.000	0.000	0.000	0.000	0.000

NOTES: Estimator: Pooled Probit (columns 1-3) and Ordinary Least Squares (OLS) (columns 4-6). Period: 1996-2017. Dependent variables: *BANK_CRISIS* = 1 for banking crises, 0 otherwise (columns 1-3); *CRISIS_INDEX* = continuous index of financial instability from PCA (columns 4-6). Independent variables: *ISQU* = institutional quality as the first component from Principal Component Analysis. *ICRG* = International Country Risk Guide. *QUIC* = institutional quality as the first component from Principal Component Analysis using ICRG database. *GDPpc* = GDP per capita in current US$ (divided by 10,000). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *PERIOD* = 1 for year > 2008, 0 otherwise. *EU* = 1 for European Union member countries, 0 otherwise. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *FFI* = Financial Freedom Index. Subscript *t-1* indicates a one-year lagged variable. See Appendix A for detailed definitions and sources of the variables of interest. Statistics: Pseudo R^2 and LL Model report McFadden's R^2 and the log-likelihood function of the model. AIC and BIC refer to Akaike and Bayesian Information Criterion. F^{ALL} is the statistics of the full specification F-test. R^2 report the statistics for the OLS models. *** p<0.01, ** p<0.05, * p<0.10, # p<0.15.

Figure 1. Number of banking crisis years by country.



NOTES: our sample includes 138 Countries. Apart from Afghanistan, Iran, Iraq, North Korea, United Arab Emirates, Uzbekistan, and Turkmenistan in Asia, Montenegro and North Macedonia in Europe, and Central African Republic, Chad, Congo Republic, Equatorial Guinea, Eritrea, Gabon, Guinea, Liberia, Mauritania, Somalia, Western Sahara, and Zimbabwe in Africa, missing countries are microstates or not fully independent regions. The scale of gray reports the number of crisis years over the period 1996-2017.

APPENDIX A. VARIABLE DEFINITIONS AND SOURCES.

Table A.1. Full list of variables used in the paper, their definitions, and their sources.

Variable	Definition	Source
BANK_CRISIS	Dummy variable for the presence of a systemic banking crisis (1=banking crisis, 0=none)	Laeven, L., Valencia, F., 2018. Systemic Banking Crises Revisited. IMF Working Papers 18/206, International Monetary Fund.
CRISIS	Dummy variable for the presence of a systemic banking crisis and/or a sovereign debt default/restructuring (1=crisis, 0=none)	Authors elaboration from Laeven and Valencia (2018)
DINS	Dummy variable: 1= The deposit insurance existed when the blanket guarantee was introduced. ; 0=otherwise	Authors elaboration from Laeven and Valencia (2018)
DFBH	Dummy variable: 1= Authorities-imposed restriction on deposit withdrawals or a bank holiday ; 0=otherwise	Authors elaboration from Laeven and Valencia (2018)
SBLG	Dummy variable: 1= Full protection of liabilities or the extension of guarantees to non-deposit liabilities of banks by government; 0=otherwise	Authors elaboration from Laeven and Valencia (2018)
BARE	Dummy variable: 1= Bank restructuring cost exceed the 3% of GDP; 0=otherwise	Authors elaboration from Laeven and Valencia (2018)
NATI	Dummy variable: 1= There have been takeovers by the government of systemically important financial institutions; 0=otherwise	Authors elaboration from Laeven and Valencia (2018)
APTR	Dummy variable:1= Implementation of purchases of assets by the central bank, the treasury, or a government entity; 0=otherwise	Authors elaboration from Laeven and Valencia (2018)
RCAP	Dummy variable: 1= Bank recapitalization was implemented during the bank crisis ; 0=otherwise	Authors elaboration from Laeven and Valencia (2018)
PSDE	Peak of liquidity support in % of GDP	Authors elaboration from Laeven and Valencia (2018)
GDPpc	GDP per capita in current US$ (divided by 10000)	Authors elaboration from World Development Indicator. World Bank (2019b)
BAS	Total assets held by deposit money banks as a share of GDP	Global Financial Development Database (GFDD). World Bank (2019a)
INF	Inflation, consumer price index (annual %)	World Development Indicator. World Bank (2019b)
CAB	Current account balance (% of GDP)	World Development Indicator. World Bank (2019b)
TOP5	Assets of the five largest domestic banks as a share of total domestic commercial banking assets	Global Financial Development Database (GFDD). World Bank (2019a)
FFI	Financial Freedom Index (0=repressive,…, 100=negligible government interference)	The Heritage Foundation (2019)
MUSLIM	Percentage of Muslims in the total population in 1980	La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1999. The Quality of Government. J. Law Econ. Organ. 15 (1), 222-279.
ENGLISH	Dummy variable: 1=British Common Law; 0=otherwise	La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1999. The Quality of Government. J. Law Econ. Organ. 15 (1), 222-279.
EU	Dummy variable: 1=European Union member; 0=otherwise	Authors elaboration
EURO	Dummy variable: 1=Eurozone member; 0=otherwise	Authors elaboration
PERIOD	Dummy variable: 1=year>2008; 0=otherwise	Authors elaboration
CONTAGION	Dummy variable:1=another country in the same region is affected by a crisis; 0=otherwise	Authors elaboration
CC	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests	Worldwide Governance Indicators. World Bank (2019c)
PS	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism	Worldwide Governance Indicators. World Bank (2019c)

RL	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular, the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Worldwide Governance Indicators. World Bank (2019c)
VA	Voice and Accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media.	Worldwide Governance Indicators. World Bank (2019c)
GE	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Worldwide Governance Indicators. World Bank (2019c)
RQ	Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	Worldwide Governance Indicators. World Bank (2019c)
ICRG	Normalized measure (0-1) of the mean value of the ICRG variables "Corruption", "Law and Order" and "Bureaucracy Quality", scaled from 0 to 1.	Authors elaboration from QoG Database (2024)
SC	Normalized measure (0-1) of the assessment of the socioeconomic pressures that could constrain government action or foster social displeasure.	Authors elaboration from *ICRG* Historical Database (The PRS Group, 2020)
IP	Normalized measure (0-1) of the assessment of factors affecting the risk to investment (not covered by other political, economic and financial risk components).	Authors elaboration from *ICRG* Historical Database (The PRS Group, 2020)
IC	Normalized measure (0-1) of the assessment of political violence in the country and its current or potential impact on Governance.	Authors elaboration from *ICRG* Historical Database (The PRS Group, 2020)
CO	Normalized measure (0-1) of the assessment of corruption within the political system.	Authors elaboration from *ICRG* Historical Database (The PRS Group, 2020)
MP	Normalized measure (0-1) of the assessment of military involvement in politics.	Authors elaboration from *ICRG* Historical Database (The PRS Group, 2020)
LO	Normalized measure (0-1) of the "Law and Order" single component. This measure is composed by the assessment of both "Law" element and "Order" element.	Authors elaboration from *ICRG* Historical Database (The PRS Group, 2020)
DA	Normalized measure (0-1) of how responsive government is to its citizens.	Authors elaboration from *ICRG* Historical Database (The PRS Group, 2020)
BQ	Normalized measure (0-1) of the assessment of the bureaucracy's institutional strength and quality.	Authors elaboration from *ICRG* Historical Database (The PRS Group, 2020)
SMRT	Log of the mortality rate faced by European settlers at the time of colonization.	QoG Database (2024); Acemoglu et al. (2001)
LATI	Centroid latitude (geographic center latitude) of the Country	Authors elaboration
LONG	Centroid longitude (geographic center longitude) of the Country	Authors elaboration

NOTES: Descriptions of variables.

APPENDIX B. CORRELATION ANALYSIS.

Table B.1. Correlation matrix of independent variables.

	BANK_CRISIS	*CRISIS*	*GDPpc*	*BAS*	*INF*	*CAB*	*TOP5*	*EU*	*EURO*	*PERIOD*	*FFI*	*CONTAGION*	*ICRG*
BANK_CRISIS	1.000												
CRISIS	0.930*	1.000											
GDPpc	0.130*	0.112*	1.000										
BAS	0.119*	0.103*	0.547*	1.000									
INF	0.033*	0.031*	-0.050*	-0.062*	1.000								
CAB	0.033*	0.022	0.332*	0.081*	0.048*	1.000							
TOP5	-0.083*	-0.082*	0.056*	-0.059*	0.014	0.049*	1.000						
EU	0.145*	0.123*	0.317*	0.358*	-0.035*	0.092*	0.021	1.000					
EURO	0.162*	0.200*	0.297*	0.295*	-0.027*	0.088*	0.046*	0.732*	1.000				
PERIOD	-0.018	-0.017	0.127*	0.130*	-0.045*	-0.027	-0.084*	0.062*	0.078*	1.000			
FFI	0.089*	0.077*	0.481*	0.459*	-0.061*	0.090*	0.044*	0.387*	0.255*	-0.056*	1.000		
CONTAGION	0.299*	0.276*	0.113*	0.057*	0.046*	-0.033*	-0.063*	0.230*	0.161*	-0.183*	0.172*	1.000	
ICRG	0.109*	0.090*	0.741*	0.534*	-0.055*	0.219*	0.060*	0.502*	0.392*	-0.045*	0.580*	0.239*	1.000

NOTES: *BANK_CRISIS* = 1 for systemic banking crises, 0 otherwise. *CRISIS* = 1 for banking and/or sovereign debt crises, 0 otherwise. *GDPpc* = GDP per capita in current US$ (divided by 10000). *BAS* = Total assets held by deposit money banks as a share of GDP. *INF* = Inflation, consumer price index (annual %). *CAB* = Current account balance (% of GDP). *TOP5* = Assets of the five largest domestic banks as a share of total domestic commercial banking assets. *EU* = 1 for European Union member countries, 0 otherwise. *EURO* = 1 Eurozone members, 0 otherwise. *PERIOD* = 1 year > 2008, 0 otherwise. *FFI* = Financial Freedom Index. *CONTAGION* = 1 if another country in the same region is affected by a crisis, 0 otherwise. *ICRG* = International County Risk Guide. See Appendix A for detailed definitions and sources of the variables of interest. * p<0.05.

APPENDIX C. COLLINEARITY AND PCA ON WORLD BANK INDICATORS

To fully depict the severity of multicollinearity, Table C.1 reports VIFs (i.e. Variance Inflation Factor), R^2, Eigenvalues, and Condition Indexes using all the variables in our main dataset.[18] There is no consensus on the critical thresholds for multicollinearity indicators.[19] However, Hair et al. (2014) provide guidelines for good practices: a mean VIF larger than six or an overall condition number larger than 15 need further inspection; individual VIFs larger than 10, single condition indexes higher than 15, and specific R^2 higher than 0.95 usually lead to coefficients instability; and VIFs or condition indexes greater than 30 reveal serious multicollinearity problems, in particular with $R^2 > 0.95$.[20]

In our dataset, VIF mean (6.71), and condition number (15.30) are marginally higher than their corresponding critical thresholds (6 and 15, respectively). Large individual VIFs drive this outcome for *CC* (17.20), *RL* (23.17), and *GE* (20.14). Moreover, *RL* and *GE* show an $R^2 > 0.95$ despite their VIF remains below the critical maximum threshold of 30. In brief, even if this evidence does not undermine our empirical results, we should not overlook that multicollinearity affects our dataset.

[18] We exclude *CRISIS* and *EURO* because they are used as substitutes for *BANK_CRISIS* and *EU* respectively.
[19] For example, in the traditional literature, VIF values exceeding 10 (or 5) indicate multicollinearity issues (Neter et al, 1989). But "this rule of thumb lacks a theoretical basis" (Salmeron Gomez et al. 2016, p.1832). O'Brien (2007) finds that other factors affect multi-collinearity and "the practice of automatically questioning the results of studies when the variance inflation factor is greater than 4, 10, or even 30 is inappropriate" (p.681).
[20] Note that $VIF_i = \frac{1}{1-R_i^2}$ and a high condition index corresponds to a low eigenvalue.

Table C.1. Collinearity diagnostics on World Bank Institutional variables.

Variable	VIF	R-Squared		Eigenvalue	Condition Index
BANK_CRISIS	1.14	0.1226	1	7.4358	1.0000
GDPpc	3.41	0.7066	2	1.2680	2.4216
BAS	2.53	0.6050	3	1.1827	2.5075
INF	1.20	0.1669	4	1.0943	2.6067
CAB	1.33	0.2500	5	0.9012	2.8724
TOP5	1.16	0.1354	6	0.7109	3.2340
EU	1.73	0.4216	7	0.5859	3.5624
PERIOD	1.16	0.1397	8	0.5028	3.8457
FFI	2.75	0.6357	9	0.4552	4.0417
CC	**17.20**	0.9419	10	0.3233	4.7958
PS	2.48	0.5972	11	0.2506	5.4469
RL	**23.17**	**0.9568**	12	0.1609	6.7975
VA	4.70	0.7871	13	0.0615	10.9948
GE	**20.14**	**0.9503**	14	0.0351	14.5597
RQ	**16.54**	0.9395	15	**0.0318**	**15.2985**
Mean VIF	**6.71**		Condition Number		**15.2985**

NOTES: Eigenvalues and Condition Index computed from scaled raw score of the sums of squares and cross products matrix without intercept. Det(correlation matrix)=0. R_i^2 = goodness of fit of the regression of the i^{th} variable on all the others; critical: 0.95 and 0.99. Individual $VIF_i = 1/(1 - R_i^2)$; critical: 10 (standard "rule of thumb") and 30 (maximum). Mean $VIF = \sum_{i=1}^{17} VIF_i$; critical: 6 (conservative). Eigenvalue λ: see Chatterjee and Price (1991); critical: 0.10 and 0.01. $\text{Condition Index}_i = \sqrt{\frac{\max_p \lambda}{\lambda_i}}$; critical: 15 (standard "rule of thumb") and 30 (maximum). $\text{Condition Number} = \sqrt{\frac{\max_p \lambda}{\min_p \lambda}}$; critical 15 (conservative). Values above critical threshold in bold.

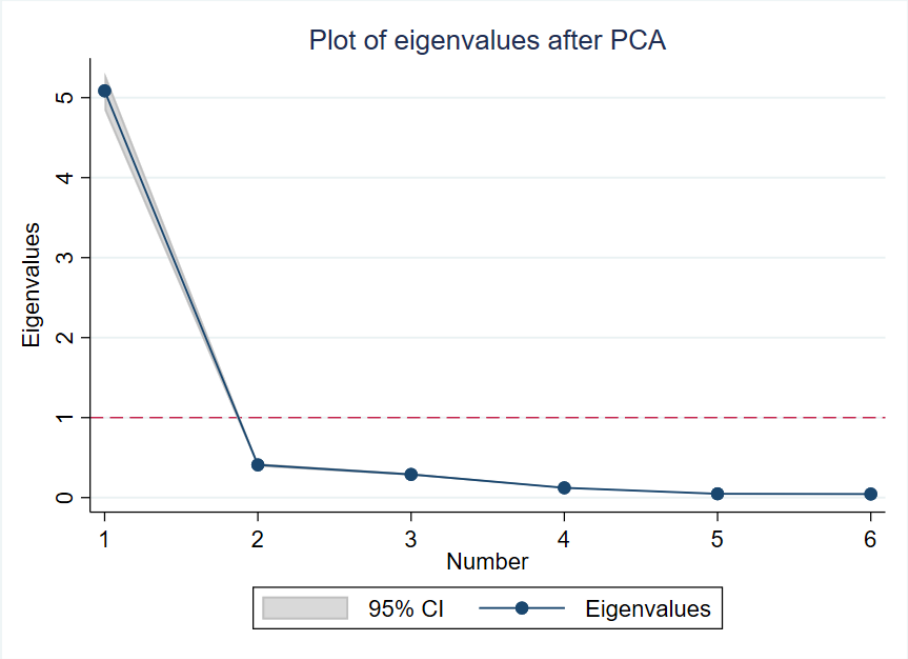
To avoid the multicollinearity problems between variables, we construct the synthetic variable *ISQU*, starting from the six components. We extract the main component that shows only an eigenvalue above the threshold of one. Since this component is related to all six components, it can be interpreted as a synthetic measure of institutional quality.

Table C.2. PCA on World Bank Institutional variables.

Component	Eigenvalue	Difference	Variance Proportion	Cumulative Variance	Variable	Correlation with Component 1 (*ISQU*)
Component 1	**5.0854**	4.6759	**0.8476**	0.8476	***CC***	0.4233
Component 2	0.4095	0.1195	0.0682	0.9158	***PS***	0.3625
Component 3	0.2900	0.1677	0.0483	0.9641	***RL***	0.4336
Component 4	0.1223	0.0742	0.0204	0.9845	***VA***	0.3862
Component 5	0.0481	0.0034	0.0080	0.9926	***GE***	0.4240
Component 6	0.0447	.	0.0074	1.0000	***RQ***	0.4152

NOTES: Period: 1996-2017. Principal Component Analysis on the left panel. Variable-Component Correlation on the right panel. *CC* = Control Corruption. *PS* = Political Stability. *RL* = Rule of Law. *VA* = Voice and Accountability. *GE* = Government Effectiveness. *RQ* = Regulatory Quality. See Appendix A for detailed definitions and sources of the variables of interest. Relevant components have an eigenvalue larger than one.

Figure C.1. Plot of eigenvalues after PCA (World Bank Institutional variables).



NOTES: The solid line represents the eigenvalues from the PCA. The dotted line indicates the threshold for significant eigenvalues higher than one.

APPENDIX D. COLLINEARITY AND PCA ON ICRG'S VARIABLES

ICRG dataset includes eight institutional variables. To check if they are affected by multicollinearity issues, we run a multicollinearity analysis similar to that in Appendix C. In this case, VIFs lower than 6 and R^2 lower than 0.95 suggest that ICRG institutional variables do not suffer from multicollinearity, as confirmed by a condition number smaller than 15.

Table D.1. Collinearity diagnostics on ICRG Institutional variables.

Variable	VIF	R-Squared		Eigenvalue	Condition Index
BANK_CRISIS	1.11	0.0969	1	6.8918	1.0000
GDPpc	3.49	0.7138	2	1.3293	2.2769
BAS	2.27	0.5589	3	1.3074	2.2959
INF	1.07	0.0620	4	1.1425	2.4560
CAB	1.41	0.2888	5	0.9762	2.6570
TOP5	1.09	0.0818	6	0.8321	2.8779
EU	1.68	0.4036	7	0.7625	3.0064
PERIOD	1.31	0.2355	8	0.6400	3.2815
FFI	1.83	0.4524	9	0.5937	3.4071
SC	3.91	0.7445	10	0.5128	3.6661
IP	2.13	0.5299	11	0.4337	3.9865
IC	1.87	0.4659	12	0.3964	4.1698
CO	3.14	0.6813	13	0.3072	4.7369
MP	2.98	0.6646	14	0.2440	5.3146
LO	2.79	0.6412	15	0.2417	5.3394
DA	2.27	0.5593	16	0.2068	5.7729
BQ	3.60	0.7221	17	**0.1818**	**6.1576**
Mean VIF	**2.23**		Condition Number		**6.1576**

NOTES: Eigenvalues and Condition Index computed from scaled raw score of the sums of squares and cross products matrix without intercept. Det(correlation matrix)=0. R_i^2 = goodness of fit of the regression of the i^{th} variable on all the others; critical: 0.95 and 0.99. Individual $VIF_i = 1/(1 - R_i^2)$; critical: 10 (standard "rule of thumb") and 30 (maximum). Mean $VIF = \sum_{i=1}^{17} VIF_i$; critical: 6 (conservative). Eigenvalue λ: see Chatterjee and Price (1991); critical: 0.10 and 0.01. Condition $Index_i = \sqrt{\frac{\max_p \lambda}{\lambda_i}}$; critical: 15 (standard "rule of thumb") and 30 (maximum). Condition Number $= \sqrt{\frac{\max_p \lambda}{\min_p \lambda}}$; critical 15 (conservative). Values above critical threshold in bold.

Hence, we run a PCA to extract the institutional quality factor from the eight dimensions.

Table D.2. PCA on ICRG Institutional variables.

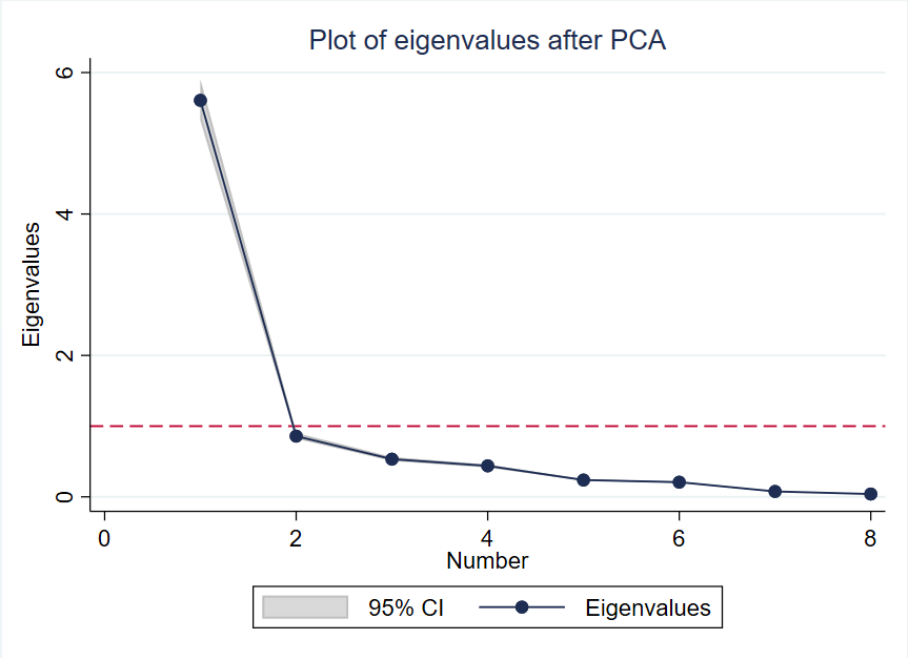
Component	Eigenvalue	Difference	Variance Proportion	Cumulative Variance
Component 1	**5.0265**	4.2394	**0.6283**	0.6283
Component 2	0.7871	0.1979	0.0984	0.7267
Component 3	0.5892	0.0449	0.0737	0.8004
Component 4	0.5443	0.2164	0.0680	0.8684
Component 5	0.3279	0.0278	0.0410	0.9094
Component 6	0.3001	0.0519	0.0375	0.9469
Component 7	0.2481	0.0713	0.0310	0.9779
Component 8	0.1768	.	0.0221	1.0000

Variable	Correlation with Component 1 (*QUIC*)
SC	0.3829
IP	0.3381
IC	0.3247
CO	0.3644
MP	0.3814
LO	0.3574
DA	0.2857
BQ	0.3822

NOTES: Period: 1996-2017. Principal Component Analysis on the left panel. Variable-Component Correlation on the right panel. *SC* = Socioeconomic Conditions. *IP* = Investment Profile. *IC* = Internal Conflict. *CO* = Corruption. *MP* = Military in Politics. *LO* = Law and Order. *DA* = Democratic Accountability. *BQ* = Bureaucracy Quality. See Appendix A for detailed definitions and sources of the variables of interest. Relevant components have an eigenvalue larger than one.

Only the first component has an eigenvalue larger than one as shown also in Figure D.1. The right table shows its correlation with the original variables, which is 0.35 on average. Hence, it can be interpreted as an institutional quality index.

Figure D.1. PCA eigenvalues for ICRG Institutional variables.



NOTES: The solid line represents the eigenvalues from the PCA. The dotted line indicates the threshold for significant eigenvalues higher than one.

APPENDIX E. PCA ON LAEVEN AND VALENCIA (2018) DATASET

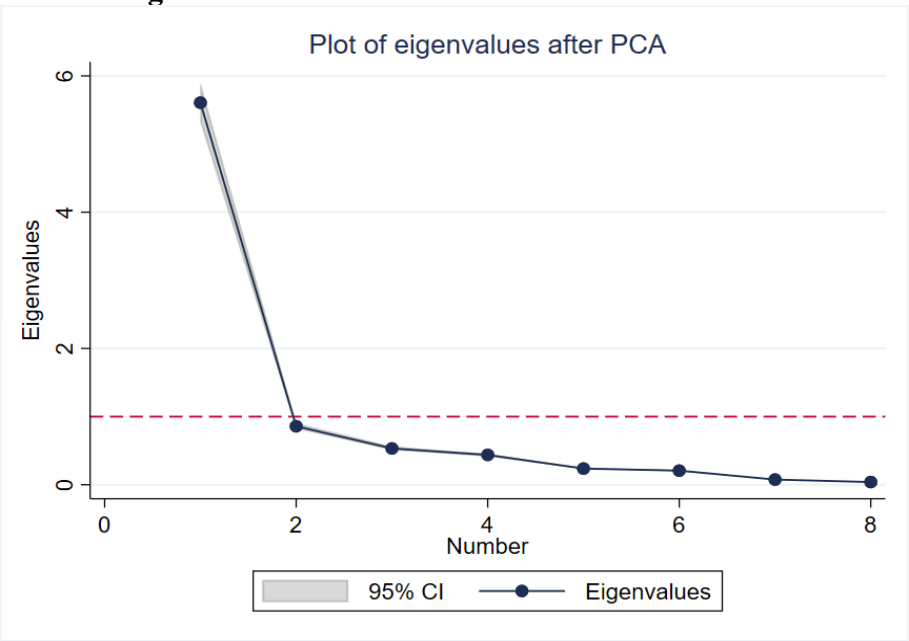
To get a continuous measure of financial instability and better control for omitted variables in the estimates, we run a PCA on the bank variables Leaven and Valencia (2018) used to determine dummy *BANK_CRISIS*. Only the first component has an eigenvalue larger than one (see Figure E.1) and since it is related to all the bank variables used to determine *BANK_CRISIS*, we interpret it as a continuous proxy for the probability of a crisis.

Table E.1. PCA on the bank variables in Leaven and Valencia's (2018) dataset.

Component	Eigenvalue	Difference	Variance Proportion	Cumulative Variance	Variable	Correlation with Component 1 (*CRISIS_INDEX*)
Component 1	5.6071	4.7483	0.7009	0.7009	***DINS***	0.3775
Component 2	0.8588	0.3253	0.1073	0.8082	***BFBH***	0.2021
Component 3	0.5335	0.0953	0.0667	0.8749	***SBLG***	0.3523
Component 4	0.4382	0.1999	0.0548	0.9297	***BARE***	0.4118
Component 5	0.2382	0.0305	0.0298	0.9595	***NATI***	0.3648
Component 6	0.2078	0.1313	0.0260	0.9854	***APTR***	0.3310
Component 7	0.0765	0.0365	0.0096	0.9950	***RCAP***	0.4051
Component 8	0.0400	.	0.0050	1	***PSDE***	0.3409

NOTES: Period: 1996-2017. Principal Component Analysis on the left panel. Variable-Component Correlation on the right panel. *DINS* = Deposit insurance. *DBFH* = Deposit Freeze or Bank holiday. *SBLG* = Significant Bank Liabilities Guarantees. *BARE* = Bank restructuring. *NATI* = Nationalizations. *APTR* = Asset Purchases and Transfers. *RCAP* = Recapitalization. *PSDE* = Peak support (in % of deposits). See Appendix A for detailed definitions and sources of the variables of interest. Relevant components have an eigenvalue larger than one.

Figure E.1. PCA eigenvalues for the bank variables in Leaven and Valencia (2018).



NOTES: The solid line represents the eigenvalues from the PCA. The dotted line indicates the threshold for significant eigenvalues higher than one.