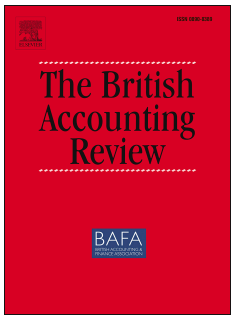


Institutional Mechanisms, Ownership and Bank Risk-taking during Crises

Nathan Lael Joseph, Thi Thuy Anh Vo

PII: S0890-8389(24)00215-4

DOI: https://doi.org/10.1016/j.bar.2024.101451

Reference: YBARE 101451

To appear in: *The British Accounting Review*

Received Date: 27 January 2022

Revised Date: 11 January 2024

Accepted Date: 29 July 2024

Please cite this article as: Joseph, N.L., Anh Vo, T.T., Institutional Mechanisms, Ownership and Bank Risk-taking during Crises, *The British Accounting Review*, https://doi.org/10.1016/j.bar.2024.101451.

Institutional Mechanisms, Ownership and Bank Risk-taking during Crises

Nathan Lael Joseph[a]
Department of Economics and Finance, Brunel University London, UK.

Thi Thuy Anh Vo[b]
University of Economics, University of Danang, Danang Vietnam

[a]Corresponding author's email: Nathan.joseph@brunel.ac.uk or NLjoseph@hotmail.com. Telephone +44(0)7766104537.

[b]We are grateful to the Teaching and Research Team in Corporate Finance and Asset Pricing (CFAP) at University of Economics, The University of Danang, for providing valuable comments on the paper. We are also grateful to the seminar participants at the Bournemouth University, U.K. and the British Accounting and Finance Association's Corporate Finance and Asset Pricing Conference (2019) for their valuable comments. We thank Monica Hernández-Alava for providing additional support on the application of their BICOP software.

Institutional Mechanisms, Ownership and Bank Risk-taking during Crises

Abstract

Previous studies indicate that prior period investor protection, quality of government/institution and ownership have little to no influence on bank risk-taking around crisis periods. Using contemporaneous data of 40 countries, we show that institutional mechanisms, investor protection, bank regulation and supervision (BRS) rules, and ownership reduced bank risk-taking around the Global Financial Crisis (GFC) and Eurozone Crisis/Sovereign Debt Crisis periods. Institutional mechanisms have the strongest risk-reducing impacts on bank risk-taking, whereas foreign and government ownership has the weakest impacts. The greater the percentage distance from bank default the lower the likelihood of crisis regimes. Investor protection increased (decreased) the likelihood of the GFC (Eurozone Crisis) regimes. Government ownership increased (decreased) the likelihood of the GFC (Eurozone Crisis) regimes. Using a generalized bivariate copula function, we untangle the relation between crisis regimes and bank risk-taking by showing that higher bank risk-taking increases the likelihood of bank crisis regimes.

Keywords: Bank risk-taking; Investor protection; Institutional mechanisms; Ultimate ownership; Bank regulation; Bivariate copula function; Crisis regimes

JEL: G01; G21; G28; G32

1. Introduction

Since La Porta et al. (1997; 1998), there has been substantial research interest in the influences of institutional mechanisms on economic growth, financial market development and risk-taking.[1] These studies show that the strength of institutional mechanisms has economic consequences for countries. Despite the considerable influences of institutional mechanisms (see, e.g., La Porta et al., 1997; Wurgler, 2000), previous studies show that prior period investor protection, ownership, and institutional mechanisms, have little to no influence on bank risk-taking during crisis periods (Beltratti and Stulz, 2012; Erkens et al., 2012; Hoque et al., 2015). Specifically, Beltratti and Stulz (2012) report that prior period investor protection levels only predict stock returns of non-U.S. banks and the strength of bank regulation and supervision (BRS) rules is unrelated to stock price performance during crisis periods, except for large banks in countries with more restrictions, and banks with more shareholder-friendly boards. Hoque et al. (2015) provide related results. They show that investor protection and quality of government do not jointly influence bank performance, nor does ownership robustly influence risk-taking during crisis periods. These results are surprising since they imply that legal and regulatory mechanisms are ineffective in averting financial crises or mitigating crisis events. They also suggest that banks that perform well during crisis periods may have done so due to their risk culture or business model (Fahlenbrach et al., 2012), thus supporting the view that certain legal and BRS rules may be revocable, by banks adopting their own provisions and governance practices (Klapper and Love, 2004). However, prior evidence is mixed on the role of bank-level governance in mitigating risk-taking around crisis periods (Erkens et al., 2012; Minton et al., 2014; Vallascas et al., 2017; Fernandes et al., 2021; Abid et al., 2021).

Motivated by the above considerations, we examine whether institutional mechanisms, as well as ownership, investor protection, and BRS rules, influence the risk-taking behavior of commercially listed banks headquartered in 40 countries. Since institutional mechanisms, ownership, and BRS rules influence bank risk-taking during tranquil periods (Barth et al., 2004; Laeven and Levine, 2009; Angkinand and Wihlborg, 2010), we test whether they also influence the extent of risk-taking around the Global Financial Crisis (GFC) and Eurozone Crisis periods. Higher levels of non-performing loans (NPLs) also increase risk-taking during crisis periods (Leung et al., 2015). We undertake a

[1]By institutional mechanisms we mean the different laws and legal enforcement rules in countries that influence ownership concentration, investor and creditor rights protection, financial system development, and property rights. The level of investor protection reflects the strength of institutional mechanisms and ownership rights in countries (La Porta et al., 1999). When we refer to governance mechanisms, we sometimes include legal/institutional mechanisms and ownership structure.

multi-country study since prior studies show that the effects of institutional mechanisms, investor protection, and BRS rules vary across countries and, in turn, influence ownership structures and financial market development (La Porta et al., 1997; 1998; Laeven and Levine, 2009). Indeed, the effects of BRS rules on risk-taking depend on the strength of investor protection (Teixeira et al., 2020) as well as the comparative powers of bank owners (Laeven and Levine, 2009).[2] Furthermore, higher risk-taking is associated with expropriate from minority shareholders and is more pronounced around crisis periods, particularly when investor protection and bank regulations are weak and asset values are expected to fall (Johnson et al., 2000; Boyd and Hakenes, 2014). Thus, collectively, we expect our measures to influence risk-taking around crisis periods. Unlike Beltratti and Stulz (2012), Erkens et al. (2012), and Hoque et al. (2015), we use the *contemporaneous* values of our measures since they aim to maintain market discipline during both tranquil and crisis periods. We separately analyze each crisis period since crisis events are unique and have different origins (Kaminsky and Reinhart, 1999). [3] We therefore ask: How do governance mechanisms, investor protection, and BRS rules shape risk-taking around crisis periods? Do these mechanisms predict the likelihood of crisis regimes?

Using the standard deviation of return on bank assets (ROA), hereinafter, RISK, and the natural logarithm of Z-score, we find results that contrast with those of prior studies (i.e., Beltratti and Stulz, 2012; Erkens et al., 2012; Hoque et al., 2015).[4] Specifically, we find that institutional mechanisms, ownership, investor protection, and BRS rules reduce risk-taking around both crisis periods. We attribute the difference between our results and those of prior studies to our research design and the hypotheses we test. We also find that institutional mechanisms and investor protection have the largest decreasing impacts on risk-taking, whereas ultimate foreign and government ownership have the smallest decreasing impacts. The effects of macroeconomic variables are also weak. The stronger influence of institutional mechanisms on risk-taking relative to macroeconomic

[2]Too strong a level of supervisory power is associated with corruption in lending (Beck et al., 2006b). However, reforms of legal institutions, corporate governance, and bank liberalization increase banking stability (Fang et al., 2014).

[3]The sample periods are the years: i) 2005–2009, which include the GFC of 2007–2008, in line with prior studies (Beltratti and Stulz, 2012; Erkens et al., 2012; Hoque et al., 2015); and ii) 2009–2019, which include the Eurozone Crisis of 2010–2018. 2009 is a common year in both sample periods since we want to predict the non-crisis years of each sample period and the two crises are not far apart in years. The Eurozone Crisis is considered to have started May 2, 2010, after the first Greek bailout (https://www. reuters.com/article/us-eurozone/, accessed, Nov. 9, 2018) and ended August 2018, following the European leaders' declaration (Brunsden and Khan, 2018). Joseph et al. (2020) also use 2010–2018 as the Eurozone Crisis period. Our results are robust using alternative years for the Eurozone Crisis period. Years outside the crisis periods are included since we also want to predict the years of crises by country.

[4]Explanations for crises include asset bubbles, panic, external shocks, and contagion (Krugman, 1998; Corsetti et al., 1999). The severity of a financial crisis often reflects the strength of institutional mechanisms and BRS rules, and the types of ownership in countries (see Johnson et al., 2000).

variables is in line with the view that institutions are more effective in achieving economic outcomes compared to macroeconomic policy (Acemoglu et al., 2003). Our findings are robust to an alternative risk-taking proxy, alternative sub-sample estimations, and difference-in-difference (DID) regression estimates.

Using the Bussiere and Fratzscher (2006) post-crisis bias test, we find that bank risk-taking predicts the pre-crisis regimes more strongly than the crisis/post-crisis regimes. This result suggests that governmental and regulatory actions aimed at mitigating crisis events are likely to be more effective during pre-crisis regimes. Furthermore, the greater the distance from bank default, the lower the likelihood of the crisis regime. This result re-enforces the view that the strength of ex-ante bank balance sheet stability is critical in ensuring that banks withstand the liquidity shocks associated with crisis events (see Kapan and Minoiu, 2018). Stronger investor protection reduced the likelihood of crisis regimes in countries during the 2005–2009 period but increased their likelihood during the 2009–2019 period. The latter result does not call for self-regulation, since institutional mechanisms and investor protection tend to constrain expropriation by controlling investors, especially when investment returns are expected to fall (Johnson et al., 2000). That is, self-regulation would only incentivize greater expropriation and risk-taking around crisis periods.[5] Thus, even if bank consolidation reduces regulatory constraints, it is still necessary to ensure legal rules, and prudential and BRS rules are effective (Mishkin, 1999).

We contribute to prior research in the following ways. First, we contribute to prior research on the collective roles of institutional mechanisms, ownership, investor protection, and BRS rules in shaping bank risk-taking around crisis periods. Unlike prior studies that use an alternative research design (see Beltratti and Stulz, 2012), we show that institutional mechanisms have the largest mitigating impacts on risk-taking. Second, our focus on crisis periods allows us to assess the effectiveness of institutional and regulatory mechanisms in periods when controlling investors and managers are more likely to expropriate (Johnson et al., 2000). For example, Laeven and Levine (2009) find that, in tranquil periods, bank risk-taking varies under different bank regulatory conditions depending on the comparative powers of shareholders. We show that, around crisis periods, institutional mechanisms, investor protection, and BRS rules have stronger mitigating effects on bank risk-taking than foreign and government ownership. Thus, while Iannotta et al. (2013) show that government ownership induces higher operational risk compared to privately held banks, failure

[5]Dominant insiders of complex organizations may siphon off cash from low cash flow rights units to high cash flow rights units, thereby causing dominant insiders to take more risk in low cash flow rights units (John et al., 2008).

to account for the effects of institutional mechanism, investor protection, and BRS rules suggests that their reported effects for ownership may have been overestimated. We do not endogenize board characteristics since board governance may be counter-productive around crisis events (Beltratti and Stulz, 2012; Van Essen et al., 2013).[6] Indeed, board-level governance practices do not substitute for institutional mechanisms or BRS rules (Klapper and Love, 2004), meaning that, if bank-level governance practices fail, there is no recourse for investors except through existing legal and regulatory channels. Third, unlike prior studies (Demirgüç-Kunt and Detragiache, 2002; Beck et al., 2006a), we estimate the likelihood of: i) the tranquil regime for countries, when economic conditions are largely sound; ii) the pre-crisis regime; and, iii) the crisis/post-crisis regime for countries, when economic fundamentals go through adjustments. Using this approach, we address the weak and, perhaps, unconvincing view that lax institutional mechanisms, weak investor protection, and BRS rules incentivize excessive risk-taking that in turn increases the likelihood of crisis events (Kirkpatrick, 2009; Bebchuk and Spamann, 2010). We corroborate these results using a generalized bivariate copula function. We believe we are the first to directly test the relation between risk-taking and crisis events.

The next section reviews prior studies and presents our hypotheses. Section 3 presents our models and data. Sections 4 and 5 present the results and we conclude in Section 6.

2. Background and hypothesis development

While the strength of investor protection may influence controlling shareholders' behavior, legal rules determine how property rights are protected (John et al., 2008). Legal rights vary across countries and predict differences in ownership structure and financial development (La Porta et al., 1998). Laws and bank regulations determine bank capital requirements, foreign ownership, and foreign bank entry (Barth et al., 2013). Governance mechanisms and BRS rules also influence risk-taking behavior (Laeven and Levine, 2009). Our hypotheses are developed from these perspectives for the sample periods 2005–2009 (which contains the 2007–2008 GFC) and 2009–2019 (which contains the 2010–2018 Eurozone Crisis). Fuller definitions of our variables are in the WEB Appendix A.

[6]There is substantial debate about whether firm-level governance is more effective in enhancing firm performance than institutional mechanisms and investor protection (Klapper and Love, 2004; Chhaochharia and Laeven, 2009).

2.1. Institutional mechanisms and investor protection

Countries that lack sound governance mechanisms are more prone to corruption, poor legal enforcement, and ineffective governments (La Porta et al., 1998). Weak institutional mechanisms incentivize expropriation by managers and controlling investors (Shleifer and Vishny, 1997). Johnson et al. (2000) show that agency conflicts in countries with weak legal systems make these countries more economically vulnerable, when market prices are likely to decline. The enforceability of investors' intrinsic rights depends on a country's rule of law and government effectiveness (La Porta et al., 1998). Caprio et al. (2007) report that higher cash flow rights reduce the negative effects of poor investor protection. However, shareholders may tolerate excessive risk-taking if they stand to benefit substantially from up-side risk, if losses are also borne by governments and society (Bebchuk and Spamann, 2010). As such, strong investor protection rules create less fear of managerial expropriation and less of a need for dominant shareholders to direct investment policy (Burkart et al., 2003). If a decline in the power of the dominant shareholder allows managers to have more discretion to pursue conservative policies, this may lead to a negative relation between investor protection and risk-taking. However, John et al. (2008) suggest that investor protection and risk-taking may be positively related, since riskier investments generate higher returns, if such investments pay off. Given these conflicting perspectives, we hypothesize that for the periods around our crises,

***H*$_{1A}$.** *Stronger institutional mechanisms and investor protection reduced bank risk-taking around the crisis periods.*

***H*$_{1B}$.** *Stronger institutional mechanisms and investor protection increased bank risk-taking around the crisis periods.*

We measure the strength of institutional mechanisms using four of the six institutional mechanisms of the standardized Worldwide Governance Indicators (WGIs) of Kaufmann et al. (2011).[7] We therefore use the components of Rule of Law, Control of Corruption, Regulatory Quality, and Government Effectiveness. Since 2002, the WGIs have been updated yearly by the World Bank. Following Houqe et al. (2012), we use the aggregated six dimensions of the WIGs, called the Quality of Government. Beltratti and Stulz (2012) and Hoque et al. (2015) also use the WGIs' six dimensions,

[7]For simplicity we refer to WGI measures as institutional mechanisms/arrangements in line with what Beltratti and Stulz (2012) and Hoque et al. (2015) and others who also use the WGIs which they call *Institution*. Erkens et al. (2012) also use the WGIs, which they interchangeably refer to as Institution, legal institutions, country-level governance mechanisms, country-level legal institutions, and country-level governance.

which they call *Institution*, based on the simple average of the WGIs. We measure Investor Protection using the Spamann (2010) corrected Anti-Director Rights Index (ADRI). This measure is supplemented with the Djankov et al. (2008) revised ADRI for six countries, i.e., China, Kazakhstan, Ukraine, Russia, Poland, and Tunisia, due to missing data. Since both ADRI measures are highly correlated (Spearman rank correlation, r_s = 0.69; p-value ≤ 0.01), there is little loss of information using the revised ADRI.

2.2. Ultimate foreign and government ownership

Various forms of ownership impose different levels of discipline on firms (see Ferreira and Matos, 2008; Aggarwal et al., 2011). Huang et al. (2022) argue that foreign ownership substitutes for country-level governance. They suggest that foreign ownership promotes risk-taking in countries with weak institutional governance. Arguably, government ownership helps prevent market failure and promotes socially desirable projects. Prior evidence on the relation between ownership and bank performance is mixed (see Cull et al., 2017, for a review). Government ownership tends to increase risk-taking due to government protection from bank default (Iannotta et al., 2013). Large voting and cash flow rights give shareholders more power and incentive to shape investment policy (La Porta et al., 1998). Thus, Laeven and Levine (2009) show that banks with owners that have larger voting and control rights take more risk. Very few studies examine the competing influences of government and foreign ownership on bank risk-taking. An exception is the study by Angkinand and Wihlborg (2010). They report that institutional mechanisms and ownership shape risk-taking in the presence of deposit insurance schemes. Yeyati and Micco (2007) indicate that banks with foreign ownership undertake higher risk-taking than domestic banks. Beltratti and Stulz (2012) measure ownership using the largest ultimate shareholder and find that ownership increases risk-taking. Given these perspectives, we hypothesize that for the periods around our crises,

***H*$_{2A}$.** *Banks with government and/or foreign ownership decreased bank risk-taking around the crisis periods.*

***H*$_{2B}$.** *Banks with government and/or foreign ownership increased bank risk-taking around the crisis periods.*

By government and foreign ownership, we mean part ownership of banks by governments and foreign investors, respectively. We measure ownership using the percentage of ultimate foreign corporate

and ultimate government ownership available in BankFocus for our listed banks, headquartered in the 40 countries. Specifically, ownership is the percentage of bank shares held by foreign corporate and government owners of the commercial banks in our sample.

2.3. Bank regulation and supervision (BRS)

Due to the complexity of banks' operations (Morgan, 2002), institutional mechanisms and investor protection may be ineffective in thwarting expropriation or controlling excessive risk. BRS rules may supersede investor protection arrangements or even render them superfluous (Caprio et al., 2007). As stated before, bank risk-taking varies under different bank regulatory conditions depending on the comparative powers of shareholders (Laeven and Levine, 2009). Given these conditions, BRS rules may interact with institutional mechanisms and investor protection to influence risk-taking in addition to the influence of investor protection. Indeed, theory predicts that BRS rules enhance social welfare in the presence of higher risk-taking incentives (Boyd et al., 1998). However, while, empirically, generous deposit insurance exacerbates moral hazard and increases banking fragility (Demirgüç-Kunt and Detragiache, 2002), bank supervision incentivizes greater disclosure and private monitoring, while also reducing the moral hazard of deposit insurance (Barth et al., 2004). Cihák and Tieman (2008) report, however, that tighter official supervisory power and capital regulation increase banking system fragility (see also Demirgüç-Kunt and Detragiache, 2011). Thus, we hypothesize that for the periods around our crises,

***H*$_{3A}$.** *Stronger BRS rules reduced bank risk-taking around the crisis periods.*
***H*$_{3A}$.** *Stronger BRS rules increased bank risk-taking around crisis the periods.*

We measure BRS rules using Capital Regulation, Overall Banking Restrictions on Banking, Independence of Supervisory Authority (Political), Limitations on Foreign Bank Entry, and No Explicit Deposit Insurance Scheme. We use these measures since they are commonly used in prior studies (Cihák and Tieman, 2008; Beltratti and Stulz, 2012; Barth et al., 2013; Hoque et al., 2015). Independence of Supervisory Authority (Political) and No Explicit Deposit Insurance Scheme are measured as dummy variables.

2.4. Predicting crisis regimes

Prior studies show that weaknesses in legal and regulatory mechanisms contribute to crisis events (Kirkpatrick, 2009; Bebchuk and Spamann, 2010). Beck et al. (2006a) suggest that regulatory systems and national institutions that thwart bank competition, increase banking systems' fragility and intensify risk-taking. For example, deposit insurance schemes exacerbate moral hazard in banking by disincentivizing depositors to monitor banks, further encouraging excessive risk-taking. Thus, Demirgüç-Kunt and Detragiache (2002) find that deposit insurance schemes increase the likelihood of banking crises. While BRS rules aim to curb excessive managerial incentives, their effectiveness depends on the quality of the legal environment. Indeed, weak investor protection in countries increases the severity of crises (Johnson et al., 2000). Poor market discipline is associated with excessive risk-taking and increases the likelihood of banking crises (Barth et al., 2004; Anginer et al., 2014). Since economic fundamentals are largely sound and sustainable during tranquil periods but undergo an adjustment process during the crisis/post-crisis periods, we hypothesize that,

***H*$_{4A}$**: *Stronger institutional mechanisms, investor protection, and BRS rules decreased the likelihood of the pre-crisis and crisis/post-crisis regimes.*

***H*$_{4B}$**. *Stronger institutional mechanisms, investor protection, and BRS rules increased the likelihood of the pre-crisis and crisis/post-crisis regimes.*

Unlike prior studies (see Demirgüç-Kunt and Detragiache, 2002), we use the Bussiere and Fratzscher (2006) post-crisis bias test to predict the crisis regimes. The model estimates the likelihood of the tranquil regime, the pre-crisis regime, and the crisis/post-crisis regime (see Section 3.1). The post-crisis bias test is more powerful than the binary logit or probit models since these models do not sufficiently discriminate among the phases of the crisis regimes (Bussiere and Fratzscher, 2006). We identify the crisis year(s) for each country using the Laeven and Valencia (2018) database. We extend their crisis years(s) to the more recent period. We adopt this approach since all countries did not necessarily experience a crisis in the same year. ***H*$_{4A}$** and ***H*$_{4B}$** are tested for each sample period.

3. Model specification and the data

3.1. Model specification

We measure risk-taking using $RISK_{i,t}$ and Z-$score_{i,t}$. These measures, and especially Z-$score_{i,t}$, are often used to capture risk-taking (John et al., 2008; Laeven and Levine, 2009; Berger and Bouwman,

2009; Houston et al., 2010). Following John et al. (2008) and Faccio et al. (2016), we estimate $RISK_{i,t}$ for bank *i* in year *t*, using the standard deviation of $DE_{i,t}$ from *t* to *t*+4, where $DE_{i,t}$is the deviation of a bank's return on assets (ROA) from our global sample average, over a five-year overlapping window. Hence, $DE_{i,t} = ROA_{i,t} - \overline{ROA}_t$ where $\overline{\text{ROA}}_t$ is the global average of ROA for our sample banks in 40 countries, in year *t*. ROA is the ratio of bank profit before tax to total assets. $RISK_{i,t}$ is for bank *i* at year *t* in a country, computed as,

$$RISK_{i,t} = \sqrt{\frac{1}{4}\sum_{j=0}^{4}\left(DE_{i,t+j} - \frac{1}{5}\sum_{k=0}^{4} DE_{i,t+k}\right)^2}, \quad (1a)$$

requiring five years of observations and removing bank-year observations, if unavailable over the window. We denote $RISK_{i,t}$ as RISK, as appropriate. Arguably, since we use the sample average $\overline{\text{ROA}}_t$, RISK may not be significantly affected by differences across countries. We therefore estimate another RISK measure, which we call RISK*, using the standard deviation of each bank's ROA over a five-year overlapping window. Thus, $RISK^*_{i,t} = \sqrt{\frac{1}{4}\sum_{j=0}^{4}\left(ROA_{i,t+j} - \frac{1}{5}\sum_{k=0}^{4} ROA_{i,t+k}\right)^2}$. Both RISK and RISK* are profit volatility measures in line with our risk-taking focus. They are likely to capture banks' risky assets whose downside is realized at default. Since both risk measures generate similar results, we focus on the results using RISK as the dependent variable.

Following Laeven and Levine (2009) and Houston et al. (2010), we estimate $Z\text{-}score_{i,t}$ for bank *i* in a country at year *t* as,

$$Z\text{-}score_{i,t} = Ln((ROA_{i,t} + CAR_{i,t})/\sigma ROA_{i,t}). \quad (1b)$$

In Eq. (1b), $ROA_{i,t}$ is the return on total assets, as before. $CAR_{i,t}$ is the equity to total assets ratio. σ(ROA) is the standard deviation of $ROA_{i,t}$ which gives $Z\text{-}score_{i,t}$ a risk-taking interpretation. We use $Z\text{-}score_{i,t}$ and *Z*-score interchangeably. Z-score compares a bank's buffer (capitalization and returns) with the volatility of its return on assets, i.e., σ(ROA). A higher Z-score indicates stronger balance sheet stability. Ahrend and Goujard (2015) show that bilateral bank flows significantly decrease when creditors' bank assets are hit by negative exogenous shocks, suggesting that Z-score is economically meaningful. Since Z-score is highly skewed (Laeven and Levine, 2009; Anginer et al., 2014), we follow prior studies by using the natural logarithm of the raw Z-score value. This approach enables us to compare our results with prior related studies.

Using our risk-taking measures, our baseline equation is:

$$RISK_{i,t}\ or\ Z\text{-}score_{i,t} = \alpha + \rho_1 DLoans_{i,t} + \sum_l \beta_l Legal_{l,j,t} + \sum_m \beta_m Control_{m,i,t} + \\ + \sum_k \theta_k Income\ level_k + \sum_t \gamma_t Year_t + \varepsilon_{i,t}. \quad (2)$$

In Eq. (2), $RISK_{i,t}$ and $Z\text{-}score_{i,t}$ are risk-taking measures for bank *i* in year *t*, defined earlier. Using bank loans scaled by total assets is likely to be a source of endogeneity since bank loans by total assets, and risk-taking may be jointly determined. Furthermore, bank executives can increase risk-taking during tranquil periods and decrease the level of risk-taking during crisis periods, depending on their tolerance for risk. A change of board structure can also cause risk-taking to be correlated with bank loans. Thus, in Eq. (2), we use $DLoans_{i,t}$, which are the deviations of bank loans to total assets of bank *i*, from the average country-level bank loans to total assets in year *t*. We instrument $DLoans_{i,t}$, since we assume that an individual bank's $DLoans_{i,t}$ are unlikely to influence total country bank loans in year *t* (absence of simultaneity).[8] We address the selection of our IVs below.

In Eq. (2), $Legal_{l,j,t}$ is a set of legal/institutional measures *l* in country *j* in year *t*. $Control_{m,i,t}$ is a set of *m* control macroeconomic and financial variables that influence crisis events and economic and financial development (La Porta et al., 1997; Johnson et al., 2000; Frankel and Saravelos, 2012). The *m* control variables include real GDP Growth to capture business cycle conditions (De Bruyckere et al., 2013) and the ratio of Market Capitalization by country to GDP to proxy for the state of financial development (see Wurgler, 2000). Higher financial market development improves the capital allocation and stronger legal and regulatory environments improve financial market development (La Porta et al., 1997). $Income\ level_k$ and $Year_t$ capture country income group and year fixed effects, respectively. Both aim to mitigate model misspecification due to potential missing variables and capture unobservable country development effects. For example, income level explains differences in the quality of BRS and economic development (Cihák and Tieman, 2008). $\varepsilon_{i,t}$, is an error term. Our explanatory and control variables are not lagged since we want to relate them to risk-taking in the same sample period.

Since ownership and BRS rules may also influence risk-taking (see Caprio et al., 2007; Laeven and Levine, 2009), we extend Eq. (2) such that our full model is,

$$RISK_{i,t}\ or\ Z\text{-}score_{i,t} = \alpha + \rho_1 DLoans_{i,t} + \sum_l \beta_l Legal_{l,j,t} + \sum_w \beta_w Ownership_{w,i,t} + \\ \sum_r \beta_r Regulation_{r,j,t} + \sum_m \beta_m Control_{m,i,t} + \sum_k \theta_k Income\ level_k + \\ \sum_t \gamma_t Year_t + \varepsilon_{i,t}. \quad (3)$$

[8] Laeven and Levine (2009) use a related approach for their variables but based on their mean values.

Here, $Ownership_{w,i,t}$ captures ultimate foreign corporate and government percentage ownership *w*, for bank *i* at year *t*. $Regulation_{r,j,t}$ captures a set of BRS measures, *r*, in country *j* in year *t*. $Legal_{l,j,t}$ and $Regulation_{r,j,t}$ are likely to be exogenous since management cannot control their levels. However, $Ownership_{w,i,t}$, may be a source of endogeneity if innovations in $Ownership_{w,i,t}$ affect risk-taking. We suggest that this is unlikely, since the percentages of foreign and government ownership are relatively small (Table 1) and appear to cluster at low levels of risk-taking (Figure 2).

Since Eqs. (2) and (3) are estimated using IV-GMM, we now consider our IVs. An IV should be correlated with the endogenous variable, i.e., $DLoans_{i,t}$, and affect risk-taking *only* through its effect on $DLoans_{i,t}$. As such, we use various combinations of macroeconomic variables including Private Credit to GDP, Domestic Credit to Private Sector over GDP, GDP per Capita, Gross National Product per Capita, since they are likely to affect $DLoans_{i,t}$ through their effects on economic conditions in an economy. For example, GDP per capita appears to be a valid IV since GDP and per capita vary by country and may affect $DLoans_{i,t}$. Our IVs are invalid (i.e., the exclusion principle) if they simultaneously proxy for variables that affect the outcome variable. We report several diagnostic tests to validate our IVs. We find no evidence that our IVs are invalid.

Finally, we predict the crisis regimes using the Bussiere and Fratzscher (2006) post-crisis bias test. The test provides an early warning signal of the likelihood of: i) the tranquil year(s)/regime ($Y_{i,t} = 0$), when economic conditions are largely sound; ii) the pre-crisis year(s)/regime ($Y_{i,t} = 1$), when economic conditions are subject to adjustments; and iii) the crisis/post-crisis year(s)/regime ($Y_{i,t} = 2$), when economic adjustment occurs before achieving stability. Thus:

$$\Pr(Y_{i,t} = 0) = \frac{1}{\left(1+e^{X_{i,t}\beta^1}+e^{X_{i,t}\beta^2}\right)},$$

$$\Pr(Y_{i,t} = 1) = \frac{e^{X_{i,t}\beta^1}}{\left(1+e^{X_{i,t}\beta^1}+e^{X_{i,t}\beta^2}\right)}, \tag{4}$$

$$\Pr(Y_{i,t} = 2) = \frac{e^{X_{i,t}\beta^2}}{\left(1+e^{X_{i,t}\beta^1}+e^{X_{i,t}\beta^2}\right)}.$$

In Eq. (4), $X_{i,t}$ is a vector of country-level explanatory variables including RISK or Z-score. For example, β^1 captures the effect of a change in $X_{i,t}$ on the probability of being in a (say) pre-crisis regime, relative to the probability of being in a tranquil regime. ($Y_{i,t}$ =2) captures a part of $(Y_{i,t} = 0)$, as in standard binary models, but splits it into the crisis/post-crisis regime and the new tranquil regime. Thus,

$$Y_{i,t} = \begin{cases} 1 \text{ if } \exists\ k = 1, \dots n, \text{year(s)}\ \ s.t.\ \ CE_{i,t+k} = 1, \\ 2 \text{ if } \exists\ k = 0, \dots, p,\ s.t.\ \ CE_{i,t-k} = 1, \\ 0, \text{otherwise.} \end{cases} \quad (5)$$

In Eq. (5), $CE_{i,t}$ is the crisis event/year, which has a value of 1 in year *t* if country *i* is hit by a crisis; 0, otherwise. To predict the likelihood of a pre-crisis regime and crisis/post-crisis regime, we use the Laeven and Valencia (2018) country-crisis years to identify countries hit by a crisis in a given year. Since their sample ends in 2017, we extend their approach to the more recent period.

3.2. The data

Our regression results are based on two sub-periods, estimated independently: i) the years 2005–2009, which span the GFC of 2007–2008; and, ii) the years 2009–2019, which span the 2010–2018 Eurozone Crisis period. As stated before, 2009 is a common year in both sample periods since we want to predict the crisis years in each period. We follow Beltratti and Stulz (2012), Erkens et al. (2012), and Hoque et al. (2015) and use similar years for the GFC period. We use 2010 as the start of the Eurozone Crisis period since May 2010 is the date of the first Greek bailout by the European Central Bank and IMF (see also, Joseph et al., 2020). We use 2018 as the end of the Eurozone Crisis period since European leaders declared the crisis to be over in August 2018 (Brunsden and Khan, 2018).[9] Our crisis periods include the years outside the crisis periods since we also want to predict the crisis regimes. Our full sample contains 686 listed commercial banks, headquartered in 40 countries, after removing bank subsidiaries, banks with loans-to-asset ratios of less than 10%, banks with deposits-to-assets ratios of less than 20% (see Beltratti and Stulz, 2012), and banks with total assets of less than US$1billion. These restrictions are likely to limit our sample to mainly deposit-taking banks (Beltratti and Stulz, 2012). Since we need to have at least three banks in a country to compute the Bank Concentration proxy (see Beltratti and Stulz, 2012), this further limits the number of countries we examine. The number of countries in our study is comparable to those of Laeven and

[9]Prior studies use different sample periods for the Eurozone Crisis. Ongena et al. (2019) use 2009–2012 for the Eurozone Crisis period whereas Acharya et al. (2018) use the 2010–2012 period. For both studies, the crisis year end is 2012 although Ongena et al. (2019) extended their sample to 2013. Hoque et al. (2015) use 2010–2011 to examine risk-taking around the Eurozone Crisis period. 2011 appears to be the end of their sample period. Using the 2010–2011 or 2010–2012 period ignores several other crisis events during the Eurozone Crisis period, including the bailout of Italian banks in mid-2016, and Spain's bank recapitalization programs between 2012 and 2014, and its deleveraging in late 2016 (see Gandrud and Hallerberg, 2014; Lehmann, 2017). Gandrud and Hallerberg (2014) provide a list of 15 Asset Management Companies (AMCs) created by 12 EU countries for some 37 failing banks during 2008–2014. Even so, we re-run the estimation for the 2009–2012 period. These additional results are consistent with our reported findings (see WEB Appendix B).

Levine (2009) and Beltratti and Stulz (2012) but we have a larger number of listed banks (see Appendix 1).[10]

Our data sources include the World Bank Global Financial Development (2019), the World Bank, and Bank Focus. The BRS rules are from World Bank Surveys on the Bank Regulation database. The U.K. and U.S. economies are treated as affected by the Eurozone Crisis since their sovereign bond yields declined during the period (De Santis and Zimic, 2018). However, we test the sensitivity of our results to the assumption that only Eurozone banks were affected by the Eurozone Crisis. The largest and smallest 1% of the observations are winsorized variable by variable before estimation.

3.3 Descriptive statistics, correlations and plots

Table 1 shows the descriptive statistics for the main variables used to estimate our regressions. RISK and RISK* have non-zero means of 0.71% and 0.72%, respectively, using bank-level data (Panel A). The mean of log (Z-score) is 3.58 at bank level. These risk-taking values are not too different from those of the country-level data in terms of their means and standard deviations (see Panels A and B, Table 1). Foreign Ownership and Government Ownership have means of 15.52 and 4.14%, respectively (Panel A). The Foreign Ownership percentage is larger than the Government Ownership percentage (see Table 1, Panel A). The large percentage of Foreign Ownership is unexpected since foreign ownership tends to decrease around crisis events and government ownership tends to increase (Cull et al., 2017). However, Claessens and Van Horen (2014) show that, as the overall number of domestic banks decreased during the 2007 to 2013 period, foreign bank share increased and ownership shifted away from OECD to non-OECD countries. This may partly explain the larger percentage of Foreign Ownership compared to Government Ownership.

[Table 1, about here]

RISK and RISK* are positively correlated (r_s = 0.80; p-value ≤ 0.01), in untabulated results. Thus, using RISK or RISK* would not systematically alter our results. RISK and RISK* are negatively correlated with the governance mechanisms, whereas Z-score has the expected positive relationship (p-value ≤ 0.10). Since the correlations do not imply causality, we test for causality effects using our regressions.

[10]Our sample compares favourably with prior studies. Laeven and Levine (2009) use 279 publicly listed banks from 48 countries. Beltratti and Stulz (2012) use 387 banks from 32 countries. Using an overlapping window to compute RISK further reduces the number of observations in our sample.

Figures 1 and 2 plot the relationship between risk-taking at country level and Investor Protection, Quality of Government, and ownership. We do so for one year of each crisis period, i.e., 2008 and 2010. Figure 1 shows that, except for the U.S. (USA), developed countries tend to have the highest levels of Investor Protection and Quality of Government. Their values align with low to moderate RISK levels in both years. For both years, China (CHN) has the lowest Investor Protection value, followed by the U.S. (USA). The U.S. (USA) has a relatively high value for Quality of Government in both years, against a relatively low value of RISK. Pakistan (PAK) has the lowest Quality of Government score followed by Russia (RUS). Ukraine (UKR) has the highest RISK value in 2008, even if the U.S. is the source of the GFC (Panel A of Figure 1). In contrast, Greece (GRC) has the highest RISK value in 2010, with moderate Investor Protection and Quality of Government values (Panel B of Figure 1). While Greece (GRC) is regarded as the source of the Eurozone Crisis, it is Ukraine (UKR) that has the highest RISK value in 2008 (Panels A and B). Hence, higher risk-taking does not clearly lead to crisis regimes.

Figure 2 plots RISK against ownership in 2008 and 2010. Ownership varies across countries in both years. The trend lines for Foreign and Government Ownership are downward sloping in 2008 but upward sloping in 2010. For both years, low to moderate levels of Foreign Ownership are concentrated at low levels of RISK (Panels A and B). In contrast, low to moderate levels of Government Ownership are concentrated at higher levels of RISK, in line with the view that government ownership is associated with higher risk-taking (Iannotta et al., 2013). We find related patterns using the Z-score plots. These plots are available on request.

[Figures 1 and 2, about here]

4. Empirical results

4.1. Institutional mechanisms, investor protection and risk-taking

Tables 2a and 2b show the IV-GMM regression coefficients after regressing RISK or Z-score on the institutional mechanisms, Investor Protection (ADRI), and the control variables. The IV-GMM regressions include country income and year fixed effects to control for unobservable confounding effects. We do not show the coefficients of the control variables and fixed effects to save space. The tables show that the Hayashi *C* statistic for endogeneity and Hansen *J*-statistic for over-identifying restrictions are insignificant (p-value ≥ 0.10). The robust *F*-statistic of the first-stage regression is significant, indicating that our IVs are not weak (p-value ≤ 0.10). These tests do not suggest that there are no other endogeneity concerns.

Tables 2a and 2b show that ADRI (Investor Protection) and institutional mechanisms reduced risk-taking in the baseline equations (see Eq. 2) for both sample periods. They do so using both RISK and Z-score as dependent variables (p-value ≤ 0.10). Thus, we reject $\boldsymbol{H_{1B}}$ in favor of $\boldsymbol{H_{1A}}$ to support the view that Investor Protection and institutional mechanisms reduce risk-taking. Using RISK as the dependent variable, the negative ADRI coefficients are in the range of –0.58 (p-value ≤ 0.01) and –0.26 (p-value ≤ 0.05) for the 2005–2009 period, which also contains the GFC period (see Panel A of Table 2a). These coefficients have a wider range for the 2009–2019 period, which contains the Eurozone Crisis period (p-value ≤ 0.10; Panel B of Table 2a). As expected, the sensitivity of these variables varies across the sample periods since they contain crisis events that have different origins.

[Tables 2a and 2b, about here]

As indicated above, the coefficients for institutional mechanisms and investor protection are large in absolute terms. Furthermore, the coefficients for institutional mechanisms are much larger than those of Investor Protection in absolute terms. For example, when significant, the coefficients for institutional mechanisms are up to seven (five) times larger than those of ADRI, using RISK (Z-score) as the dependent variable during the 2005–2009 period. We find related results for the 2009–2019 period, but here, the magnitudes of the institutional mechanisms and ADRI coefficients are generally smaller. In general, laws relating to institutional mechanisms dominate ADRI in reducing risk-taking. This may be due to investor protection rules largely being drawn from legal rules, as well as the origin of legal rules (La Porta et al., 1998).

For the 2005–2009 period, Investor Protection is in the range of 0.28 (p-value ≤ 0.01) and 0.60 (p-value ≤ 0.01), when significant, after controlling for Control of Corruption and Regulatory Quality, respectively (see Panel A, Table 2b) and using Z-score as the dependent variable. Based on these coefficients, a one standard deviation increase of 0.92 for Investor Protection, is associated with a change in Z-score in the range of 6.85% (=0.28×0.92/3.76) and 14.68% (=0.60×0.92/3.76), when Z-score has a mean of 3.76 and Investor Protection has a standard deviation of 0.92 in *untabulated* results. Given the large decreasing effects of institutional mechanisms and Investor Protection, it is questionable whether increases in their stringency could have prevented the crises, since more stringent rules could be detrimental to well-governed banks (Bruno and Claessens, 2010). However, it can be argued that weaknesses in institutional mechanisms and investor protection may have increased the severity of the crises once the crises took effect. Johnson et al.'s (2000) results appear to support this view. Our results contrast with those of Beltratti and Stulz (2012) and Hoque et al.

(2015), who test an alternative hypothesis. In a subsequent section, we replicate the Beltratti and Stulz (2012) and Hoque et al. (2015) approach and find support for their claims.

4.2. Strength of investor rights protection and risk-taking

Cross-country differences in financing and investments levels are attributed to heterogeneity in investor protection and legal rules (La Porta et al., 1997; 2002). High ownership concentration is associated with poor investor protection in countries (La Porta et al., 1999). Thus, while we find that institutional mechanisms and investor protection reduce risk-taking, it is possible that the extent of risk mitigation depends on the strength of investor protection in countries. As such, we test the effects of variation in the strength of investor protection by attributing a value of 1 to the highest 30% of the ADRI scores by country, denoted High_ADRI; 0, otherwise. Conversely, countries with the lowest 30% of ADRI scores, denoted Low_ADRI, are attributed a value of 1; 0, otherwise. We then separately interact High_ADRI and Low_ADRI with each institutional mechanism (IM) to determine their combined effects. While these cut-off points are arbitrary, they enable us to test conditions that relate to theoretical and empirical predictions. For example, La Porta et al. (1999) show that very few firms are widely held except in countries with strong investor protection, implying that the absence of dominant shareholders is likely to reduce risk-taking. In the Stulz (2005) model, private appropriation benefits vary across countries and stronger investor protection makes it more costly for insiders to expropriate from outsiders. These perspectives suggest that banks in high investor protection countries are likely to experience decreases in risk-taking, whereas those in low investor protection countries are likely to experience increases in risk-taking.

Tables 2a and 2b show the coefficients based on the interaction terms, i.e., High_ADRI × IM and Low_ADRI × IM. The tables show that high Investor Protection countries experienced lower risk-taking, whereas low Investor Protection countries experienced higher risk-taking (p-value ≤ 0.10) during the 2005–2009 period. This result is in line with the view that greater (weaker) Investor Protection, given the institutional environment, enhances (reduces) stock valuation and investment opportunities. High Investor Protection also reduces the private benefits of controlling investors on account of greater property rights (La Porta et al., 1997; Wurgler, 2000; La Porta et al., 2002; Nenova, 2003). Conversely, low Investor Protection, given the institutional environment, increases risk-taking if controlling shareholders stand to gain more cash flow rights in poor investor protection countries (see Shleifer and Vishny, 1997). Thus, the fear of expropriation is much higher in countries with weak investor protection and legal enforcement (Giannetti and Simonov, 2006).

Our results contrast across the sample periods. Using RISK as the dependent variable, only one coefficient is negative and significant during the 2009–2019 period (p-value ≤ 0.10). The remaining coefficients are insignificant. However, using Z-score as the dependent variable, both high and low Investor Protection countries experienced lower risk-taking for the 2009–2019 period. The risk reduction effect of Low_ADRI × IM is unexpected. If moral suasion caused many Eurozone banks to increase their exposure to sovereign risk (see Weidmann, 2013), then low investor protection countries should also experience an increase in risk-taking. This is not what we find. Alternatively, under Basel III, all banks are required to maintain higher capital requirements, suggesting that the Basel III requirements may provide the explanation for low risk-taking in both high and low investor protection countries. It is worth noting that not all the banks in our sample are headquartered in a Eurozone member state. We therefore note ahead of Section 5, that re-estimating the regressions using only Eurozone banks does not alter our main results.

4.3. Financial and macroeconomic variables

Prior evidence relating to the influence of bank charter/franchise value on bank financial performance is mixed (Keeley, 1990; Beltratti and Stulz, 2012). Banks with a valuable charter are predicted to take less risk to avoid bankruptcy or loss of their valuable charter. Beltratti and Stulz (2012) hypothesize that a more concentrated banking system allows banks to earn monopoly rent. However, they find no support for their prediction. Like Houston et al. (2010) and Beltratti and Stulz (2012), we measure bank charter value using the total assets of the three largest commercial banks in a country, relative to the total assets of all banks in that country. We call this measure Bank Concentration. Table 2a shows that Bank Concentration increased risk-taking during the 2005–2009 period (p-value ≤ 0.10), although we find mixed evidence when Z-score is used as the dependent variable (p-value ≤ 0.10; Panel A, Table 2b). Bank Concentration is insignificant for the 2009–2019 period, using RISK as the dependent variable (Table 2a, Panel A). However, Bank Concentration decreased risk-taking using Z-score for the same period (p-value ≤ 0.10; Table 2b, Panel B). As such, a one standard deviation increase of 26.92% for Bank Concentration is associated with an increase in Z-score of between 0.054% (= 0.008×26.92/4.00) and 0.07% (=0.011×26.92/4.00) when Bank Concentration has a standard deviation of 26.92% and Z-score has a mean of 4.00 (in untabulated results). Thus, the percentage reduction in default risk due to charter value is small. The coefficient values for macroeconomic are also small. We do not show them to save space. However, institutional mechanisms followed by Investor Protection are economically more important drivers of risk-taking

compared to macroeconomic factors. Johnson et al. (2000) report related results for the relative importance of institutional mechanisms on macroeconomic policy.

4.4. How do ultimate ownership and investor protection influence risk-taking?

Theoretical models predict that government ownership is associated with adverse economic outcomes, in contrast to the public interest view that it mitigates market failure and exploits market externalities. There are countervailing economic costs associated with ownership. Large controlling shareholders have more incentives to monitor managers compared to minority shareholders. Furthermore, foreign ownership helps improve firm-level governance, especially if foreign owners are from strong investor protection countries (Aggarwal et al., 2011). Since the strength of investor protection influences the extent to which controlling shareholders expropriate minority shareholders (Johnson et al., 2000), it is worthwhile to explore the effects of ownership on risk-taking. For this estimation, we include Investor Protection and Quality of Government in the IV-GMM regressions since they may influence the level of ownership (La Porta et al., 1998). The diagnostic statistics on the IV-GMM regressions do not suggest obvious endogeneity concerns.

Tables 3a and 3b show that Quality of Government and Investor Protection still reduce risk-taking in the presence of ownership effects (p-value ≤ 0.10). They do so for both sample periods. The coefficients for Quality of Government and Investor Protection are, however, larger in absolute value compared to those of ownership. Thus, Quality of Government and Investor Protection have stronger effects on risk-taking. Many governments imposed regulatory constraints on capital and liquidity flows during the GFC period, particularly where foreign banks constituted a substantial part of the banking system.[11] However, while our findings are in line with the implications of studies that show that foreign ownership enhances firm-level governance (Aggarwal et al., 2011), our estimates show that the effects of Foreign Ownership on risk-taking are economically small. Thus, for the 2005–2009 period, Foreign Ownership decreased RISK by –0.003 (p-value ≤ 0.05) in baseline regressions and by up to –0.008 (p-value ≤ 0.01) in the regressions with interaction terms (Table 3a). For the 2005–2009 period, a one standard deviation increase of 22.28% for Foreign Ownership is associated with a decrease in RISK of –0.069% (= –0.003×22.28/0.97), using the coefficient value of –0.003, when Foreign Ownership has a standard deviation of 22.28% and RISK has a mean of 0.97% in untabulated results. We find related results for the 2009–2019 period.

[Tables 3a and 3b, about here]

[11] Asset share of foreign banks exceeds 80% of the financial banking system in some countries (see Cull et al., 2017).

The coefficients of Government Ownership are insignificant, using both RISK and Z-score for the 2005–2009 period. However, Government Ownership has negative and significant coefficients for the 2009–2019 period (p-value ≤ 0.10), using RISK as the dependent variable. While we find some support of $\boldsymbol{H_{2A}}$, this support only holds for the 2009–2019 period, when RISK is the dependent variable. The significant coefficients are still economically small, indicating that Government Ownership has relatively weak effects on risk-taking across our sample periods.[12]

The tables also show that Foreign Ownership increased risk-taking in low Investor Protection countries (p-value ≤ 0.10) for both sample periods. Poor investor protection countries have higher information disadvantage as well as higher monitoring costs, which in turn disincentivize foreign investment (Leuz et al., 2010). Thus, our finding of higher risk-taking in low Investor Protection countries may be due to foreign investors having more control over investment policy, perhaps through being dominant investors. Alternatively, since foreign investors are likely to hold diversified portfolios, they may temporarily tolerate poor performance that is associated with higher risk-taking in some countries (Ederer and Manso, 2013; Luong et al., 2017). These factors may explain our result. Huang et al. (2022) show, however, that foreign institutional investors (FIIs) promote risk-taking in countries with weak governance and that their presence substitutes for weak country-level governance. However, we find that the High_ADRI × Foreign Ownership coefficients are insignificant, even if financial information is more credible in high Investor Protection countries and investments are better protected (see Bae et al., 2006).[13] We find that Government Ownership increased risk-taking in both high and low Investor Protection countries during the 2009–2019 period (p-value ≤ 0.05). Government ownership may incentivize greater risk-taking due to moral hazard (Iannotta et al., 2013). Government Ownership has insignificant effects in both high and low Investor Protection countries during the 2005–2009 period.

4.5. What are the effects of bank regulation and supervision on risk-taking?

Laeven and Levine (2009) report that bank risk-taking varies according to the comparative powers of bank owners and the effects of BRS rules. Thus, ignoring BRS effects may lead to the incorrect conclusions regarding the effects of institutional mechanisms, investor protection, and ownership on risk-taking. Barth et al. (2004) also argue that there are severe shortcomings in empirical studies that

[12] Boubakri et al. (2013) report a positive (negative) relation between risk-taking and foreign (government) ownership for non-financial firms during 1981 to 2007. They ignore the Asian Financial Crisis period of 1998.

[13] Governments in poor investor protection countries are more likely to impose restrictions on the flow of international funds during crisis periods. Improved investor protection enhances international investment flows in countries (Shleifer and Wolfenzon, 2002).

examine BRS effects without regard to government ownership. In the Boyd and Hakenes (2014) model, capital regulation increases looting and risk-shifting, which in turn increases the severity of crisis events. Given these arguments, we examine whether BRS rules influence risk-taking in the presence of ownership, Investor Protection, and Quality of Government. We focus on four BRS rules that are commonly tested in empirical work.[14] We report the results where RISK is used as the dependent variable. Using Z-score as the dependent variable generally generated consistent results, which are available on request.

Table 4 shows the IV-GMM results. Our diagnostic tests do not suggest endogeneity concerns. The table shows two notable findings. First, both Investor Protection and Government Ownership have insignificant coefficients for the 2009–2019 period, when we control for Independence of Supervisory Authority (political) and include interaction terms in the regression. Otherwise, both government and foreign ownership decreased risk-taking during both sample periods, although they have more pronounced effects during the 2009–2019 period. Second, Foreign Ownership increased risk-taking in both high and low Investor Protection countries during the 2005–2009 period (*p*-value ≤ 0.10). Foreign Ownership increased risk-taking but only in low Investor Protection countries during the 2009–2019 period (*p*-value ≤ 0.10) Otherwise, our prior results remain robust after controlling for BRS effects.

Table 4 also shows that BRS rules reduced risk-taking (*p*-value ≤ 0.10). The only exception is No Explicit Deposit Insurance (a dummy variable), which increased risk-taking during the 2005–2009 period (*p*-value ≤ 0.10). The increase in risk-taking associated with No Deposit Insurance Scheme is in line with prior results (see Demirgüç-Kunt and Detragiache, 2002; Barth et al., 2004). While the coefficients for No Explicit Deposit Insurance are positive for the 2005–2009 period, they do not fully eliminate the negative effects of Investor Protection. However, they do so to a limited extent using Quality of Government. In contrast, No Explicit Deposit Insurance reduced risk-taking for the 2009–2019 period (*p*-value ≤ 0.01). This may be due to greater information disclosure by official supervisors which may have increased private monitoring and mitigated the moral hazard associated with deposit insurance (Demirgüç-Kunt and Detragiache, 2002).[15] Overall, our results

[14]To save space we do not show the results for Limitations on Foreign Bank Entry. The coefficients for Limitations on Foreign Bank Entry are negative, suggesting that increased competition reduces risk-taking. Prior evidence on the influence of bank competition and bank risk-risking is mixed (Boyd and De Nicoló, 2005).

[15] In an analysis, we find that Private Monitoring increases risk-taking (*p*-value ≤ 0.10). Under the private monitoring view, supervisory policies that promote information disclosure and distort the adverse effects of deposit insurance, stabilize banking systems. Private monitoring is more effective in well-functioning institutional systems (Beck et al., 2006b).

support $\boldsymbol{H_{3A}}$, thereby allowing us to reject $\boldsymbol{H_{3B}}$. It is also useful to note that BRS rules have more pronounced effects on risk-taking compared to ownership.

[Table 4, about here]

4.6. Post-crisis bias test

In this section, we present the results of the Bussiere and Fratzscher (2006) post-crisis bias test. This test jointly estimates the likelihood of a pre-crisis year by county (denoted, Y=1), a crisis/post-crisis year by county (denoted, Y=2), and a tranquil year/regime by county (denoted, Y=0). In line with Eqs. (4) and (5), these event year(s) are crisis/tranquil regimes by country. In our application, a crisis year for a country is identified using the Laeven and Valencia (2018) database, which we extend to the more recent period. This approach allows us to relate out tests to the specific economic conditions in a country since all countries did not necessarily experience a crisis in the same year. Country-fixed effects are excluded from the estimation, since countries with no crisis would drop out of the estimation if country-fixed effects are also captured (Demirgüç-Kunt and Detragiache, 2002). Since the strength of a country's institutional mechanisms reflects the quality of its legal environment (La Porta et al., 1998) and the legal environment influences the relationship between BRS rules and financial stability (see Demirgüç-Kunt and Detragiache, 2002; Ashraf, 2017), we include Quality of Government and BRS rules in the regressions. Ownership is also included in the regressions since Laeven and Levine (2009) show that the relationship between bank risk-taking and BRS rules depends on banks' ownership structure. Finally, we include RISK and Z-score since prior studies argue that higher risk-taking increases the likelihood of crisis events (Bebchuk and Spamann, 2010). We believe that we are first to directly test the link between risk-taking and crisis events. Our results are presented below.

4.6.1. Does higher risk-taking increase the likelihood of crisis and tranquil regimes?

Table 5a shows that RISK has positive and significant coefficients for the 2005–2009 pre-crisis and crisis/post-crisis regimes, relative to the tranquil regime (p-value ≤ 0.10). Only one coefficient is insignificant. In Table 5b, Z-score is negative and significant for all pre-crisis and crisis/post-crisis coefficients of the same period (p-value ≤ 0.05). Both results indicate that risk-taking increased the likelihood of the pre-crisis and crisis/post-crisis regimes, after controlling for our BRS rules. However, the magnitude of the coefficients depends on the BRS rule. Furthermore, both RISK and Z-score have the largest coefficient values (in absolute terms) during the pre-crisis regime. If banks increased risk-taking in the run-up to the GFC period (Minton et al., 2014), then our results suggest

that this strategy increased the likelihood of the pre-crisis regime much more strongly than the likelihood of the crisis/post-crisis regime of the 2005–2009 period. Furthermore, both RISK and Z-score generally have the largest coefficient values (in absolute terms), compared to the coefficient values of our other predictors. This suggests that the risk-taking is a stronger predictor (relative to our other variables) of the 2005–2009 regimes compared to (say) ownership. In contrast to the 2005–2009 regimes, only one RISK coefficient is significant for the 2009–2019 period (p-value ≤ 0.05; Table 5a). This coefficient is positive for the pre-crisis regime when we control for Overall Banking Restrictions. Furthermore, only the pre-crisis regime coefficients for Z-score are significant. They are, however, negative in line with the results for 2005–2009 period (p-value ≤ 0.10; Table 5b). Collectively, risk-taking is a stronger predictor of the likelihood of the pre-crisis regimes compared to crisis/post-crisis regimes for both sub-periods, even if the coefficients of the 2009–2019 crisis/post-crisis regime are insignificant. To illustrate, RISK has coefficients of 2.98 (p-value ≤ 0.01) and 1.05 (p-value ≤ 0.01) for the pre-crisis and crisis/post-crisis regimes of the 2005–2009 period, respectively, after controlling for No Explicit Deposit Insurance (Table 5a, Panel A). The log-odds based on these coefficients are $e^{\beta} = 19.68$ and $e^{\beta} = 2.85$ for the pre-crisis and crisis/post-crisis regimes, respectively. In this case, the log-odds for the pre-crisis regime are 6.9 times larger than those of the crisis/post-crisis regime, indicating the pre-crisis risk-taking levels are a stronger predictor of crisis regimes. The associated average marginal effects (AMEs) are significant for both estimates (p-value ≤ 0.10) in untabulated results.[16] Furthermore, the pre-crisis Z-score coefficients are larger (in absolute value) than those of the crisis/post-crisis coefficients, indicating that the greater the percentage distance from default, the larger the decrease in the likelihood of the pre-crisis regime relative to the crisis/post-crisis regime, especially for the 2005–2009 period. As such, the stronger the balance sheets of banks are, ex-ante, the more likely they will withstand economic shocks during crisis periods (Kapan and Minoiu, 2018). Since higher risk-taking during the pre-crisis regime is a stronger predictor of crisis events than risk-taking during the crisis/post-crisis regime, regulators should focus on the level of risk-taking during the pre-crisis regime since it would be difficult to curb the crisis once it is set in motion.

[Tables 5a and 5b, about here]

[16] The AMEs are partial effects for each observation averaged across all the observations of each variable. The AMEs may not carry the same sign as the regression coefficient since the marginal effects are averaged.

4.6.2. Do investor protection and ownership decrease the likelihood of crisis and tranquil regimes?

The panels in Tables 5a and 5b show that, for the 2005–2009 period, higher Investor Protection reduces the likelihood of the crisis regimes (p-value ≤ 0.10). Quality of Government has related effects for the 2005–2009 period, but these effects are not as pronounced based on absolute coefficient values (p-value ≤ 0.05). Specifically, for the 2005–2009 period, Investor Protection has log-odds of $e^{\beta} = 0.0005$ and $e^{\beta} = 0.19$ for the pre-crisis and crisis/post-crisis regimes, respectively, after controlling for No Deposit Insurance Scheme (Panel A of Table 5a). The correspondingly log-odds for Quality of Government are $e^{\beta} = 0.36$ and $e^{\beta} = 0.83$ for the pre-crisis and crisis/post-crisis regimes, respectively (Panel A of Table 5a). These results, however, contrast with those of the 2009–2019 period. Thus, for the 2009–2019 period, both Investor Protection and Quality of Governments increased the likelihood of the pre-crisis and crisis/post-crisis regimes, in support of $\boldsymbol{H_{4B}}$. Following Kaminsky and Reinhart (1999), economic crises have unique origins, such that crisis predictors may not have similar effects across different crises. If moral suasion increased risk-taking by European banks during the Eurozone Crisis (see Ongena et al., 2019), contained in our sample period, then the factors that influenced moral suasion to increase risk-taking appear to have exceeded those of Investor Protection and Quality of Government during the crisis regimes.

The tables also show that both foreign and government ownership increased the likelihood of the 2005–2009 crisis regimes (p-value ≤ 0.10). They have more pronounced effects during the pre-crisis regimes. However, the effects of Foreign Ownership are weak (see Tables 5a and 5b, Panel A). However, overall, these results support $\boldsymbol{H_{4B}}$, indicating that ownership increases the likelihood of the crisis regimes. In contrast to the 2005–2009 period, Foreign Ownership has more pronounced effects on the likelihood of the 2009–2019 crisis regimes (p-value ≤ 0.05). It increases the likelihood of the crisis regimes with more pronounced effects during the pre-crisis regime. In contrast, Government Ownership decreased the likelihood of the 2009–2019 crisis regimes (p-value ≤ 0.01), indicating that, unlike the 2005–2009 period, Government Ownership had a stabilizing effect during the 2009–2019 period. However, across the sub-periods, the AMEs of both ownership measures are relatively small – around 0.50% – when the associated regression coefficients are significant. Thus, the influence of ownership on crisis regime predictability is comparatively small.

The BRS rules have mixed coefficient signs. We find that No Explicit Deposit Insurance had more pronounced effects in reducing the likelihood of the 2009–2019 crisis regimes compared to the 2005–2009 crisis regimes. Furthermore, No Explicit Deposit Insurance had more pronounced effects in reducing the likelihood of the 2009–2019 crisis/post-crisis regime compared to the 2005–2009

crisis/post-crisis regime. Thus, our results imply that deposit insurance reduced systemic fragility more strongly for the 2009–2019 crisis/post-crisis regime. Advocates of deposit insurance claim that its adverse effects are constrained by effective supervisory power and prudential regulation. Indeed, Anginer et al. (2014) report that deposit insurance increased bank risk and systemic fragility during the 2004–2006 pre-crisis regime but it had stronger destabilizing effects during normal times compared to the 2007–2009 crisis period. Our results are in line with their findings but for our 2009–2019 period.

4.7. A generalized bivariate copula approach to crisis and no-crisis regimes

In this section, we directly examine the relationship between crisis regimes and risk-taking, using the generalized bivariate copula function (BICOP) of Hernández-Alava and Pudney (2016). The BICOP procedure is a generalization of the more familiar bivariate probit model but does not require the bivariate dependent variables to be continuous, as in standard copulas. BICOP can be specified as follows:

$$Y_{i,1}^{*} = \beta_1 X_{i,1} + U_{i,1} \quad (4a)$$

$$Y_{i,2}^{*} = \beta_2 X_{i,2} + U_{i,2}, \quad (4b)$$

where $Y_{i,1}^{*}$ and $Y_{i,2}^{*}$ are the latent variables with row vectors of covariates $X_{i,1}$and $X_{i,2}$ and with coefficients β_1 and β_2, respectively. $U_{i,1}$ and $U_{i,2}$ are unobservable residuals, which may be stochastically dependent and non-normal. $U_{i,1}$ and $U_{i,2}$ are assumed to have a bivariate joint distribution with correlation, $\rho \neq 0$. Under the BICOP formulation, the likelihood function of the estimates can be maximized, knowing the properties of the joint distributional form, $F(U_{i,1}, U_{i,2})$. Denote $Y_{i,1}^{*}$ as a crisis dummy, where 1 represents the crisis year(s) by country; 0, otherwise. Denote $Y_{i,2}^{*}$ as the threshold for risk-taking, where 1 captures high risk-taking and 0 captures low risk-taking, based on the median values of RISK and Z-score of the 2005–2009 and 2009–2019 sub-periods. We estimate BICOP under the Gaussian, Frank, Gumbel, Joe, and Clayton copula functions. Since Gaussian copula provides the best overall fit, using the Akaike Information Criterion (AIC), we focus on these results.

Table 6 shows our results when we control for RISK in the regressions. The unreported results using Z-score in the regressions are available on request. The panels of the table show that the Wald χ^2 statistic of independence is significant for all but one regression estimate (p-value ≤ 0.05). As such, we reject the null hypothesis that the covariates are conditionally independent. The result therefore suggests dependence between risk-taking and the crisis event, meaning that higher risk-

taking is associated with crisis events. Panel A of Table 6 also shows that both Investor Protection and Government Ownership decreased the probability of both the crisis and higher risk-taking during the 2005–2009 period. The result for Investor Protection (Government Ownership) is consistent (inconsistent) with our earlier results for this sub-period. Investor Protection has a stronger decreasing effect on risk-taking compared to its decreasing effects on the probability of the crisis regime (Panel A). The table shows that Foreign Ownership has no effect on the crisis event and risk-taking during the period. However, Quality of Government increased the probability of the crisis although it had no effect on risk-taking. While No Explicit Deposit Insurance reduced the probability of the crisis event, it increased the probability of higher risk-taking (p-value ≤ 0.01).

[Table 6, about here]

In contrast to the 2005–2009 period, higher Investor Protection increased the probability of crisis during the 2009–2019 period, as well as higher risk-taking (Panel B; p-value ≤ 0.10). Foreign Ownership (Government Ownership) increases (decreases) the probability of a crisis during the same period. While ownership had no effect on risk-taking, Quality of Government increased the probability of the crisis and decreased the probability of higher risk-taking (p-value ≤ 0.01). These results are partly in line with those of the post-crisis bias test. A distinguishing feature of these results is that we find evidence for dependence between risk-taking and the crisis events.

5. Additional tests

To validate our main results, we perform several additional tests. First, we run DID regressions to assess the differential effect that crisis events by country have during our sample periods. As before, we use the Laeven and Valencia (2018) database to identify the crisis years by county for each sample period. Tables 7a and 7b show the results of the DID regressions. These results do not alter our previous findings. Indeed, the tables show that institutional mechanisms and Investor Protection reduce risk-taking (p-value ≤ 0.10). However, the Country Crisis coefficient for the 2005–2009 period is positive and significant when RISK is the dependent variable (p-value ≤ 0.10), indicating that risk-taking increased during the period. The corresponding result using Z-score is weak (see Table 7b). Using Panel A of Table 7a, the interaction terms, i.e., ADRI × Country Crisis and IM × Country Crisis, are negative when significant. This result suggests that Investor Protection (ADRI) and institutional mechanisms (IM) reduced risk-taking during the 2005–2009 period (p-value ≤ 0.10). Since the main effects of Investor Protection and Quality of Government are both negative and significant, their combined effects with ADRI × Country Crisis and IM × Country Crisis indicate that,

overall, these measures decreased risk-taking during the 2005–2009 period. To illustrate, for the case of Investor Protection, the coefficient of the Country Crisis is 0.48 (p-value ≤ 0.05), when we control for Rule of Law. The associated ADRI × Country Crisis coefficient is –0.13 (p-value ≤ 0.05). The positive impact of the crisis dummy is therefore reduced to 0.35 (= 0.48 + (–0.13)) by the ADRI × Country Crisis effect. The main effect for Investor Protection is –0.41 (p-value ≤ 0.01). Thus, overall, Investor Protection reduced risk-taking when we account for DID in our regressions. Our results for Z-score are, however, weak for the 2005–2009 period. Thus, using Z-score, only one Country Crisis coefficient is significant and the crisis year interaction terms are insignificant, except in one case (see Table 7b, Panel B).

[Table 7a and 7b, about here]

Investor Protection and institutional mechanisms are negatively related to RISK for the 2009–2019 period (see Tables 7a and 7b). These results are in line with those of 2005–2009. However, only one IM × Country Crisis coefficient is significant when RISK is the dependent variable (Panel B of Table 7a; p-value ≤ 0.10). No Country Crisis coefficient is significant and only one interaction term is significant. It is worth noting that, contrary to our results in Table 2a, only one Low_ADRI × IM interaction term has a positive and significant coefficient and High_ADRI × IM interaction terms have insignificant coefficients in all cases. Thus, using the DID regressions has caused the increase in risk-taking in high Investor Protection countries to disappear. Two Country Crisis coefficients are negative and significant (p-value ≤ 0.10; Panel B, Table 7b), when Z-score is used as the dependent variable. IM × Country Crisis has insignificant coefficients in all cases. However, the ADRI × Country Crisis coefficients are positive and significant (p-value ≤ 0.10), indicating the risk-taking decreased during the crisis years. Baker et al. (2022) note, however, that there are econometric issues associated with applying DID tests to avoid Type I and Type II errors.

We also use the ratio of NPLs to total gross loans as an alternative risk-taking measure. Using NPLs, Table 8 shows that the Investor Protection and institutional mechanism reduce risk-taking (p-value ≤ 0.10) in line with our earlier results. The associated coefficient values are larger (in absolute value) compared to those in Table 2a. This may reflect the more direct impact of Investor Protection and the institutional mechanism on NPLs, unlike the RISK and Z-score measures, which are computed at the aggregated level for each bank. It is useful to note that the definition of NPLs varies across countries, leading to large variation in its dispersion across countries (Laeven and Valencia, 2018). While banks may follow national and/or international regulations for NPL recognition, collateral enforcement of debt obligations may be impeded by legal, judicial, and consumer protection

impediments and recovery costs (European Central Banks, Banking Supervision, 2017), thereby imposing substantial managerial discretion in the determination of NPL levels across countries, as well as its quality for accounting disclosure. As such, we argue that Z-score and RISK are more reliable risk-taking measures since they allow less managerial and accounting discretion in their determination. Agoraki et al. (2011) report that market power is negatively related to NPLs, and supervisor power and capital requirements reduce the level of NPLs. In line with the implication of their results, we show that institutional mechanisms also reduce the level of NPLs.

We next investigate whether the larger average size of U.S. banks unduly influences our results. We therefore re-run the regressions in Table 2a by excluding all U.S. banks from the sample. The results in WEB Appendix C are consistent with our earlier findings. Furthermore, since the Eurozone Crisis mostly affected Eurozone banks, we also re-run the regressions in Table 2a by including only Eurozone banks in the sample. Here, we identify 127 Eurozone banks in 16 countries for this analysis. We find that institutional mechanisms and Investor Protection decrease risk-taking in line with earlier results (see WEB Appendix D). However, unlike the insignificant effects of Low_ADRI in Table 2a (Panel B), low Investor Protection countries decrease risk-taking. Grouping all banks in our full samples using the World Economic Situation and Prospects (WESP) and the Worlddata.info classification schemes for developed and developing economies does not alter our results. While the two classification schemes are not entirely consistent, our untabulated results do not alter our findings in Table 2a. As stated before, using the ratio of Market Capitalization to GDP controls for variation in economic development across countries.[17] Our use of country income fixed effects also controls for unobservable development effects. Thus, our results for developing and developed countries are unsurprising.

Finally, we replicate the Beltratti and Stulz (2012) and Hoque et al. (2015) method using buy-and-hold returns. The buy-and-hold returns are from June 2007 to December 2008 for the GFC period (see Beltratti and Stulz, 2012; Hoque et al., 2015) and May 2011 to December 2011 for the Eurozone Crisis (see Hoque et al., 2015). Our results are based on banks with total asset values of US$10 billion or more in 2006 (2010) for 2005–2009 (2010–2019) since we want to include banks with comparable sizes to those of Beltratti and Stulz (2012). Our untabulated results are consistent with those of Beltratti and Stulz (2012) and Hoque et al. (2015). Specifically, prior period Investor Protection and Quality of Government are poor predictors of buy-and-hold returns during crisis periods. Ownership

[17]Wurgler (2000) shows that the strength of financial market development positively influences the allocation of capital, and capital allocation efficiency is negatively correlated with state ownership but positively correlated with protection of minority investors (see also La Porta et al., 1997).

is unrelated to buy-and-hold returns. While prior studies test an alternative hypothesis to ours, we note that crisis period buy-and-hold returns are likely to be uncorrelated with governance mechanisms since stock prices and investment opportunities are unusually depressed during crisis periods (Stein and Stone, 2013). Thus, the difference between our results and those of prior studies reflects our research design and, correspondingly, the hypothesis being tested.

6. Conclusion

Prior studies blame financial crises on excessive risk-taking, poor institutional laws and ownership structure, and weak BRS rules. Weaknesses in these mechanisms are said to incentivize expropriation by controlling shareholders, especially during crisis periods (Johnson et al., 2000; Kirkpatrick, 2009; Boyd and Hakenes, 2014). We focus on the joint influences of institutional mechanisms, Investor Protection, BRS rules, and ownership on bank risk-taking. We also assess their predictive effects on crisis regimes by country years. First, we find robust results that institutional mechanisms, Investor Protection, ownership, and BRS rules reduce risk-taking. Our overall results are robust across the sample periods, although we find some variation that depends on the risk-taking measure. Second, institutional mechanisms have the most pronounced effects on risk-taking, followed by Investor Protection, BRS rules, and ownership effects (in that order). While the effects of institutional mechanisms and Investor Protection are economically large, the crises still happened. This suggests that other factors such as panic and contagion effects may provide better explanations for crisis events. Foreign ownership is seen as a key transmitter of contagion effects around crisis events (see IMF, 2009), whereas government ownership is seen as a market stabilization mechanism in many countries, especially during crisis periods (see Iannotta et al., 2013). Using Government Ownership to stabilize financial markets may be seen as costly, given its small economic impact on risk-taking.[18] A preferred policy would be for governments and regulators to set policies that improve the economic, legal, and financial conditions in countries for institutional mechanisms and BRS rules to work more effectively. In line with this view, we find that Foreign and Government Ownership increase risk-taking in both high and low Investor Protection countries, and institution mechanisms reduce (increase) risk-taking in high (low) Investor Protection countries for the 2005–2009. Admittedly, the latter result does not hold for the 2009–2019 period.

[18] Lucas (2019) shows that, for the U.S., the total fair value direct cost of the GFC was US$498 billion, representing 3.5% of the U.S. gross domestic product at 2009.

We also find that the pre-crisis regimes by country years are more predictable than crisis-post/crisis regimes. Higher risk-taking increases the likelihood of pre-crisis and crisis/post-crisis regimes, with the effects of the pre-crisis regime being more pronounced than those of the crisis/post-crisis regime. Investor Protection and Quality of Government reduced the likelihood of crisis regimes for 2005–2009 period but increased the likelihood of crisis regimes for the 2009–2019 period. BRS rules tend to have mixed effects. Government Ownership reduced the likelihood of the 2005–2009 crisis regimes but increased the likelihood of the 2009–2019 crisis regimes. Our results pose a challenge to governments and regulators regarding the specific policy to apply in the presence of institutional, ownership, and BRS effects, when seeking to mitigate crisis events. A policy stance might be to quickly react to excessive risk-taking during pre-crisis regimes since this would likely to more effective in curbing impending crises. Since we find dependency between risk-taking and crisis regimes, a further policy stance would be for regulators to ensure that banks maintain greater distance from default, given that balance sheet instability is a strong transmitter of economic shocks (Ahrend and Goujard, 2015; Kapan and Minoiu, 2018). Our results are supported by a battery of tests, thereby giving us confidence in our results. However, we do not suggest that we have examined a comprehensive list of economic factors that influence risk-taking and crisis regime outcomes.[19]

[Appendix 1 about here]

[19] In additional results, we find that stronger Limitations on Foreign Bank Entry increase the likelihood of crisis regimes and Financial Statement Transparency decreases the likelihood of crisis regimes.

References

Acemoglu, D., Johnson, S., Robinson, J., Thaicharoen, Y., 2003. Institutional causes, macroeconomic symptoms: Volatility, crises and Growth. Journal of Monetary Economics, 50, 49–123.

Abid, A., Gull, A.A., Hussain, N., Nguyen, D.K., 2021. Risk governance and bank risk-taking behavior: Evidence from Asian banks. Journal of International Financial Markets, Institutions & Money, 75, 101466.

Aggarwal, R., Erel, I., Ferreira, M., & Matos, P., 2011. Does governance travel around the world? Evidence from institutional investors. Journal of Financial Economics, 100, 154–181.

Agoraki, M.-E. K., Delis, M.D., Pasiouras, F., 2011. Regulations, competition and bank risk-taking in transition countries. Journal of Financial Stability, 7, 38–48.

Ahrend, R., Goujard, A., 2015. Global banking, Global Crises? The role of the bank balance-sheet channel for the transmission of financial crises. European Economic Review, 80, 253–279.

Anginer, D., Demirgüç-Kunt, A., Zhu, M., 2014. How does deposit insurance affect bank risk? Evidence from the recent crisis. Journal of Banking & Finance, 48, 312–321.

Angkinand, A., Wihlborg, C., 2010. Deposit insurance coverage, ownership, and banks' risk-taking in emerging markets. Journal of International Money and Finance, 29, 252–274.

Ashraf, B. N., 2017. Political institutions and bank risk-taking behavior. Journal of Financial Stability, 29, 13–35.

Bae, K., Bailey, W., & Mao, C. X., 2006. Stock market liberalization and the information environment. Journal of International Money and Finance, 25, 404–428.

Baker, A.C., Larcker, D.F., Wang, C.C.W. 2022. How much should we trust staggered difference-in-differences estimates? Journal of Financial Economics, 144, 370–395.

Barth, J. R., Caprio, G., Levine, R., 2004 Bank regulation and supervision: What works best? Journal of Financial Intermediation, 13, 205–248.

Barth, J. R., Caprio, G., and Levine, R., 2013. Bank regulation and supervision in 180 countries from 1999 to 2011. Journal of Financial Economic Policy, 5, 111–219.

Bebchuk, L.A., Spamann, H., 2010. Regulating Bankers' pay. Georgetown Law Journal, 98, 247–288.

Beck, T., Demirgüç-Kunt, A., Levine, R., 2006a. Bank concentration, competition, and crises: First results. Journal of Banking & Finance, 30, 1581–1603.

Beck, T., Demirgüç-Kunt, A., Levine, R., 2006b. Bank supervision and corruption in lending. Journal of Monetary Economics, 53, 2131–2163.

Berger, A.N., Bouwman, C.H.S., 2009. Bank liquidity creation. Review of Financial Studies, 22, 3779–3837.

Beltratti, A., Stulz, R. M., 2012. The credit crisis around the globe: Why did some banks perform better? Journal of Financial Economics, 105, 1–17.

Boubakri, N., Cosset, J.-C., Saffar, W., 2013. The role of state and foreign owners in corporate risk-taking: Evidence from privatization. Journal of Financial Economics, 108, 641–658.

Burkart, M., Panunzi, F., Shleifer, A., 2003. Family firms, Journal of Finance, 58, 2167–2201.

Boyd, J.H., Chang, C., Smith, B.D., 1998. Moral hazard under commercial and universal banking. Part 2: comparative financial systems. Journal of Money, Credit and Banking, 30, 426–468.

Boyd, J.H., Hakenes, H., 2014. Looting and risk shifting in banking crises. Journal of Economic Theory, 149, 43–64.

Boyd, J.H., De Nicoló, G., 2005. The theory of bank risk taking and competition revisited. Journal of Finance, 60, 1329-1343.

Bruno, V., Claessens, S., 2010. Corporate governance and regulation: Can there be too much of a good thing? Journal of Financial Intermediation, 19, 461–482.

Brunsden, J., Khan, M., 2018. Eurozone hails Greece's exit from bailout as end of Crisis Eurozone hails Greece's exit from bailout as end of crisis in Brussels. Financial Times. Aug. 20. https:// www.ft.com/content/aeb930e0-a475-11e8-926a-7342fe5e173f (Accessed, Nov. 9, 2020).

Bussiere, M., Fratzscher, M., 2006. Towards a new early warning system of financial crises. Journal of International Money and Finance, 25, 953–973.

Caprio, G., Laeven, L., Levine, R., 2007. Government and bank valuation. Journal of Financial Intermediation, 16, 584–617.

Chhaochharia, V., Laeven, L., 2009. Corporate governance norms and practices. Journal of Financial Intermediation, 18, 405–431.

Cihák, M., Tieman, A., 2008. Quality of financial sector regulation and supervision around the World. IMF Working Paper 08/190. International Monetary Fund, Washington.

Claessens, S., Van Horen, N., 2014. The impact of the Global Financial Crisis on banking globalization. IMF Economic Review, 63, 868–918.

Corsetti, G., Pesenti, P., Roubini, N., 1999. Paper tigers? A model of the Asian Crisis. European Economic Review, 43, 1211–1236.

Cull, R., Peria, M.S.M, Verrier, J., 2017. Bank ownership: Trends and implications. International Monetary Fund, Working Paper No. 17/60, 1–49.

De Bruyckere, V., Gerhardt, M., Schepens, G., Vennet, R.V., 2013. Bank sovereign risk spillovers in the European Debt Crisis. Journal of Banking & Finance, 37, 4793–4809.

Demirgüç-Kunt, A., Detragiache, E., 2002. Does deposit insurance increase banking system stability? An empirical investigation. Journal of Monetary Economics, 49, 1373–1406.

Demirgüç-Kunt, A., Detragiache, E., 2011. Basel core principles and bank soundness: Does compliance matter? Journal of Financial Stability, 7, 179–190.

De Santis, R. A., Zimic, S., 2018. Spillovers among Sovereign Debt Markets: Identification through absolute magnitude restrictions. Journal of Applied Econometrics, 33, 727–747.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2008. The law and economics of self-dealing. Journal of Financial Economics, 88, 430–465.

Ederer, F., Manso, G., 2013. Is Pay for Performance Detrimental to Innovation? Management Science, 59, 1496–1513.

Erkens, D. H., Hung, M., Matos, P., 2012. Corporate governance in the 2007–2008 Financial Crisis: Evidence from financial institutions worldwide. Journal of Corporate Finance, 18, 389–411.

European Central Bank: Banking Supervision. 2017, Guidance to banks on non-performing loans. March. Guidance to banks on non-performing loans (europa.eu), March.

Faccio, M., Marchica, M. T., Mura, R., 2016. CEO Gender, corporate risk-taking, and the efficiency of capital allocation. Journal of Corporate Finance, 39, 193–209.

Fahlenbrach, R., Prilmeier, R., Stulz, R. M., 2012. This time is the same: Using bank performance in 1998 to explain bank performance during the recent financial crisis. Journal of Finance, 67, 2139–2185.

Fang, Y., Hasan, I., Marton. K., 2014. Institutional development and bank stability: Evidence from transition countries. Journal of Banking & Finance 39, 160–176.

Ferreira, M. A., Matos, P., 2008. The colors of investors' money: The role of institutional investors around the world. Journal of Financial Economics, 88, 499–533.

Fernandes, C., Farinha, J., Martins, F.V., Mateus, C., 2021. The impact of board characteristics and CEO power on banks' risk-taking: Stable versus crisis periods. Journal of Banking Regulation, 22, 319–341.

Frankel, J., Saravelos, G., 2012. Can leading indicators assess country vulnerability? Evidence from the 2008–09 Global Financial Crisis. Journal of International Economics, 87, 216–231.

Gandrud, C., Hallerberg, M., 2014. Bad banks in the EU: The impact of eurostat rules. Bruegel Working paper. https://www.jstor.org/stable/resrep50877.

Giannetti, M., Simonov, A., 2006. Which investors fear expropriation? Evidence from investors' portfolio choices. Journal of Finance, 61, 1507–1547.

Hernández-Alava, M., Pudney, S., 2016. BICOP: A Command for fitting bivariate ordinal regressions with residual dependence characterized by a copula function and normal mixture marginals. Stata Journal. 16, 159–184.

Houston, J.F., Lin, C., Lin, P., Ma, Y., 2010. Creditor rights, information sharing, and bank risk Taking. Journal of Financial Economics, 96, 485–512.

Hoque, H., Andriosopoulos, D., Andriosopoulos, K., Douady, R., 2015. Bank regulation, risk and return: Evidence from the Credit and Sovereign Debt Crises. Journal of Banking & Finance, 50, 455-474.

Houqe, M.N., Monem, R.M., van Zijl, T., 2012. Government quality, auditor choice and adoption of IFRS: A cross country analysis. Advances in Accounting, Incorporating Advances in International Accounting, 28, 307–316.

Huang, G., An, Z., Li, D., 2022. Foreign institutional ownership and corporate risk-taking: International evidence. Corporate Governance: An International Review, 23, 1–25.

Iannotta, G., Nocera, G., Sironi. A. 2013. The impact of government ownership on bank risk. Journal of Financial Intermediation 22, 152–76.

International Monetary Fund, 2009. *World Economic Outlook*. IMF. Washington DC. April.

John K., Litov, L., Yeung, B., 2008. Corporate governance and risk taking. Journal of Finance, 63, 1679–1728.

Johnson S., Boone P., Breach, A., 2000. Corporate governance in the Asian Financial Crisis. Journal of Financial Economics, 58, 141–186.

Joseph, N.L., Vo, T.T.A., Mobarek, A., Mollah, S., 2020. Volatility and asymmetric dependence in Central and East European stock markets. Review of Quantitative Finance and Accounting, 55, 241–1303.

Kaminsky G. L., Reinhart, C.M., 1999. The twin crises: The causes of banking and of banking and balance-of-payments problems. American Economic Review, 89, 473–500.

Kapan, T., Minoiu, C., 2018. Balance sheet strength and bank lending: Evidence from the global financial crisis. Journal of Banking & Finance, 92, 35–50.

Kaufmann, D., Kraay, A., Mastruzzi, M., 2011. The Worldwide Governance Indicators: methodology and analytical issues. Hague Journal on the Rule of Law, 3, 220–246.

Keeley, M.C., 1990. Deposit insurance, risk, and market power in banking. American Economic Review, 80, 1183–1200.

Kirkpatrick, G., 2009. The corporate governance lessons from financial crisis. Financial Market Trends, 2009, 1–30.

Klapper, L., Love, I., 2004. Corporate governance, investor protection, and performance in emerging markets. Journal of Corporate Finance, 10, 703–728.

Krugman, P., 1998. What happened to Asia? http://web.mit.edu/krugman/www/DISINTER.html (Accessed May 25, 2023).

Laeven, L., Levine, R., 2009. Bank governance regulation and risk taking. Journal of Financial Economics, 93, 259–275.

Laeven, L., Valencia, F., 2018. Systemic banking crises revisited. IMF Working Paper/18/206. https: //www.imf.org/en/Publications/WP/Issues/2018/09/14/Systemic-Banking-Crises-Revisited-46232.

Lehmann, A., 2017. Carving out legacy assets – a successful tool for bank restructuring? Policy Contributions, 9,1–12, Bruegel.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 1999. Corporate ownership around the world. Journal of Finance, 54 471–517.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2002. Government ownership of commercial banks. Journal of Finance, 57, 265–301.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1997. Legal determinants of external finance. Journal of Finance, 52, 1131–1150.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1998. Law and finance. Journal of Political Economy, 106, 1113–1155.

Leung, W.S., Taylor, N., Evans, K.P. 2015.The determinants of bank risks: Evidence from the recent financial crisis. International Journal of International Financial Markets, Institutions & Money, 34, 277–293.

Leuz, C., Lins, K. V., Warnock, F. E., 2010. Do foreigners invest less in poorly governed firms? Review of Financial Studies, 23, 3245–3285.

Lucas, D.J., 2019. Measuring the cost of bailouts. Annual Review of Financial Economics,11,85–108.

Luong, H., Moshirian, F., Nguyen, L., Tian, X., Zhang, B., 2017. How do foreign institutional investors enhance firm innovation? Journal of Financial and Quantitative Analysis, 52, 1449–1490.

Minton, B.A., Taillard, J.P., Williamson, R., 2014. Financial expertise of the board, risk taking, and performance: Evidence from bank holding companies. Journal of Financial and Quantitative Analysis, 49, 351–380.

Mishkin, F.S., 1999. Financial consolidation: Dangers and Opportunities. Journal of Banking & Finance, 23, 675–691.

Morgan, D., 2002. Rating banks: Risk and uncertainty in an opaque industry. American Economic Review. 92, 874–888.

Nenova, T., 2003. The value of corporate voting rights and control: A cross-country analysis. Journal of Financial Economics, 68, 325–351.

Ongena, S., Popov, A., Van Horen, N., 2019. The invisible hand of the government: Moral suasion during the European Sovereign Debt Crisis." American Economic Journal: Macroeconomics, 11, 346–79.

Shleifer, A., Vishny, R.W. 1997. A Survey of Corporate Governance. The Journal of Finance, 52,737–783.

Shleifer, A., Wolfenzon, D., 2002. Investor protection and equity markets. Journal of Financial Economics, 66, 3–27.

Spamann, H., 2010. The "Antidirector Rights Index Revisited". Review of Financial Studies, 23, 467–486.

Stein, L.C.D., Stone, E., 2013.The effect of uncertainty on investment, hiring, and R&D: causal evidence from equity options. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1649108.

Stulz, R.M., 2005. The limits of financial globalization. Journal of Finance, 60, 1595–1638.

Teixeira, J.C.A., Matos, T.F.A., da Costa, G.L.P., Fortuna, M.J.A., 2020. Investor protection, regulation and bank risk-taking behavior. North American Journal of Economics and Finance 51, 101051.

Van Essen, M., Engelen, P. J., Carney, M., 2013. Does "good" corporate governance help in a crisis? The impact of country- and firm-level governance mechanisms in the European Financial Crisis. Corporate Governance: An International Review, 21, 201–224.

Vallascas, F., Mollah, S., Keasey, K., 2017. Does the impact of board independence on large bank risks change after the global financial crisis? Journal of Corporate Finance, 44, 149–166.

Weidmann, J., 2013. Stop encouraging banks to buy government debt. Financial Times, September 30, https://www.ft.com/content/81a505a4-278c-11e3-8feb-00144feab7de (Accessed Jan. 27, 2022).

Wurgler, J., 2000. Financial markets and the allocation of capital. Journal of Financial Economics, 58, 187−214.

Yeyati, E.L., Micco, A., 2007. Concentration and foreign penetration in Latin American banking sectors: impact on competition and risk. Journal of Banking & Finance 31, 1633–1647.

Table 1: I

Panel A: Summary statistics of bank-specific variables

RISK, RISK* and bank Z-score are risk-taking proxies at bank level. RISK is the standard deviation of the deviation of bank ROA from the global sample average ROA for all banks, using a fixed 5-year moving window. RISK* is the standard deviation of each bank's ROA over a similar window. Z-score is estimated as Ln ((CAR+ROA)/σ(ROA)), where CAR is the capital-to-asset ratio, ROA is bank return on assets, and σ(ROA) is standard deviation of bank ROA. Government Ownership and Foreign Ownership are government ultimate ownership and foreign ultimate corporate ownership, respectively. Bank Deposits are scaled by bank total assets. Deviation of Bank Loans is the deviation of the ratio of a bank's total loans to bank total assets in a country from the average ratio of all bank loans to total assets. Tangible Equity is shareholder equity minus intangible assets to total assets. Funding Fragility is the ratio of the sum of deposits from other banks, other deposits, and short-term borrowing, to the sum of total deposits, money market and short-term funding.

Variable	N	Mean	Median	Min	Max	Std. Dev.
RISK (%)	3,224	0.713	0.305	0.0004	84.866	2.744
RISK* (%)	3,224	0.724	0.259	0.0001	84.953	2.731
Bank Z-score (natural log)	3,207	3.581	3.655	-3.218	15.444	1.318
Foreign Ownership (%)	2,362	12.522	7.15	0	49	16.574
Government Ownership (%)	2,362	4.136	0.42	0	94.9	13.996
Tangible Equity (%)	3,224	9.832	8.134	0.063	110.0188	11.231
Deviation of Bank Loans (%)	3,221	2.208	-1.952	-132.358	2378.806	69.189
Bank Deposits (%)	3,224	79.915	74.780	20.442	3233.157	92.677
Bank Size/Total asset (in logs)	3,224	16.397	15.822	13.819	22.028	2.032
Funding Fragility (%)	3,224	13.145	8.898	0.0004	75.958	13.888
Non-performing loans (%)	3,833	3.2249	1.65	0	80	6.4118

Panel B: Summary statistics of country-level variables

RISK, RISK*, Z-Score, Foreign Ownership and Government Ownership are at country level. ADRI is the Spamann (2010) ADRI for investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. Quality of Government is the aggregate of the six dimensions of the Worldwide Governance Indicators (WGIs). The other variables are from Global Financial Development, the Popular Indicators Database of World Bank and the World Bank Surveys.

Variable	N	Mean	Median	Min	Max	Std. dev.
RISK (%)	310	0.741	0.394	0.004	21.334	2.139
RISK* (%)	310	0.623	0.183	0.001	21.997	2.211
Bank Z-score (natural log)	307	3.761	3.756	-0.447	9.012	1.301
ADRI (Investor Protection)	310	3.932	4	1	6	0.924
Rule of Law	310	0.699	0.705	-1.016	2.014	0.993
Control of Corruption	310	0.698	0.630	-1.132	2.470	1.153
Regulatory Quality	310	0.761	0.946	-0.957	1.984	0.865
Government Effectiveness	310	0.846	0.989	-0.877	2.437	0.927
Quality of Government	310	3.622	0.988	-7.069	11.334	5.490
Real GDP Growth (%)	310	-0.931	-0.433	-24.147	9.637	4.025
Foreign Ownership (%)	310	27.957	25.262	0	49	19.266
Government Ownership (%)	310	9.920	0.852	0	98.609	17.713
Capital Regulatory Index	308	6.905	7	1	10	1.963
Overall Restrictions on Banking	308	6.822	7	3	12	2.041
Limit. on Foreign Bank Entry	310	3.772	4	0	4	0.610
Bank Concentration (%)	310	63.117	62.348	20.846	100	20.232
Government Expend Growth (%)	302	3.179	2.248	-7.404	48.324	4.923
Broad Money Growth (%)	305	6.566	6.249	-54.965	60.537	11.830
Terms of Trade (%)	310	99.205	99.592	57.777	169.312	18.840
Market Capitalization to GDP (%)	305	100.994	64.411	6.532	1086.340	153.121
Stock Market Turnover Ratio	310	72.520	66.893	1.151	292.615	52.691
Bank Capital to Total Assets (%)	305	7.826	7	3	15.2	2.875
Stock Market Return (%)	308	8.439	7.332	-46.866	378.825	32.059
Bank Deposit to GDP (%)	297	77.01	64.453	15.739	320.766	51.414
Gross National Income Growth (%)	305	2.972	2.787	-15.722	19.503	4.038
Domestic Credit to Private Sector divided by GDP (%)	305	98.191	96.202	11.910	218.16	50.984

Table 2a: IV-GMM coefficients for institution

The IV-GMM coefficients are for 686 banks in 40 countries. RISK is the dependent variable at bank level. In panel A, the sample period is 2005–2009 and contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 and contains the 2010–2018 Eurozone Crisis. ADRI is the Spamann (2010) investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. IM denotes Institutional Mechanism for the Rule of Law, Control of Corruption, Regulatory Quality, Government Effectiveness and Quality of Government. Bank Deposit, Bank Size, Tangible Equity, Funding Fragility, Real GDP Growth, Government Expenditure Growth, Broad Money Growth, Terms of Trade, Market Capitalization to GDP and Stock Market Turnover Ratio are control variables. Most control variables are not shown to save space. The deviation of Bank Loans based on each bank's total loans to the total bank assets in a country from the average ratio of all bank loans to total assets ($DLoans_{i,t}$) is instrumented with Private Credit to GDP and GDP per capita. Variable definitions are in the WEB Appendix. Hayashi *C* statistic, *J*-statistic and First Stage Robust *F*-statistic are tests for endogeneity, over-identifying restriction and weak instruments, respectively. The Wald χ^2 statistic tests whether all the coefficients, besides the constant are significant. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Estimates for the 2005–2009 period

Variable	Rule of Law		Control of Corruption		Regulatory Quality		Govt. Effectiveness		Quality of Government	
ADRI (Investor protection)	-0.472[a]	-0.300[a]	-0.373[a]	-0.258[a]	-0.580[a]	-0.245[b]	-0.403[a]	-0.257[b]	-0.416[a]	-0.324[a]
	(0.082)	(0.101)	(0.049)	(0.057)	(0.103)	(0.118)	(0.071)	(0.114)	(0.097)	(0.104)
Institutional Mechanism (IM)	-2.061[a]	-1.861[a]	-1.785[a]	-1.801[a]	-2.257[a]	-1.888[a]	-1.386[a]	-1.206[a]	-0.361[a]	-0.349[a]
	(0.442)	(0.408)	(0.289)	(0.290)	(0.504)	(0.479)	(0.287)	(0.288)	(0.087)	(0.077)
High_ADRI × IM		-0.007		-0.272[a]		-0.115		-0.057		0.001
		(0.071)		(0.067)		(0.103)		(0.097)		(0.013)
Low_ADRI × IM		0.435[a]		0.015		0.583[a]		0.210[b]		0.035
		(0.133)		(0.086)		(0.176)		(0.097)		(0.022)
Bank Concentration	0.010[a]	0.010[a]	0.016[a]	0.014[a]	0.002	0.002	0.005[b]	0.005[c]	0.003	0.006[b]
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.285	0.580	-0.593	-1.161[c]	2.982[a]	2.025[c]	2.198[b]	1.637[c]	0.361	0.122
	(0.730)	(0.803)	(0.700)	(0.686)	(0.752)	(1.207)	(0.913)	(0.984)	(0.814)	(0.719)
Observations	1,037	1,052	1,037	1,037	1,037	1,052	1,052	1,052	1,054	1,052
R-squared	0.134	0.138	0.158	0.140	0.123	0.132	0.111	0.118	0.021	0.097
Wald χ^2statistic	166.58[a]	227.10[a]	275.91[a]	297.37[a]	197.80[a]	296.21[a]	340.46[a]	402.33[a]	248.87[a]	253.79[a]
Hayashi *C* statistic	2.291	1.114	0.001	0.471	2.221	0.118	0.656	0.324	0.430	0.610
Hansen *J*-statistic	1.893	0.097	0.358	1.848	1.069	0.0002	1.306	0.083	1.480	1.380
First Stage *F*-statistic	5.959[a]	9.311[a]	5.915[a]	8.248[a]	5.761[a]	14.872[a]	13.797	13.867	3.214[a]	10.232[a]
Panel B: Estimates for the 2009–2019 period										
ADRI (Investor Protection)	-0.408[a]	-0.224[c]	-0.313[c]	-0.338[b]	-0.498[c]	-0.324[c]	-0.181[b]	-0.275[b]	-0.691[a]	-0.459[b]
	(0.151)	(0.134)	(0.175)	(0.160)	(0.262)	(0.169)	(0.084)	(0.108)	(0.234)	(0.227)
Institutional Mechanism (IM)	-1.000[a]	-0.809[c]	-0.829[a]	-0.899[a]	-0.647[b]	-1.337[c]	-0.660[c]	-0.038	-0.152[a]	-0.092
	(0.286)	(0.450)	(0.289)	(0.324)	(0.317)	(0.718)	(0.361)	(0.236)	(0.057)	(0.067)
High_ADRI × IM		-0.484		-0.022		-0.694		-0.497[c]		0.019
		(0.445)		(0.359)		(0.456)		(0.280)		(0.081)
Low_ADRI × IM		-0.154		0.068		-0.203		-0.322		0.100
		(0.683)		(0.562)		(0.598)		(0.298)		(0.112)
Bank Concentration	-0.001	-0.001	0.005	-0.004	-0.016	-0.003	0.010	-0.009	-0.017	-0.028
	(0.010)	(0.018)	(0.018)	(0.024)	(0.015)	(0.012)	(0.011)	(0.009)	(0.017)	(0.019)
Constant	3.432[c]	2.388	2.161	3.818	5.784	2.920	-0.056	2.994	8.120[c]	7.511
	(1.988)	(3.696)	(2.979)	(4.239)	(3.936)	(2.196)	(1.829)	(2.053)	(4.259)	(5.646)
Observations	2,283	2,244	2,261	2,244	2,283	2,074	2,261	2,283	2,283	2,275
R-squared	0.080	0.088	0.045	0.048	0.081	0.089	0.110	0.112	0.114	0.115
Wald χ^2statistic	79.49[a]	106.31[a]	88.92	64.84	49.44	48.40	98.16	49.39	73.66	65.68
Hayashi *C* statistic	2.163	0.406	0.408	2.355	2.374	2.339	2.014	1.813	1.584	1.458
Hansen *J*-statistic	0.780	0.783	0.550	0.934	0.774	0.007	2.198	1.606	0.494	0.687
First Stage *F*-statistic	5.696[a]	4.685[a]	9.010[a]	5.155[a]	8.008[a]	4.216	6.376	2.710[c]	2.412[c]	2.519[c]

Table 2b: IV-GMM coefficients for institutional mechanisms using Z-score as the dependent variable

The IV-GMM coefficients are for 686 banks in 40 countries. Z-score is the dependent variable at bank level. In panel A, the sample period is 2005–2009 and contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 and contains the 2010–2018 Eurozone Crisis. ADRI is the Spamann (2010) investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. IM denotes Institutional Mechanism for the Rule of Law, Control of Corruption, Regulatory Quality, Government Effectiveness and Quality of Government. Bank Deposit, Bank Size, Tangible Equity, Funding Fragility, Real GDP Growth, Government Expenditure Growth, Broad Money Growth, Terms of Trade, Market Capitalization to GDP and Stock Market Turnover Ratio are control variables. Most control variables are not shown to save space. The deviation of Bank Loans based on each bank's total loans to total bank assets in a country from the average ratio of all bank loans to total assets ($DLoans_{i,t}$) is instrumented with Private Credit to GDP and GDP per capita. Variable definitions are available in the WEB Appendix. Hayashi *C* statistic, *J*-statistic and First Stage Robust *F*-statistic are tests for endogeneity, over-identifying restriction and weak instruments, respectively. Wald χ^2 statistic tests whether all the coefficients, besides the constant are significant. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Estimates for the 2005–2009 period										
Variable	**Rule of Law**		**Control of Corruption**		**Regulatory Quality**		**Govt. Effectiveness**		**Quality of Government**	
ADRI (Investor Protection)	0.462[a]	0.330[a]	0.424[a]	0.279[a]	0.597[a]	0.095	0.507[a]	0.340[a]	0.515[a]	0.309[a]
	(0.135)	(0.096)	(0.109)	(0.081)	(0.178)	(0.105)	(0.118)	(0.094)	(0.153)	(0.093)
Institutional Mechanism (IM)	1.417[a]	1.654[a]	1.409[a]	1.478[a]	1.538[a]	1.852[a]	1.341[a]	1.403[a]	0.323[a]	0.287[a]
	(0.314)	(0.280)	(0.175)	(0.172)	(0.409)	(0.300)	(0.214)	(0.205)	(0.068)	(0.050)
High_ADRI × IM		0.308[c]		0.480[a]		0.755[a]		0.370[b]		0.038
		(0.166)		(0.157)		(0.228)		(0.178)		(0.030)
Low_ADRI × IM		-0.164		-0.006		-0.460[a]		-0.039		-0.006
		(0.137)		(0.113)		(0.170)		(0.123)		(0.025)
Bank Concentration	-0.001	-0.001	-0.009[a]	-0.003	0.006	0.007[c]	-0.001	0.002	0.003	0.001
	(0.004)	(0.003)	(0.003)	(0.003)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.003)
Constant	4.097[a]	4.694[a]	5.173[a]	5.065[a]	1.708	4.331[a]	2.816[c]	3.374[a]	3.973[a]	5.283[a]
	(1.195)	(0.976)	(0.952)	(1.005)	(1.696)	(1.042)	(1.683)	(1.021)	(1.462)	(0.942)
Observations	1,046	1,029	1,029	1,029	1,046	1,029	1,044	1,029	1,046	1,029
R-squared	0.108	0.109	0.072	0.122	0.100	0.103	0.115	0.115	0.111	0.111
Wald χ^2statistic	181.17[a]	218.91[a]	270.81[a]	288.32[a]	127.65[a]	219.45[a]	179.54[a]	211.95[a]	156.94[a]	245.20[a]
Hayashi *C* statistic	0.164	0.057	0.459	2.373	1.663	0.592	0.505	0.576	1.343	.019
Hansen *J*-statistic	1.767	14.579	0.502	0.001	0.708	0.778	0.123	0.377	0.553	2.492
First Stage *F*-statistic	4.258[a]	14.579[a]	15.012[a]	7.620	4.599[b]	14.977[a]	3.194[b]	8.620[a]	3.579[b]	15.391[a]
Panel B: Estimates for the 2009–2019 period										
ADRI (Investor Protection)	0.228[b]	0.148[c]	0.208[c]	0.100	0.232[b]	0.116	0.207[a]	-0.116	0.219[b]	0.216[b]
	(0.099)	(0.087)	(0.117)	(0.109)	(0.117)	(0.106)	(0.078)	(0.132)	(0.102)	(0.100)
Institutional Mechanisms (IM)	0.812[a]	0.653[a]	0.889[a]	0.778[a]	0.920[a]	0.452[b]	0.918[a]	0.556[a]	0.130[a]	0.082[b]
	(0.178)	(0.163)	(0.158)	(0.150)	(0.312)	(0.224)	(0.166)	(0.202)	(0.033)	(0.035)
High_ADRI × IM		0.310[a]		0.232		0.505[a]		0.715[a]		0.051[b]
		(0.116)		(0.170)		(0.167)		(0.236)		(0.023)
Low_ADRI × IM		0.234[c]		0.271[c]		0.381[b]		0.444[b]		0.096[a]
		(0.136)		(0.147)		(0.193)		(0.183)		(0.032)
Bank Concentration	0.008	0.008[b]	0.004	0.002	0.009[b]	0.011[b]	0.008[c]	0.007[c]	0.009[c]	0.005
	(0.005)	(0.004)	(0.007)	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.005)	(0.006)
Constant	2.833[b]	3.835[a]	2.815[c]	4.666[a]	3.182[b]	5.622[a]	2.921[a]	6.490[a]	4.403[a]	5.612[a]
	(1.213)	(0.740)	(1.496)	(1.373)	(1.305)	(0.919)	(0.958)	(1.707)	(1.188)	(1.078)
Observations	2,272	2,272	2,250	2,272	2,272	2,020	2,272	2,272	2,020	2,020
R-squared	0.168	0.179	0.177	0.188	0.163	0.176	0.171	0.183	0.167	0.179
Wald χ^2statistic	268.50[a]	330.33[a]	278.92[a]	500.45[a]	278.92[a]	332.97[a]	372.04[a]	323.43[a]	255.93[a]	387.30[a]
Hayashi *C* statistic	1.892	1.599	2.287	0.038	1.169	0.746	0.230	2.306	2.023	0.470
Hansen *J*-statistic	0.534	2.107	2.107	2.269	0.324	0.040	0.766	2.609	1.545	2.199
First Stage *F*-statistic	2.566[c]	3.256[b]	2.870[c]	9.830[a]	8.640	3.809[b]	4.552[b]	6.055	6.684	4.851[a]

Table 3a: IV-GMM coefficients for institutional mechanisms and ownership, using RISK as the dependent variable

The IV-GMM coefficients are for 686 banks in 40 countries. RISK is the dependent variable at bank level. In panel A, the sample period is 2005–2009 and contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 and contains the 2010–2018 Eurozone Crisis. ADRI is the Spamann (2010) investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. Quality of Government is the aggregate of the six operationalized dimensions of the WGIs. Bank Deposit, Bank Size, Tangible Equity, Funding Fragility, Real GDP Growth, Government Expenditure Growth, Broad Money Growth, Terms of Trade, Market Capitalization to GDP and Stock Market Turnover Ratio are control variables. Most control variables are not shown to save space. The deviation of Bank Loans based on each bank's total loans to total bank assets in a country, from the average ratio of all bank loans to total assets ($DLoans_{i,t}$) is instrumented with Gross National Product per Capita, Private Credit to GDP. Variable definitions are available in the WEB Appendix. The Hayashi *C* statistic, *J*-statistic and First Stage Robust *F*-statistic are tests for endogeneity, over-identifying restriction and weak instruments, respectively. The Wald χ^2 statistic tests whether all the coefficients, besides the constant are significant. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	**Estimates for the 2005–2009 period**						**Estimates for the 2009–2019 period**					
ADRI (Investor Protection)	-0.401[a]	-0.332[a]	-0.383[a]	-0.346[a]	-0.399[a]	-0.380[a]	-0.178[a]	-0.192[b]	-0.1946[a]	-0.411[a]	-0.205[a]	-0.163[c]
	(0.062)	(0.091)	(0.065)	(0.101)	(0.062)	(0.098)	(0.049)	(0.095)	(0.0567)	(0.124)	(0.059)	(0.088)
Quality of Government	-0.397[a]	-0.390[a]	-0.384[a]	-0.377[a]	-0.394[a]	-0.387[a]	-0.118[a]	-0.165[a]	-0.1247[a]	-0.187[a]	-0.135[a]	-0.168[a]
	(0.075)	(0.076)	(0.074)	(0.076)	(0.075)	(0.075)	(0.033)	(0.040)	(0.0331)	(0.049)	(0.035)	(0.042)
High_ADRI × Quality		-0.030[c]		-0.022		-0.023		0.038		0.069		0.014
of Government		(0.017)		(0.019)		(0.017)		(0.029)		(0.042)		(0.026)
Low_ADRI × Quality		0.002		0.003		-0.006		0.042		0.051		0.032
of Government		(0.030)		(0.027)		(0.029)		(0.027)		(0.051)		(0.045)
Foreign Ownership	-0.003[b]	-0.008[a]			-0.003[b]	-0.008[a]	-0.003[c]	-0.004[b]			-0.002	-0.004[c]
	(0.001)	(0.002)			(0.001)	(0.002)	(0.002)	(0.002)			(0.002)	(0.002)
High_ADRI× Foreign		-0.001				-0.001		-0.003				-0.004
Ownership		(0.003)				(0.003)		(0.003)				(0.003)
Low_ADRI × Foreign		0.006[b]				0.006[b]		0.006[b]				0.007[b]
Ownership		(0.003)				(0.003)		(0.003)				(0.003)
Government Ownership			0.002	0.001	0.001	-0.001			0.003	-0.009[b]	0.003	-0.006[c]
			(0.002)	(0.002)	(0.002)	(0.002)			(0.002)	(0.005)	(0.003)	(0.003)
High_ADRI × Government				0.005		0.007				0.013[b]		0.007[b]
Ownership				(0.005)		(0.004)				(0.005)		(0.003)
Low_ADRI × Government				-0.032		-0.025				0.018[b]		0.009
Ownership				(0.024)		(0.023)				(0.009)		(0.008)
Constant	-0.150	0.139	-0.096	-0.137	-0.094	0.384	-0.482	0.812	0.209	2.673	0.207	0.922
	(0.864)	(0.963)	(0.872)	(0.909)	(0.861)	(0.947)	(0.667)	(1.017)	(0.899)	(1.841)	(0.940)	(1.071)
Observations	690	690	690	690	690	690	1,714	1,713	1,728	1,728	1,714	1,728
R-squared	0.133	0.183	0.100	0.111	0.137	0.190	0.197	0.230	0.075	0.226	0.228	0.233
Wald χ^2statistic	149.85[a]	206.47[a]	143.63[a]	155.53[a]	150.81[a]	209.80[a]	202.73[a]	97.67[a]	190.39	342.98[a]	179.31[a]	284.97[a]
Hayashi *C* statistic	0.586	0.059	0.836	0.705	0.536	0.003	0.185	1.293	0.337	0.003	0.470	0.004
Hansen *J*-statistic	1.127	1.324	1.110	1.506	1.321	1.820	1.915	1.594	0.033	0.164	0.124	.068
First Stage *F*-statistic	8.624[a]	7.077[a]	8.642[a]	7.874[a]	8.575[a]	6.506[a]	7.055[a]	6.866[a]	5.153[a]	2.349[c]	3.228[b]	2.623[c]

Table 3b: IV-GMM coefficients for inst… …dent variable

The IV-GMM coefficients are for 686 banks in 40 countries. Z-score is the dependent variable at bank level. In panel A, the sample period is 2005–2009 and contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 and contains the 2010–2018 Eurozone Crisis. ADRI is the Spamann (2010) investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. Quality of Government is the aggregate of the six operationalized dimensions of the WGIs. Bank Deposit, Bank Size, Tangible Equity, Funding Fragility, Real GDP Growth, Government Expenditure Growth, Broad Money Growth, Terms of Trade, Market Capitalization to GDP and Stock Market Turnover Ratio are control variables. Most control variables are not shown to save space. The deviation of Bank Loans based on each bank's total loans to total bank assets in a country from the average ratio of all bank loans to total assets ($DLoans_{i,t}$) is instrumented with Gross National Product per Capita, Private Credit to GDP. Variable definitions are available in the WEB Appendix. The Hayashi *C* statistic, *J*-statistic and First Stage Robust *F*-statistic are tests for endogeneity, over-identifying restriction and weak instruments, respectively. The Wald χ^2 statistic tests whether all the coefficients, besides the constant are significant. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	**Estimates for the 2005–2009 period**						**Estimates for the 2009–2019 period**					
ADRI (Investor Protection)	0.422[a]	0.325[a]	0.405[a]	0.279[b]	0.418[a]	0.279[b]	0.126[c]	0.232[c]	0.175[c]	0.381[a]	0.245[b]	0.154[c]
	(0.071)	(0.094)	(0.073)	(0.120)	(0.072)	(0.114)	(0.071)	(0.132)	(0.103)	(0.141)	(0.097)	(0.093)
Quality of Government	0.313[a]	0.311[a]	0.303[a]	0.295[a]	0.312[a]	0.307[a]	0.151[a]	0.216[a]	0.098[b]	0.154[a]	0.171[a]	0.137[a]
	(0.041)	(0.042)	(0.041)	(0.044)	(0.041)	(0.043)	(0.033)	(0.043)	(0.042)	(0.055)	(0.037)	(0.033)
High_ADRI × Quality		0.027		0.036		0.038		-0.032		-0.011		0.027
of Government		(0.021)		(0.026)		(0.024)		(0.034)		(0.043)		(0.023)
Low_ADRI × Quality		-0.013		-0.016		-0.019		-0.029		0.033		0.038
of Government		(0.033)		(0.030)		(0.034)		(0.042)		(0.053)		(0.030)
Foreign Ownership	0.002[b]	0.006[b]			0.002[b]	0.006[b]	-0.001	-0.001			-0.004	-0.001
	(0.001)	(0.003)			(0.001)	(0.003)	(0.002)	(0.003)			(0.003)	(0.002)
High_ADRI× Foreign		0.005				0.004		0.007				0.003
Ownership		(0.005)				(0.005)		(0.005)				(0.003)
Low_ADRI× Foreign		-0.005[c]				-0.005[c]		-0.006				-0.0001
Ownership		(0.003)				(0.003)		(0.004)				(0.003)
Government Ownership			-0.002	-0.006	-0.002	-0.004			0.004	-0.002	-0.005	-0.002
			(0.003)	(0.004)	(0.003)	(0.004)			(0.004)	(0.006)	(0.003)	(0.004)
High_ADRI × Government				0.007		0.005				0.004		-0.008[b]
Ownership				(0.007)		(0.006)				(0.010)		(0.004)
Low_ADRI × Government				0.008		0.002				0.002		0.005
Ownership				(0.026)		(0.028)				(0.009)		(0.007)
Constant	5.174[a]	5.035[a]	5.108[a]	5.532[a]	5.115[a]	5.195[a]	4.241[a]	3.372[a]	6.675[a]	3.769[b]	3.190[b]	5.222[a]
	(0.953)	(1.026)	(0.945)	(0.994)	(0.947)	(1.067)	(1.073)	(1.230)	(1.810)	(1.734)	(1.402)	(0.808)
Observations	684	684	684	684	684	684	1,693	1,722	1,551	1,551	1,722	1,708
R-squared	0.163	0.121	0.167	0.167	0.165	0.140	0.169	0.223	0.169	0.180	0.228	0.181
Wald χ^2statistic	230.27[a]	262.91[a]	228.83[a]	255.40[a]	231.50[a]	276.06[a]	263.11[a]	390.82[a]	238.98[a]	202.30[a]	179.31[a]	417.95[a]
Hayashi *C* statistic	0.073	0.510	0.008	0.020	0.050	0.246	0.061	0.053	0.138	1.532	0.470	0.344
Hansen *J*-statistic	0.536	0.545	0.444	0.635	0.635	0.626	1.600	2.555	2.009	0.043	0.124	2.530
First Stage *F*-statistic	8.813[a]	7.492[a]	8.940[a]	8.288[a]	8.878[a]	6.999[a]	2.914[a]	9.255[a]	2.457[c]	2.965[c]	3.228[b]	8.826[a]

Table 4: IV-GMM coefficients for institutional mechanisms, ownership and regulatory, using RISK as the dependent variable

The IV-GMM coefficients are for 686 banks in 40 countries. RISK is the dependent variable at bank level. In panel A, the sample period is 2005–2009 and contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 and contains the 2010–2018 Eurozone Crisis. ADRI is the Spamann (2010) investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. Quality of Government is the aggregate of the six operationalized dimensions of the WGIs. Bank Deposit, Bank Size, Tangible Equity, Funding Fragility, Real GDP Growth, Government Expenditure Growth, Broad Money Growth, Terms of Trade, Market Capitalization to GDP and Stock Market Turnover Ratio are control variables. Most control variables are not shown to save space. The deviation of Bank Loans based on each bank's total loans to total bank assets in a country from the average ratio of all bank loans to total assets ($DLoans_{i,t}$) is instrumented with Domestic Credit to Private Sector over GDP and Gross National Product per Capita. Variable definitions are available in the WEB Appendix. The regressors include year and country income level fixed effects. Hayashi *C* statistic, *J*-statistic and First Stage Robust *F*-statistic are tests for endogeneity, over-identifying restriction and weak instruments, respectively. Wald χ^2 statistic tests whether all the coefficients, besides the constant are significant. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Estimates for the 2005–2009 period

Variable	Capital regulatory index		Overall Restrictions on Banking		Independence of Supervisory Authority (political)		No Explicit Deposit Insurance	
ADRI (Investor Protection)	-0.496[a]	-0.470[b]	-0.455[a]	-0.554[a]	-0.397[a]	-0.239[c]	-0.437[a]	-0.526[a]
	(0.082)	(0.187)	(0.086)	(0.126)	(0.098)	(0.131)	(0.077)	(0.119)
Bank Regulation and Supervision	-0.090[b]	-0.067[c]	-0.088[b]	-0.040	-0.292[c]	-0.405[a]	0.203[c]	0.307[b]
	(0.035)	(0.040)	(0.042)	(0.048)	(0.152)	(0.147)	(0.122)	(0.143)
Quality of Government	-0.337[a]	-0.119[a]	-0.301[a]	-0.290[a]	-0.256[a]	-0.168[b]	-0.305[a]	-0.308[a]
	(0.064)	(0.041)	(0.064)	(0.064)	(0.074)	(0.075)	(0.058)	(0.064)
High_ADRI × Quality of Government		0.074[a]		0.029		-0.016		0.043[c]
		(0.028)		(0.020)		(0.023)		(0.023)
Low_ADRI × Quality of Government		0.053		0.023		0.105[b]		0.066[c]
		(0.049)		(0.038)		(0.047)		(0.040)
Foreign Ownership	-0.003[b]	-0.011[b]	-0.004[b]	-0.013[a]	-0.005[b]	-0.018[a]	-0.004[b]	-0.015[a]
	(0.001)	(0.005)	(0.002)	(0.003)	(0.002)	(0.005)	(0.002)	(0.003)
High_ADRI × Foreign Ownership		-0.002		0.010[b]		0.017[a]		0.010[b]
		(0.004)		(0.004)		(0.006)		(0.005)
Low_ADRI × Foreign Ownership		0.011[c]		0.010[a]		0.013[a]		0.012[a]
		(0.006)		(0.004)		(0.005)		(0.003)
Government Ownership	-0.001	-0.010[b]	0.002	-0.003	0.003	0.008	0.001	-0.004[c]
	(0.002)	(0.004)	(0.002)	(0.004)	(0.003)	(0.011)	(0.002)	(0.002)
High_ADRI × Government Ownership		0.006		0.005		-0.005		0.006
		(0.005)		(0.005)		(0.011)		(0.004)
Low_ADRI × Government Ownership		0.020		-0.046		-0.079[c]		-0.033
		(0.046)		(0.036)		(0.045)		(0.027)
Constant	2.305[a]	3.554[c]	1.766[c]	2.272[b]	1.523	1.645	0.714	1.445
	(0.859)	(1.837)	(1.047)	(1.065)	(1.230)	(1.332)	(0.912)	(1.007)
Observations	697	703	697	697	698	684	698	698
R-squared	0.197	0.130	0.193	0.196	0.192	0.196	0.190	0.092
Wald χ^2 statistic	219.40[a]	127.75[a]	131.90[a]	165.15[a]	116.39[a]	132.57[a]	138.71[a]	169.42[a]
Hayashi *C* statistic	0.019	1.362	0.878	0.293	0.458	1.743	1.997	0.504
Hansen *J*-statistic	1.539	1.511	2.536	.743	0.451	0.528	1.271	0.148
First Stage *F*-statistic	5.415[a]	6.358[a]	6.302[a]	3.749[b]	4.578[b]	3.534[b]	6.879[a]	5.391[a]

Table 4: (Cont'd)
panel B: Estimates for the 2009–2019 period

Variable	Capital regulatory index		Overall Restrictions on Banking		Independence of Supervisory Authority (political)		No Explicit Deposit Insurance	
ADRI (Investor Protection)	-0.264[b]	-0.319[a]	-0.200[a]	-0.292[a]	-0.143[a]	-0.074	-0.199[a]	-0.173[b]
	(0.114)	(0.094)	(0.053)	(0.103)	(0.040)	(0.138)	(0.045)	(0.080)
Bank Regulation and Supervision	-0.054[b]	-0.114[a]	-0.074[b]	-0.091[a]	-0.293[a]	-0.350[a]	-0.389[a]	-0.455[a]
	(0.027)	(0.027)	(0.031)	(0.033)	(0.098)	(0.136)	(0.099)	(0.099)
Quality of Government	-0.168[a]	-0.045[c]	-0.121[a]	-0.129[a]	-0.099[a]	-0.157[a]	-0.114[a]	-0.138[a]
	(0.044)	(0.026)	(0.032)	(0.037)	(0.028)	(0.052)	(0.031)	(0.038)
High_ADRI × Quality of Government		0.023		-0.0001		0.026		-0.007
		(0.026)		(0.013)		(0.047)		(0.014)
Low_ADRI × Quality of Government		-0.014		-0.054		0.037		-0.006
		(0.033)		(0.034)		(0.043)		(0.030)
Foreign Ownership	-0.003	-0.004[b]	-0.003[c]	-0.007[a]	-0.003[c]	-0.004[c]	-0.003[c]	-0.005[a]
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
High_ADRI × Foreign Ownership		0.002		0.0001		-0.004		-0.001
		(0.002)		(0.002)		(0.003)		(0.002)
Low_ADRI × Foreign Ownership		0.004[c]		0.007[a]		0.006[b]		0.006[a]
		(0.002)		(0.002)		(0.003)		(0.002)
Government Ownership	-0.002	-0.010[b]	0.0003	-0.005[a]	0.004[c]	-0.003	0.001	-0.005[b]
	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)
High_ADRI × Government Ownership		0.008[b]		0.005[b]		0.008		0.007[a]
		(0.004)		(0.002)		(0.005)		(0.003)
Low_ADRI × Government Ownership		0.016[b]		0.009		0.011		0.010[c]
		(0.008)		(0.006)		(0.008)		(0.006)
Constant	-0.673	1.306	-0.118	1.056	-0.023	0.832	-0.351	0.205
	(0.607)	(1.171)	(0.613)	(0.778)	(0.690)	(1.437)	(0.666)	(0.616)
Observations	1,468	1,699	1,713	1,728	1,715	1,713	1,715	1,728
R-squared	0.079	0.223	0.231	0.221	0.214	0.239	0.233	0.241
Wald χ^2 statistic	175.02	161.17	148.64	296.38	266.95	201.57	269.97	272.41
Hayashi *C* statistic	0.774	0.686	2.296	0.150	0.104	0.478	0.019	0.034
Hansen *J*-statistic	0.721	0.358	0.066	0.136	0.014	1.766	0.052	0.088
First Stage *F*-statistic	11.357	3.873[b]	11.465[b]	21.306[a]	8.235[a]	5.517[a]	8.163	9.409

Table 5a: Multinomial logistic regression using crisis regimes as dependent variables and RISK, legal and bank regulation at country level

The post-crisis bias test for 686 banks in 40 countries, where the crisis year is determined by country using the Laeven and Valencia (2018) database and extended to the more recent period. In panel A, the sample period is 2005–2009 which contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 which contains the 2010–2018 Eurozone Crisis. ($Y = 1$) is the pre-crisis regime/year(s). ($Y = 2$) is the crisis/post-crisis regime/year(s) with ($Y = 0$) for tranquil regime/year(s) at all other times. The regressions include Quality of Government, Investor Protection, ownership and bank regulation and supervision (BRS). The BRS variables, i.e., Capital Regulatory Index, Overall Restrictions on Banking, Independence of Supervisory Authority (political) and No Explicit Deposit Insurance Scheme are from World Bank Surveys on Bank Regulation database. ADRI is the Spamann (2010) investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. The control variables are according to Table 2a or 2b. Some of the control variables are not shown to save space. RISK, Foreign and Government Ownership are aggregated at country level (see panel B, Table 1). Variable definitions are available in the WEB Appendix. Robust standard errors are in parentheses. [a], [b], and [c] denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Estimates for the 2005–2009 period

Variable	Capital regulatory index		Overall Banking on Restrictions		Independence of Supervisory Authority (political)		No Explicit Deposit Insurance	
	Y=1	Y=2	Y=1	Y=2	Y=1	Y=2	Y=1	Y=2
RISK	2.713	1.009[b]	1.513[c]	0.772[c]	4.420[a]	1.092[a]	2.982[a]	1.050[a]
	(1.996)	(0.460)	(0.902)	(0.403)	(0.596)	(0.317)	(0.845)	(0.318)
ADRI (Investor Protection)	-2.713[b]	-2.149[a]	-6.894[a]	-1.606[c]	-3.993[a]	-1.657[c]	-7.645[a]	-1.654[b]
	(1.077)	(0.756)	(0.742)	(0.838)	(0.877)	(0.853)	(0.549)	(0.725)
Quality of Government	-1.366[a]	-0.205[a]	-1.132[a]	-0.228[a]	-1.239[a]	-0.203[a]	-1.018[a]	-0.185[a]
	(0.223)	(0.053)	(0.059)	(0.054)	(0.050)	(0.045)	(0.043)	(0.044)
Foreign Ownership	0.631	-0.029	2.934[a]	0.320	0.659	-0.086	1.238[a]	0.027
	(0.389)	(0.342)	(0.329)	(0.363)	(0.683)	(0.364)	(0.364)	(0.394)
Government Ownership	0.656[a]	0.117[a]	1.271[a]	0.109[c]	1.029[a]	0.094[a]	1.272[a]	0.104[b]
	(0.072)	(0.044)	(0.064)	(0.056)	(0.055)	(0.031)	(0.066)	(0.041)
Bank Regulation and Supervision	4.535[a]	0.377	-6.829[a]	-0.806[c]	1.980	-0.768	-4.092[a]	-0.506
	(1.044)	(0.306)	(0.500)	(0.475)	(1.891)	(0.724)	(1.496)	(1.119)
Constant	56.825[a]	10.764[c]	29.112[a]	16.060[a]	16.438[b]	10.561	22.455[a]	9.394
	(9.276)	(5.579)	(10.498)	(5.878)	(7.437)	(6.689)	(8.377)	(5.968)
Observations	144	144	144	144	146	146	145	145
Pseudo R^2	0.845[a]		0.857[a]		0.843[a]		0.840[a]	

Panel B: Estimates for the 2009–2019 period

RISK	0.757	0.557	0.644[b]	0.057	0.573	-0.152	0.483	0.097
	(0.471)	(0.427)	(0.327)	(0.287)	(0.377)	(0.420)	(0.324)	(0.311)
ADRI (Investor Protection)	3.281[b]	3.105[b]	2.961[b]	1.572	3.450[a]	3.481[a]	1.834[a]	1.451[b]
	(1.341)	(1.311)	(1.307)	(0.980)	(1.012)	(0.958)	(0.704)	(0.599)
Quality of Government	2.126[a]	1.846[a]	1.570[a]	1.092[a]	1.678[a]	1.375[a]	1.369[a]	0.998[a]
	(0.574)	(0.486)	(0.430)	(0.256)	(0.452)	(0.266)	(0.388)	(0.203)
Foreign Ownership	0.140[a]	0.117[a]	0.130[a]	0.095[a]	0.135[a]	0.106[a]	0.120[a]	0.087[a]
	(0.031)	(0.030)	(0.029)	(0.024)	(0.028)	(0.025)	(0.025)	(0.023)
Government Ownership	-0.328[a]	-0.347[a]	-0.225[a]	-0.216[a]	-0.241[a]	-0.296[a]	-0.203[a]	-0.220[a]
	(0.078)	(0.084)	(0.055)	(0.061)	(0.061)	(0.055)	(0.053)	(0.053)
Bank Regulation and Supervision	1.505[b]	1.353[a]	0.257	-0.367	-2.582[b]	-4.125[a]	-15.442[a]	-17.538[a]
	(0.629)	(0.405)	(0.553)	(0.555)	(1.310)	(0.971)	(1.602)	(1.350)
Constant	-26.514[b]	-25.972[b]	-22.849[b]	-9.816	-19.100[b]	-17.963[a]	-15.916[a]	-15.098[a]
	(10.929)	(10.135)	(11.347)	(11.008)	(7.815)	(6.698)	(5.989)	(4.931)
Observations	186	186	186	186	186	186	186	186
Pseudo R^2	0.646		0.642		0.610		0.631	

Table 5b: Multinomial logistic regression using crisis regimes as dependent variables and Z-score, legal and bank regulation at country level

The post-crisis bias test for 686 banks in 40 countries, where the crisis year is by determined country using the Laeven and Valencia (2018) database and extended to the more recent period. In panel A, the sample period is 2005–2009 which contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 which contains the 2010–2018 Eurozone Crisis. ($Y = 1$) is the pre-crisis regime/year(s). ($Y = 2$) is the crisis/post-crisis regime/year(s) with ($Y = 0$) for tranquil regime/year(s) at all other times. The regressions include Quality of Government, Investor Protection, ownership and bank regulation and supervision (BRS). The BRS variables, i.e., Capital Regulatory Index, Overall Restrictions on Banking, Independence of Supervisory Authority (political) and No Explicit Deposit Insurance Scheme are from World Bank Surveys on Bank Regulation database. ADRI is the Spamann (2010) investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. Z-score, Foreign and Government Ownership are aggregated at country level (see panel B, Table 1). The control variables are according to Table 2a or 2b. Some of the control variables are not shown to save space. Variable definitions are available in the WEB Appendix. Robust standard errors are in parentheses. [a], [b], and [c] denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Estimates for the 2005–2009 period

Variable	Capital regulatory index		Overall Restrictions on Banking		Independence of Supervisory Authority (political)		No Explicit Deposit Insurance	
	Y=1	Y=2	Y=1	Y=2	Y=1	Y=2	Y=1	Y=2
Z-Score	-8.955[a]	-1.571[a]	-4.451[a]	-1.731[a]	-5.316[b]	-1.656[a]	-9.191[a]	-1.526[a]
	(1.260)	(0.538)	(1.708)	(0.530)	(2.071)	(0.547)	(1.068)	(0.491)
ADRI (Investor Protection)	-2.913[a]	-1.840[b]	-5.439[a]	-1.417	-3.241[a]	-0.834	-2.450[a]	-0.691
	(0.576)	(0.881)	(0.731)	(0.888)	(0.733)	(0.559)	(0.607)	(0.464)
Quality of Government	-0.926[a]	-0.202[b]	-0.943[a]	-0.236[a]	-0.926[a]	-0.156[a]	-0.908[a]	-0.141[b]
	(0.057)	(0.102)	(0.062)	(0.060)	(0.047)	(0.055)	(0.050)	(0.063)
Foreign Ownership	0.479	-0.032	0.887	0.173	0.710	0.100	0.994[a]	0.164
	(0.386)	(0.242)	(0.541)	(0.280)	(0.453)	(0.231)	(0.184)	(0.198)
Government Ownership	0.433[a]	0.097	0.824[a]	0.099[c]	0.839[a]	0.053	0.707[a]	0.060
	(0.065)	(0.063)	(0.094)	(0.053)	(0.095)	(0.040)	(0.055)	(0.044)
Bank Regulation and Supervision	3.417[a]	0.352	-3.933[a]	-0.979[b]	5.619[a]	-0.285	-6.635[a]	-1.488
	(0.510)	(0.430)	(0.725)	(0.425)	(1.501)	(0.852)	(0.930)	(1.062)
Constant	70.415[a]	14.489[b]	44.951[a]	20.698[a]	38.939[a]	11.218[b]	21.368[b]	9.769[c]
	(9.071)	(7.103)	(8.486)	(6.544)	(7.609)	(5.472)	(8.896)	(5.228)
Observations	143	143	143	143	145	145	144	144
Pseudo R^2	0.725[a]		0.684[a]		0.720[a]		0.687[a]	
Panel B. Estimates for the 2009–2019 period								
Z-Score	-0.142[b]	0.0003	-0.150[c]	0.0003	-0.169[c]	0.0006	-0.137[c]	0.0003
	(0.059)	(0.0003)	(0.082)	(0.0003)	(0.091)	(0.0004)	(0.072)	(0.0003)
ADRI (Investor Protection)	2.973[a]	3.075[b]	2.461[a]	1.606	2.446[b]	3.449[a]	2.619[a]	1.441[b]
	(1.087)	(1.556)	(0.760)	(1.092)	(0.996)	(0.985)	(0.818)	(0.713)
Quality of Government	2.743[a]	1.746[a]	2.443[a]	1.108[a]	2.564[a]	1.440[a]	2.275[a]	1.002[a]
	(0.826)	(0.545)	(0.910)	(0.276)	(0.871)	(0.294)	(0.859)	(0.247)
Foreign Ownership	0.132[a]	0.118[a]	0.112[a]	0.099[a]	0.132[a]	0.113[a]	0.119[a]	0.092[a]
	(0.032)	(0.033)	(0.028)	(0.028)	(0.026)	(0.031)	(0.026)	(0.029)
Government Ownership	-0.377[a]	-0.334[a]	-0.239[a]	-0.204[a]	-0.244[a]	-0.318[a]	-0.220[a]	-0.222[a]
	(0.092)	(0.084)	(0.066)	(0.052)	(0.051)	(0.066)	(0.052)	(0.059)
Bank Regulation and Supervision	1.388[b]	1.234[a]	-0.530	-0.474	0.721	-4.455[a]	-9.831[b]	-19.413[a]
	(0.637)	(0.432)	(0.481)	(0.684)	(2.328)	(1.320)	(3.997)	(1.388)
Constant	-17.923	-25.931[b]	4.892	-9.833	-1.837	-19.049[a]	-1.973	-15.840[b]
	(16.839)	(12.431)	(16.660)	(12.522)	(11.699)	(6.732)	(11.389)	(6.327)
Observations	186	186	186	186	186	186	186	186
Pseudo R^2	0.768[a]		0.736[a]		0.772[a]		0.739[a]	

Table 6: Gaussian copula regressions using crisis and RISK dummies as dependent variables

The Gaussian copula regressions are for 686 banks in 40 countries where the crisis year is determined by country using the Laeven and Valencia (2018) database and extended to the more recent period. In panel A, the sample period is 2005–2009 which contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 which contains the 2010–2018 Eurozone Crisis. EQ1 is a dependent variable which has a value of 1 for the crisis year(s); 0, otherwise. EQ2 is a zero/one dependent variable which has a value of 1 for RISK observations above the median; 0, otherwise. RISK is at country level. ADRI is the Spamann (2010) investor protection measure. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. The control variables are according to Table 2a or 2b. The Bank Regulation and Supervision (BRS) variables, i.e., Capital Regulatory Index, Overall Restrictions on Banking, Independence of Supervisory Authority (political) and No Explicit Deposit Insurance Scheme are from World Bank Surveys on Bank Regulation database. Foreign and Government Ownership are aggregated at country level. The control variables are not shown to save space. Variable definitions are available in the WEB Appendix. The Wald χ^2 Equality is a test of the equality of the coefficients in the bivariate regressions. The Wald χ^2 Independence is a test of independence. Theta is the dependency parameter. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Gaussian copula estimates for the 2005–2009 period

Variable	Capital regulatory index		Overall Restrictions on Banking		Independence of Supervisory Authority (political)		No Explicit Deposit Insurance	
	EQ1	EQ2	EQ1	EQ2	EQ1	EQ2	EQ1	EQ2
ADRI (Investor Protection)	-0.602[b]	-0.863[a]	-0.220	-0.666[a]	-0.488[c]	-0.724[a]	-0.333	-0.710[a]
	(0.298)	(0.211)	(0.180)	(0.161)	(0.258)	(0.184)	(0.266)	(0.154)
Quality of Government	0.197[a]	0.012	0.007	-0.048	0.246[a]	-0.005	0.206[a]	-0.035
	(0.074)	(0.045)	(0.045)	(0.040)	(0.074)	(0.041)	(0.054)	(0.039)
Foreign Ownership	0.009	-0.010	0.011	-0.012	0.013	-0.007	0.015	-0.011
	(0.015)	(0.009)	(0.009)	(0.007)	(0.015)	(0.008)	(0.016)	(0.007)
Government Ownership	-0.073[a]	-0.032[a]	-0.046[a]	-0.023[a]	-0.083[a]	-0.027[a]	-0.074[a]	-0.022[a]
	(0.023)	(0.009)	(0.016)	(0.008)	(0.022)	(0.009)	(0.024)	(0.008)
Bank Regulation and Supervision	0.029	0.137	-0.201[b]	-0.012	-0.453	-0.078	-1.306[b]	0.634[b]
	(0.136)	(0.085)	(0.088)	(0.074)	(0.441)	(0.247)	(0.575)	(0.297)
Observations	144	144	144	144	146	146	145	145
Wald χ^2 Equality	2507.686[a]		38.449[a]		2301.116[a]		44.233[a]	
AIC	232.619		317.053		232.477		220.714	
Theta	0.064		-0.073		0.463		0.433	
Wald χ^2 Independence	4.179[b]		8.159[a]		4.174[b]		7.695[a]	

Panel B. Gaussian copula estimates for the 2009–2019 period

ADRI (Investor Protection)	0.848[a]	0.265[c]	0.506[c]	0.086	1.231[a]	0.331[b]	0.548[b]	0.339[b]
	(0.269)	(0.136)	(0.273)	(0.150)	(0.328)	(0.139)	(0.215)	(0.138)
Quality of Government	0.447[a]	-0.123[a]	0.349[a]	-0.167[a]	0.471[a]	-0.108[a]	0.341[a]	-0.122[a]
	(0.092)	(0.030)	(0.068)	(0.034)	(0.087)	(0.029)	(0.068)	(0.033)
Foreign Ownership	0.027[a]	-0.003	0.027[a]	-0.0001	0.030[a]	-0.003	0.023[b]	-0.004
	(0.010)	(0.006)	(0.010)	(0.006)	(0.011)	(0.006)	(0.010)	(0.007)
Government Ownership	-0.089[a]	-0.004	-0.068[a]	-0.007	-0.101[a]	-0.003	-0.077[a]	-0.003
	(0.023)	(0.006)	(0.019)	(0.006)	(0.025)	(0.006)	(0.020)	(0.006)
Bank Regulation and Supervision	0.280[b]	-0.118[c]	-0.153	-0.135[b]	-1.493[a]	-0.052	-5.969[a]	-0.453
	(0.142)	(0.067)	(0.157)	(0.066)	(0.536)	(0.235)	(0.768)	(0.316)
Observations	186	186	181	181	186	186	186	186
Wald χ^2 Equality	96.788[a]		93.004[a]		76.528[a]		133.545[a]	
AIC	299.541		312.374		299.245		301.792	
Theta	0.576		0.331		0.500		0.436	
Wald χ^2 Independence	8.298[a]		1.724		4.801[b]		3.725[b]	

Table 7a: DID regressions of RISK on institutional measures and country-crisis years

The IV-GMM coefficients are for 686 banks in 40 countries. Country Crisis is a dummy variable which is 1 in crisis year(s) and 0 otherwise. Crisis year is determined by country using the Laeven and Valencia (2018) database and extended to the more recent period. In panel A, the sample period is 2005–2009. In panel B, the sample period is 2009–2019. RISK is the dependent variable at bank level. ADRI is the Spamann (2010) investor protection measure. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. IM denotes Institutional Mechanism for Rule of Law, Control of Corruption, Regulatory Quality, Quality of Government and Government Effectiveness. The control variables are: Bank Deposit; Bank Size; Tangible Equity; Funding Fragility; Real GDP Growth; Government Expenditure Growth; Broad Money Growth; Terms of Trade; Market Capitalization to GDP; Reserve Growth; and Stock Market Turnover Ratio. Most control variables are not shown to save space. The deviation of a bank's loans to total assets from the country's average ratio of bank loans to total assets ($DLoans_{i,t}$) is instrumented with Gross National Product per Capita and Domestic Credit to Private Sector over GDP. Variable definitions are available in the WEB Appendix. [a], [b], and [c] denote statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A: Estimates are for the 2005–2009 period with country-crisis dummies

Variable	Rule of Law		Control of Corruption		Regulatory Quality		Govt. Effectiveness		Quality of Government	
ADRI (Investor Protection)	-0.412[a]	-0.153[c]	-0.262[a]	-0.134[c]	-0.320[a]	-0.030	-0.262[a]	-0.382[b]	-0.395[a]	-0.194[b]
	(0.071)	(0.084)	(0.081)	(0.072)	(0.060)	(0.064)	(0.045)	(0.165)	(0.094)	(0.078)
Institutional Mechanism (IM)	-1.998[a]	-1.281[a]	-0.857[b]	-0.679[b]	-1.029[a]	-0.350	-1.057[a]	-1.290[a]	-0.371[a]	-0.262[a]
	(0.409)	(0.393)	(0.355)	(0.316)	(0.326)	(0.309)	(0.218)	(0.333)	(0.083)	(0.065)
High_ADRI × IM		-0.057		-0.146[b]		-0.220[b]		0.271		-0.004
		(0.069)		(0.060)		(0.110)		(0.194)		(0.013)
Low_ADRI × IM		0.336[b]		0.108		0.275[b]		0.321		0.035
		(0.157)		(0.085)		(0.112)		(0.246)		(0.023)
Country Crisis	0.483[b]	0.602[c]	0.970[a]	1.005[a]	0.517	1.264[a]	1.380[a]	2.639[a]	1.133[a]	0.821[a]
	(0.227)	(0.341)	(0.256)	(0.223)	(0.353)	(0.266)	(0.465)	(0.800)	(0.334)	(0.313)
ADRI× Country Crisis	-0.130[b]	-0.120[c]	-0.322[a]	-0.308[a]	-0.043	-0.304[a]	-0.180[a]	-0.434[a]	-0.244[a]	-0.157[a]
	(0.063)	(0.070)	(0.088)	(0.071)	(0.050)	(0.071)	(0.059)	(0.152)	(0.084)	(0.059)
IM× Country Crisis	0.148	-0.001	-0.159[b]	-0.165[b]	-0.077	-0.338[a]	-0.344	-0.925[b]	-0.036	-0.013
	(0.109)	(0.165)	(0.070)	(0.067)	(0.209)	(0.128)	(0.229)	(0.376)	(0.028)	(0.032)
Constant	0.544	-0.061	1.167[c]	0.741	1.777[a]	0.638	0.925	1.312	0.154	-0.087
	(0.611)	(0.623)	(0.698)	(0.616)	(0.536)	(0.590)	(0.577)	(1.264)	(0.772)	(0.594)
Observations	1,043	1,054	1,005	1,005	1,037	1,001	1,052	1,052	1,054	1,052
R-squared	0.132	0.085	0.158	0.159	0.102	0.129	0.132	0.138	0.142	0.143

Panel B: Estimates are for the 2009–2019 period with country-crisis dummies

ADRI (Investor Protection)	-0.275[b]	-0.316[c]	-0.666[c]	-0.406[c]	-0.592[c]	-0.231[c]	-0.333[c]	-0.498[c]	-0.461[c]	-0.124
	(0.139)	(0.163)	(0.388)	(0.218)	(0.303)	(0.128)	(0.190)	(0.256)	(0.241)	(0.138)
Institutional Mechanism (IM)	-1.542[a]	-0.500[a]	-1.390[b]	-0.380[a]	-1.464[b]	-0.333[b]	-0.770[b]	-0.324	-0.250[a]	-0.255[a]
	(0.487)	(0.145)	(0.547)	(0.147)	(0.653)	(0.151)	(0.355)	(0.348)	(0.081)	(0.082)
High_ADRI × IM		0.139		0.224		-0.111		0.430		-0.056
		(0.333)		(0.307)		(0.257)		(0.515)		(0.044)
Low_ADRI × IM		0.164		0.175		0.391		0.857		0.091[c]
		(0.661)		(0.514)		(0.270)		(0.572)		(0.050)
Country Crisis	-4.074	-1.822	-2.554	-0.769	-4.179	-3.834	-2.312	-0.587	-4.358	-3.890
	(2.628)	(2.707)	(2.417)	(1.836)	(4.150)	(2.450)	(2.250)	(2.452)	(3.371)	(3.252)
ADRI× Country Crisis	-0.156	-0.229	-0.260	-0.248	-0.004	-0.011	-0.400	-0.443	-0.005	-0.125
	(0.274)	(0.289)	(0.498)	(0.277)	(0.252)	(0.211)	(0.443)	(0.507)	(0.252)	(0.241)
IM× Country Crisis	4.143	2.643	1.738	1.855	3.220	3.661[c]	3.356	1.705	0.593	0.635
	(2.630)	(2.654)	(2.136)	(2.100)	(3.435)	(2.163)	(2.980)	(2.584)	(0.552)	(0.545)
Constant	0.446	2.163	11.566	4.354	7.947[c]	3.882	3.628	9.734[c]	5.341	3.968
	(2.444)	(6.060)	(8.394)	(6.249)	(4.299)	(3.083)	(2.467)	(5.562)	(4.114)	(3.026)
Observations	2,244	2,266	2,266	2,266	2,266	2,283	2,261	2,283	2,283	2,283
R-squared	0.061	0.053	0.061	0.053	0.057	0.054	0.056	0.052	0.058	0.059

Table 7b: DID regressions of Z-score on institutional measures and country-crisis years

The IV-GMM coefficients are for 686 banks in 40 countries. Country Crisis is a dummy variable which is 1 in crisis year(s) and 0 otherwise. Crisis year is determined by country using the Laeven and Valencia (2018) database and extended to the more recent period. Z-score is the dependent variable at bank level. In panel A, the sample period is 2005–2009. In panel B, the sample period is 2009–2019. ADRI is the Spamann (2010) investor protection measure. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. IM denotes Institutional Mechanism for Rule of Law, Control of Corruption, Regulatory Quality, Quality of Government and Government Effectiveness. The control variables are: Bank Deposit; Bank Size; Tangible Equity; Funding Fragility; Real GDP Growth; Government Expenditure Growth; Broad Money Growth; Terms of Trade; Market Capitalization to GDP; Reserve Growth; and Stock Market Turnover Ratio. Most control variables are not shown to save space. The deviation of a bank's loans to total assets from the country's average ratio of bank loans to total assets ($DLoans_{i,t}$) is instrumented with Domestic Credit to Private Sector over GDP and GDP per capita. Variable definitions are available in the WEB Appendix. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Estimates are for the 2005–2009 period with country-crisis dummies

Variable	Rule of Law		Control of Corruption		Regulatory Quality		Govt. Effectiveness		Quality of Government	
ADRI (Investor Protection)	0.475[a]	0.299[a]	0.369[a]	0.195[b]	0.414[a]	0.196[b]	0.341[a]	0.336[b]	0.376[a]	0.307[a]
	(0.096)	(0.096)	(0.105)	(0.077)	(0.077)	(0.089)	(0.125)	(0.157)	(0.075)	(0.106)
Institutional Mechanism (IM)	1.368[a]	1.532[a]	1.162[a]	1.250[a]	0.993[b]	0.872[c]	1.281[a]	1.241[a]	0.284[a]	0.293[a]
	(0.256)	(0.252)	(0.182)	(0.166)	(0.386)	(0.456)	(0.339)	(0.258)	(0.050)	(0.056)
High_ADRI × IM		0.358[b]		0.373[a]		0.599[c]		0.008		0.060[b]
		(0.154)		(0.127)		(0.337)		(0.240)		(0.028)
Low_ADRI × IM		-0.089		-0.083		-0.104		-0.023		0.005
		(0.156)		(0.132)		(0.157)		(0.147)		(0.027)
Country Crisis	-0.070	-0.013	-0.366	-0.370	0.318	0.472	-0.561	-0.687	-0.537[c]	-0.482
	(0.291)	(0.329)	(0.284)	(0.333)	(0.310)	(0.512)	(0.935)	(0.822)	(0.307)	(0.320)
ADRI× Country Crisis	-0.045	-0.056	0.031	0.060	-0.178[b]	-0.176	-0.003	0.028	0.047	0.034
	(0.077)	(0.067)	(0.067)	(0.077)	(0.088)	(0.137)	(0.235)	(0.190)	(0.071)	(0.069)
IM× Country Crisis	-0.069	-0.134	0.088	0.060	-0.202	-0.176	0.099	0.169	0.015	0.005
	(0.126)	(0.139)	(0.129)	(0.161)	(0.159)	(0.190)	(0.502)	(0.426)	(0.026)	(0.028)
Constant	3.931[a]	4.577[a]	4.140[a]	4.596[a]	3.297[a]	3.341[a]	4.114[b]	3.954[a]	4.638[a]	4.919[a]
	(0.686)	(0.802)	(0.671)	(0.715)	(0.877)	(0.792)	(1.967)	(1.478)	(0.675)	(0.760)
Observations	1,046	1,029	1,029	1,029	1,046	996	1,044	1,044	1,029	1,029
R-squared	0.110	0.115	0.104	0.122	0.105	0.107	0.108	0.109	0.113	0.106
Panel B: Estimates are for the 2009–2019 period with country-crisis dummies										
ADRI (Investor Protection)	0.265[c]	0.178[c]	0.163[a]	0.150[a]	0.220[c]	0.245[c]	0.169[c]	0.214[c]	0.332[c]	0.339[c]
	(0.137)	(0.107)	(0.033)	(0.047)	(0.127)	(0.127)	(0.092)	(0.116)	(0.169)	(0.186)
Institutional Mechanism (IM)	1.071[a]	1.069[a]	0.131[a]	0.243[a]	1.160[a]	0.734[a]	0.974[a]	0.620[a]	0.314[a]	0.123[a]
	(0.235)	(0.196)	(0.039)	(0.061)	(0.311)	(0.182)	(0.184)	(0.150)	(0.052)	(0.042)
High_ADRI × IM		0.063		-0.181		-0.012		-0.053		-0.060[c]
		(0.121)		(0.139)		(0.157)		(0.136)		(0.036)
Low_ADRI × IM		0.098		-0.080		0.065		0.060		-0.012
		(0.152)		(0.155)		(0.192)		(0.157)		(0.039)
Country Crisis	-0.436	-0.187	-0.974[b]	-0.609	-1.075	-1.524	-0.984	-1.450[c]	1.500	-1.561
	(1.062)	(0.830)	(0.420)	(0.470)	(1.388)	(1.302)	(0.838)	(0.878)	(1.342)	(1.464)
ADRI× Country Crisis	0.256	0.238[c]	0.084	0.054	0.337[b]	0.334[b]	0.206	0.284[c]	0.240[c]	0.405[b]
	(0.173)	(0.130)	(0.093)	(0.106)	(0.147)	(0.140)	(0.153)	(0.162)	(0.142)	(0.160)
IM× Country Crisis	-0.413	-0.952	0.095	-0.119	-0.502	-0.253	-0.118	-0.223	-0.197	-0.041
	(0.924)	(0.594)	(0.289)	(0.313)	(1.068)	(0.978)	(0.808)	(0.781)	(0.265)	(0.213)
Constant	1.834	3.779[a]	3.385[a]	2.723[a]	2.847	2.926[a]	2.563[b]	2.986[a]	-1.616	1.649
	(1.413)	(0.841)	(0.486)	(0.703)	(1.798)	(1.068)	(1.037)	(0.981)	(1.925)	(1.652)
Observations	2,250	2,272	2,326	2,327	2,272	2,272	2,272	2,272	2,317	2,250
R-squared	0.146	0.159	0.098	0.099	0.145	0.141	0.158	0.146	0.141	0.144

Table 8: IV

The table shows IV-GMM regression results where NPL (the ratio of non-performing Loans to Gross Loans) is the risk-taking measure at the bank level. The GFC crisis period spans 2005–2009 which contains the 2007–2008 GFC. The Eurozone Crisis period spans 2009–2019 which contains the 2010–2018 Eurozone Crisis. ADRI is the Spamann (2010) ADRI for investor protection measure. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. IM denotes Institutional Mechanism for Rule of Law, Control of Corruption, Regulatory Quality, Quality of Government and Govt. Effectiveness. Control variables are: Bank Deposit; Bank Size; Tangible Equity; Funding Fragility; Real GDP Growth; Government Expenditure Growth; Broad Money Growth; Terms of Trade; Market Capitalization to GDP; Reserve Growth; and Stock Market Turnover Ratio. Most control variables are not shown to save space. The deviation of a bank's loans to total assets from the total bank loans to total bank assets by country ($DLoans_{i,t}$) is instrumented with Private Credit to GDP and GDP per capita. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are in the WEB Appendix.

Panel A: Estimates for the 2005–2009 period					
	Rule of Law	**Control of Corruption**	**Regulatory Quality**	**Govt. Effectiveness**	**Quality of Government**
ADRI (Investor Protection)	-2.896[c]	-1.611[c]	-1.537[a]	-0.789[a]	-0.527[b]
	(1.551)	(0.829)	(0.305)	(0.235)	(0.215)
Institutional Mechanism (IM)	-1.851[c]	-0.995	-8.984[a]	-4.335[a]	-0.669[a]
	(1.018)	(0.713)	(1.635)	(1.397)	(0.211)
Constant	-11.516	8.820[b]	13.718[a]	6.603[a]	4.607[a]
	(11.931)	(4.026)	(2.439)	(2.060)	(1.497)
Number of observations	695	695	698	698	698
R-squared	0.0975	0.321	0.235	0.127	0.114
Panel B: Estimates for the 2009–2019 period					
ADRI (Investor Protection)	-0.749[b]	-1.855[b]	-1.335[a]	-1.032[b]	-2.816[c]
	(0.373)	(0.911)	(0.455)	(0.415)	(1.486)
Institutional Mechanism (IM)	-4.930[a]	-5.793[a]	-5.811[a]	-5.636[a]	-1.236[a]
	(0.985)	(0.992)	(1.274)	(1.026)	(0.291)
Constant	-6.902[b]	-19.935[a]	-11.932[a]	-11.469[a]	-30.728[b]
	(3.305)	(6.719)	(3.667)	(4.101)	(13.002)
Number of observations	3,381	3,363	3,381	3,363	3,121
R-squared	0.245	0.310	0.291	0.295	0.308

Appendix 1: List of countries and number of banks for the sample period

Country	ISO3	No. of Banks	Country	ISO3	No. of Banks
Argentina	ARG	3	Malaysia	MYS	5
Australia	AUS	10	Netherlands	NLD	6
Austria	AUT	5	Norway	NOR	6
Brazil	BRA	12	Pakistan	PAK	7
Canada	CAN	10	Peru	PER	3
China	CHN	19	Philippines	PHL	6
Denmark	DNK	9	Poland	POL	5
Egypt, Arab Rep.	EGY	8	Portugal	PRT	3
Finland	FIN	3	Russia	RUS	18
France	FRA	7	Singapore	SGP	3
Germany	DEU	10	South Africa	ZAF	4
Greece	GRC	3	Spain	ESP	7
Hong Kong	HKG	3	Sweden	SWE	4
India	IND	3	Switzerland	CHE	19
Indonesia	IDN	10	Thailand	THA	7
Israel	ISR	5	Tunisia	TUN	3
Italy	ITA	5	Turkey	TUR	3
Japan	JPN	63	Ukraine	UKR	3
Jordan	JOR	11	United Kingdom	GBR	8
Kazakhstan	KAZ	6	United States	USA	361
			Total		686

Appendix A: Variable definition

Bank level variables

Variable	Description	Data source
ROA (%)	Ratio of bank profit before tax to total asset	Calculated from Bankfocus data.
RISK (%)	$RISK_{i,t}$, is risk-taking of bank *i* in year *t* based on $DE_{i,t}$ from *t* to *t*+4, where $DE_{i,t}$ is the deviation of the bank ROA from the global average. Thus, $$DE_{i,t} = ROA_{i,t} - \overline{ROA_t}$$ where $\overline{ROA_t}$ is the global average of the ROA of the 40 countries in year t. $RISK2_{it}$ is estimated using: $$RISK*_{it} = \sqrt{\frac{1}{4}\sum_{j=0}^{4}\left(DE_{i,t+j} - \frac{1}{5}\sum_{k=0}^{4} DE_{i,t+k}\right)^2}.$$	
RISK* (%)	RISK* proxies for bank risk-taking based on the standard deviation of the bank return on assets (ROA). $RISK_{i,t}$, is risk-taking for bank *i* in year *t* based on the standard deviation of $ROA_{i,t}$ from *t* to *t*+4, thus: $$RISK_{it} = \sqrt{\frac{1}{4}\sum_{j=0}^{4}\left(ROA_{i,t+j} - \frac{1}{5}\sum_{k=0}^{4} ROA_{i,t+k}\right)^2}.$$	Calculated from Bankfocus data.
Z-score (in natural logarithm)	Bank *Z*-score captures the probability of a bank default. It is estimated as $Ln((ROA_{i,t} + CAR_{i,t})/\sigma ROA_{i,t})$ where $ROA_{i,t}$ is the return on total assets of bank *i* at *t*. $CAR_{i,t}$ is the equity to total assets ratio of bank *i* at *t*. σ(ROA) is the standard deviation of $ROA_{i,t}$	Calculated from Bankfocus data.
NPL (%)	Ratio of non-performing loans to gross loans at the bank level	Calculated from Bankfocus data
Government Ultimate Ownership	Percentage of ultimate ownership of government.	Calculated from Bankfocus data
Foreign Corporate Ultimate Ownership	Percentage of ultimate ownership of corporate ultimate ownership.	Calculated from Bankfocus data
Tangible Equity	Tangible Equity is equity minus intangible assets whenever available or equity when intangible assets are not available divided by total assets	Calculated from Bankfocus data
Deviation of Bank Loans (DLoans)	DLoans are instrumented in our IV-GMM based on the deviation of bank *i* loans to total assets of bank *i*, from the average country-level bank loans to total assets.	Calculated from Bankfocus database
Deposits	Bank deposits normalized by total assets	Calculated from Bankfocus data
Bank Size	The natural logarithm of bank total assets	Calculated from Bankfocus data
Funding Fragility	Funding Fragility is the ratio between the sum of deposits from other banks, other deposits, and short-term borrowing over total deposits plus money market and short-term funding	Calculated from Bankfocus data

Appendix A: Variable definition (Cont'd)

Country level variables

Variable	Description	Data source
Revised ADRI (Investor Protection)	This is the Djankov et al. (2008) revised Anti-Self-Dealing Index (ADRI) comprising of the sum of the following components: (1) vote by mail; (2) shares not deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital to call a meeting. Low scores indicate stronger directors' rights or lower investor rights. This index captures the law in force in May 2003.	The Law and Economics of Self-Dealing | Andrei Shleifer (harvard.edu)
Corrected ADRI (Investor Protection)	This is the Spamann (2010) corrected ADRI which based on the law in force in January 2005. We use the corrected ADRI for all our countries, except for six countries, i.e., China, Kazakhstan, Ukraine, Russia, Poland and Tunisia where this index is unavailable. We use the corrected ADRI rather than the Revised ADRI since the former captures the laws in force closest to the crisis events.	Spamann (2010), Table 1, pp.745
Rule of Law	Rule of Law captures the tradition of law and order of a particular country including respect for property rights, judicial integrity and quality of contract enforcement (Kaufmann et al., 2011).	www.govindicators.org
Control of Corruption	Control of Corruption captures the perceived use of public power for private gain, both petty and grand forms of corruption. The measure captures the extent to which the state is influenced by elitism and private interests (Kaufmann et al., 2011).	www.govindicators.org
Regulatory Quality	Regulatory Quality captures the perceived ability of governments to formulate and implement sound policies and regulations, to promote and develop the private sector (Kaufmann et al., 2011).	www.govindicators.org
Government Effectiveness	Government Effectiveness captures quality of public and civil services, independence of the civil service from political pressure, and policy formulation quality and implementation, and the perceived credibility of the government's commitment to such policies (Kaufmann et al., 2011).	www.govindicators.org
Quality of Government	The Quality of Government Index is due to Houqe et al. (2012). It is based on the aggregate of the six operationalized dimensions of Worldwide Governance Indicators (WGIs), available at the World Bank for approximately 200 countries.	World Bank website.
Capital Regulatory Index	This index is the sum of Overall Capital Stringency and Initial Stringent Capital, i.e., whether specific funds can officially be used to initially capitalize a bank. The index has a range of 0 to 10.	World Bank Surveys on Bank Regulation
Overall Restrictions on Banking	This is the sum of insurance activities measured from 3 to 12. It captures securities and insurance activities.	World Bank Surveys on Bank Regulation
Independence of Supervisory Authority (Political)	Independence of Supervisory Authority-Political captures the extent to which a supervisory authority is independent from political influences within government. The measure has a range of 0 to 1.	World Bank Surveys on Bank Regulation

Appendix A: Variable definition (Cont'd)

Variable	Description	Data source
No Explicit Deposit Insurance Scheme	No explicit deposit insurance captures whether there is an explicit deposit insurance scheme as well as whether depositors were fully compensated the last time a bank failed. It is measured as a dummy variable.	World Bank Surveys on Bank Regulation
Limitations on Foreign Bank Entry	This variable measures whether foreign banks own domestic banks and whether foreign banks may enter a country's banking industry. The measure has a range of 0 to 4.	World Bank Surveys on Bank Regulation
Real GDP Growth	Real GDP Growth proxies for economic development. It is based on the annual growth rate of each country's real GDP. De Bruyckere et al. (2013) use GDP growth to proxy for business cycle conditions.	GDP is available from the World Bank website.
Government Expenditure Growth	Government Expenditure Growth measures the consequences of the fiscal and monetary policy by a government in a country.	Government Expenditure is available on World Bank website.
Broad Money Growth	Broad Money Growth (M3 Growth) measures the annual growth rate of government expenditure.	Broad Money is available from the World Bank website.
Reserve Growth	Reserve Growth measures the annual growth rate of a country's reserves. It comprises of holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities.	Reserve is available from the World Bank website.
Terms of Trade	Terms of Trade is the ratio of the Export Value Index to Import Value Index at 2010 prices.	The Export Value Index and Import Value Index, available from the World Bank website.
Stock market Capitalization to GDP	Stock Market Capitalization to GDP is measured as the total market value of all listed stocks in a country divided by the country's GDP. It is an indicator of the financial market development. Market capitalization to GDP also proxies for general business conditions.	Details available from the Global Financial Development (2020) database.
Bank Concentration	Bank concentration is based on the total assets of the three largest commercial banks in a country divided by the total assets of all the banks in that country. Total assets include total retained earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax assets, discontinued operations and other assets. Houston et al. (2010) and Beltratti and Stulz (2012) use a similar measure.	Details available from the Global Financial Development (2020) database.
Instrumental variables		
Private Credit to GDP	Private credit scaled by GDP.	Global Financial Development (2020) database.
Domestic Credit to Private Sector over GDP	Domestic credit to private sector scaled by GDP.	Global Financial Development (2020) database.
GDP per Capita	Total GDP divided by population	World Bank website.
Gross National Product per Capita	Total gross national product divided by population.	World Bank website.

Appendix B: **IV-GMM coefficients for the**

The IV-GMM coefficients are for 686 banks in 40 countries. RISK is the dependent variable at bank level. The sample period spans 2009–2019. We capture country-crisis year(s) during the 2009-2012 period. Country Crisis is a dummy variable which is 1 for a country-crisis year during 2009-2012; 0, otherwise. ADRI is the Spamann (2010) investor protection measure. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. IM denotes Institutional Mechanism for Rule of Law, Control of Corruption, Regulatory Quality, Quality of Government and Government Effectiveness. The control variables are: Bank Deposit; Bank Size; Tangible Equity; Funding Fragility; Real GDP Growth; Government Expenditure Growth; Broad Money Growth; Terms of Trade; Market Capitalization to GDP; Reserve Growth; and Stock Market Turnover Ratio. Most control variables are not shown to save space. The deviation of a bank's loans to total assets from the country's average ratio of bank loans to total assets ($DLoans_{i,t}$) is instrumented with Gross National Product per Capita and Domestic Credit to Private Sector over GDP. Variable definitions are available in a WEB Appendix. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	Rule of Law		Control of Corruption		Regulatory Quality		Govt. Effectiveness		Quality of Government	
Panel A: Estimates for the 2009–2019 period using RISK as the dependent variable and country-crisis dummies for 2009–2012										
ADRI (Investor Protection)	-0.619[b]	-0.247[c]	-0.591[b]	-0.311[b]	-0.622[b]	-0.314[c]	-0.324[c]	-0.368[c]	-0.417[c]	-0.396[b]
	(0.270)	(0.127)	(0.280)	(0.122)	(0.305)	(0.173)	(0.182)	(0.210)	(0.229)	(0.187)
Institutional Mechanism (IM)	-0.815[c]	-0.999[c]	-0.360[c]	-0.328[c]	-0.539[c]	-0.539[c]	-0.398[b]	-0.540[b]	-0.077[a]	-0.197[c]
	(0.489)	(0.603)	(0.201)	(0.186)	(0.322)	(0.304)	(0.193)	(0.243)	(0.030)	(0.116)
High_ADRI × IM		-0.283		-0.167		-0.419		0.074		-0.014
		(0.175)		(0.260)		(0.525)		(0.586)		(0.062)
Low_ADRI × IM		0.009		-0.213		0.183		0.451		0.071
		(0.414)		(0.320)		(0.729)		(0.515)		(0.099)
Country Crisis	1.867	0.158	1.860	0.839	1.485	0.554	2.817[b]	-0.678	2.641[b]	0.035
	(1.545)	(1.266)	(1.607)	(1.417)	(1.667)	(1.714)	(1.181)	(1.526)	(1.112)	(1.348)
ADRI× Country Crisis	0.392[c]	0.409	0.365[c]	0.465[b]	0.364[c]	0.383[b]	0.176	0.378	0.243	0.244
	(0.207)	(0.253)	(0.203)	(0.206)	(0.186)	(0.186)	(0.252)	(0.230)	(0.190)	(0.243)
IM× Country Crisis	-2.311[b]	-1.142	-2.279[b]	-1.652[c]	-2.272[c]	-1.625	-1.715[c]	-0.919	-0.363[b]	-0.223
	(1.079)	(1.186)	(1.002)	(0.977)	(1.228)	(1.196)	(1.025)	(1.272)	(0.147)	(0.198)
Constant	6.046	2.656	5.286	1.612	5.867	4.126	1.209	6.451	2.676	6.460
	(3.896)	(2.715)	(4.079)	(2.717)	(3.883)	(4.438)	(3.675)	(4.889)	(3.851)	(4.167)
Observations	2,244	2,266	2,266	2,266	2,266	2,283	2,261	2,283	2,283	2,283
R-squared	0.060	0.058	0.061	0.054	0.058	0.059	0.056	0.058	0.061	0.059
Panel B: Estimates for the 2009–2019 period using Z-score as the dependent variable and country-crisis year dummies for 2009–2012										
ADRI (Investor Protection)	0.304[b]	0.239[a]	0.167[a]	0.103[b]	0.393[b]	0.304[a]	0.201[b]	0.272[a]	0.335[b]	0.357[b]
	(0.120)	(0.088)	(0.033)	(0.043)	(0.180)	(0.113)	(0.085)	(0.096)	(0.154)	(0.147)
Institutional Mechanism (IM)	0.976[a]	0.856[a]	0.134[a]	0.145[b]	1.247[a]	0.689[a]	0.931[a]	0.574[a]	0.277[a]	0.099[a]
	(0.224)	(0.178)	(0.039)	(0.060)	(0.393)	(0.163)	(0.182)	(0.132)	(0.064)	(0.036)
High_ADRI × IM		0.190		0.162		0.046		-0.028		-0.038
		(0.116)		(0.126)		(0.151)		(0.136)		(0.036)
Low_ADRI × IM		0.303[b]		0.159		0.233		0.212		0.024
		(0.135)		(0.136)		(0.182)		(0.139)		(0.036)
Country Crisis	-0.219	-0.512[c]	-0.456[b]	-0.547[a]	-0.335	-0.436	-0.420	-0.482	1.191	-0.237
	(0.602)	(0.310)	(0.202)	(0.198)	(0.664)	(0.414)	(0.401)	(0.365)	(0.851)	(0.578)
ADRI× Country Crisis	-0.211	-0.223[c]	-0.221[b]	-0.309[a]	-0.180	-0.195	-0.155	-0.209	-0.153	-0.166
	(0.144)	(0.130)	(0.109)	(0.116)	(0.158)	(0.131)	(0.129)	(0.128)	(0.150)	(0.128)
IM× Country Crisis	0.692	0.566	0.514	0.534	0.837	0.586	0.507	0.582	0.057	0.089
	(0.533)	(0.437)	(0.326)	(0.351)	(0.775)	(0.518)	(0.479)	(0.469)	(0.120)	(0.094)
Constant	1.897	3.485[a]	3.438[a]	3.622[a]	1.202	3.313[a]	2.700[a]	3.222[a]	-1.093	2.283[c]
	(1.274)	(0.768)	(0.479)	(0.637)	(2.691)	(0.955)	(0.969)	(0.890)	(1.781)	(1.308)
Observations	2,250	2,272	2,326	2,327	2,272	2,272	2,272	2,272	2,317	2,250
R-squared	0.152	0.160	0.099	0.100	0.140	0.146	0.159	0.148	0.146	0.145

Appendix C: IV-GMM coefficients for institutional measures using RISK as the dependent variable for non-US banks

The table shows IV-GMM coefficients for 352 non-US banks in 40 countries. RISK is the dependent variable captured at bank level. In panel A, the sample period is 2005–2009 and contains the 2007–2008 GFC. In panel B, the sample period is 2009–2019 and contains the 2010–2018 Eurozone Crisis. ADRI is the Spamann (2010) ADRI for investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. IM denotes Institutional Mechanism for the Rule of Law, Control of Corruption, Regulatory Quality, Quality of Government and Govt. Effectiveness. Control variables are: Bank Deposit; Bank Size; Tangible Equity; Funding Fragility; Real GDP Growth; Government Expenditure Growth; Broad Money Growth; Terms of Trade; Market Capitalization to GDP; Reserve Growth; and Stock Market Turnover Ratio. Most control variables are not shown to save space. The deviation of a bank's loans to total assets from total bank loans to total bank assets by country ($DLoans_{i,t}$) is instrumented with Private Credit to GDP and GDP per capita. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively. See WEB appendix for variable definition.

Panel A: Estimates for the 2005–2009 period

Variable	Rule of Law		Control of Corruption		Regulatory Quality		Govt. Effectiveness		Quality of Government	
ADRI (Investor	-0.536[a]	-0.302[a]	-0.372[a]	-0.363[a]	-0.469[a]	-0.053	-0.441[a]	-0.241[c]	-0.499[a]	-0.416[a]
Protection)	(0.132)	(0.096)	(0.091)	(0.093)	(0.120)	(0.067)	(0.148)	(0.143)	(0.111)	(0.107)
Institutional	-2.141[a]	-1.599[a]	-1.653[a]	-1.870[a]	-2.210[a]	-1.141[a]	-1.327[a]	-1.169[a]	-0.403[a]	-0.349[a]
Mechanism (IM)	(0.469)	(0.330)	(0.294)	(0.290)	(0.479)	(0.307)	(0.347)	(0.306)	(0.071)	(0.066)
High_ADRI × IM		-0.030		-0.222[b]		-0.253[b]		-0.251		-0.003
		(0.119)		(0.089)		(0.106)		(0.174)		(0.019)
Low_ADRI × IM		0.878[b]		-0.163		1.523[a]		0.756[b]		0.084
		(0.419)		(0.117)		(0.555)		(0.373)		(0.053)
Constant	1.132	2.863[c]	-0.963	-1.892	2.467[c]	2.759[b]	2.703	2.751	1.458	2.040
	(2.292)	(1.576)	(1.476)	(1.430)	(1.497)	(1.264)	(2.480)	(2.008)	(1.756)	(1.318)
Observations	268	283	268	268	268	283	283	283	285	283
R-squared	0.082	0.422	0.474	0.493	0.374	0.452	0.454	0.455	0.358	0.514

Panel B: Estimates for the 2009–2019 period

ADRI (Investor	-0.509[b]	-0.548[b]	-0.448[c]	-0.695[b]	-0.431	-0.288[c]	-0.485[b]	-0.422[b]	-0.631[a]	-0.583[a]
Protection)	(0.211)	(0.226)	(0.230)	(0.271)	(0.266)	(0.168)	(0.226)	(0.200)	(0.241)	(0.214)
Institutional	-1.109[a]	-0.648[c]	-0.602[b]	-0.689[c]	-0.356	0.395	-0.275	-0.167	-0.093[c]	-0.103[c]
Mechanism (IM)	(0.319)	(0.336)	(0.261)	(0.390)	(0.406)	(0.295)	(0.350)	(0.386)	(0.055)	(0.062)
High_ADRI × IM		-0.050		0.396		-0.459		-0.444		0.003
		(0.313)		(0.653)		(0.392)		(0.341)		(0.057)
Low_ADRI × IM		0.427		0.532		-0.313		0.352		0.069
		(0.538)		(0.741)		(0.447)		(0.456)		(0.087)
Constant	14.036[b]	16.662[a]	13.554[b]	21.301[b]	14.741[c]	9.724[c]	15.435[b]	17.113[a]	16.011[b]	17.446[a]
	(5.608)	(6.146)	(6.708)	(10.089)	(7.772)	(5.448)	(6.624)	(6.040)	(6.672)	(6.303)
Observations	980	980	980	980	980	941	980	980	980	980
R-squared	0.117	0.119	0.118	0.119	0.118	0.120	0.116	0.123	0.111	0.118

Appendix D: IV-GMM coefficients for institutional measures using RISK as the dependent variable for Eurozone banks

The table shows IV-GMM coefficients for 127 banks in 16 Eurozone countries. RISK is the dependent variable captured at bank level. The sample period is 2009–2019 which contains the 2010–2018 Eurozone Crisis. ADRI is the Spamann (2010) ADRI for investor protection. The Djankov et al. (2008) revised ADRI is used for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia due to unavailable Spamann (2010) ADRI data. IM denotes Institutional Mechanisms for the Rule of Law, Control of Corruption, Regulatory Quality, Quality of Government and Govt. Effectiveness. Control variables are: Bank Deposit; Bank Size; Tangible Equity; Funding Fragility; Real GDP Growth; Government Expenditure Growth; Broad Money Growth; Terms of Trade; Market Capitalization to GDP; Reserve Growth; and Stock Market Turnover Ratio. Most control variables are not shown to save space. The deviation of a bank's loans to total assets from the total bank loans to total bank assets by country ($DLoans_{i,t}$) is instrumented with Private Credit to GDP and GDP per capita. Robust standard errors are in parentheses. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% levels, respectively. See WEB appendix for variable definition.

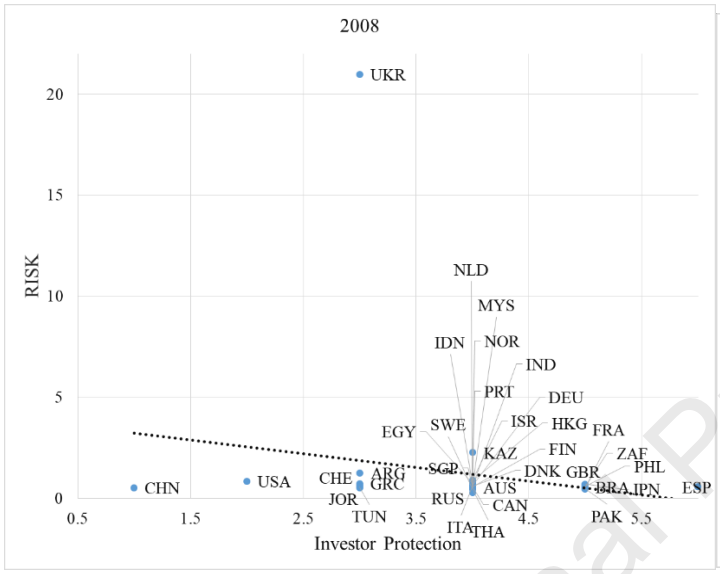
Estimates for the 2009–2019 period

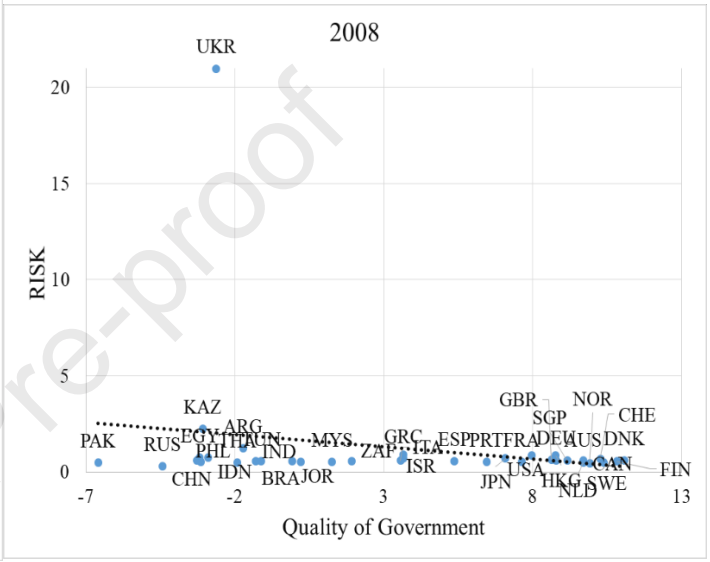
Variable	**Rule of Law**		**Control of Corruption**		**Regulatory Quality**		**Govt. Effectiveness**	**Quality of Government**		
ADRI (Investor Protection)	-0.166[c]	-0.800[b]	-0.196[b]	-0.603[b]	-0.226[c]	-0.821[a]	-0.136[c]	-0.394[c]	-0.207[b]	-0.787[b]
	(0.086)	(0.316)	(0.098)	(0.299)	(0.131)	(0.317)	(0.081)	(0.203)	(0.098)	(0.323)
Institutional Mechanism (IM)	-0.507[c]	-0.763[a]	-0.361[c]	-0.591[c]	-0.888[c]	-1.041[c]	-0.849[a]	-0.559[c]	-0.136[b]	-0.192[b]
	(0.288)	(0.258)	(0.201)	(0.320)	(0.537)	(0.586)	(0.286)	(0.314)	(0.057)	(0.088)
High_ADRI × IM		-0.711		-1.322[c]		0.662		-0.127		0.124
		(0.483)		(0.677)		(0.457)		(0.236)		(0.083)
Low_ADRI × IM		-3.373[b]		-3.492[b]		-1.067[a]		-0.735[a]		-0.157[a]
		(1.541)		(1.451)		(0.354)		(0.276)		(0.055)
Constant	2.007[a]	4.039[a]	1.990[b]	3.069[a]	1.934[b]	4.558[a]	2.615[a]	3.501[a]	1.973[b]	3.754[a]
	(0.692)	(1.066)	(0.823)	(0.810)	(0.850)	(1.106)	(0.646)	(1.036)	(0.782)	(0.913)
Observations	541	541	541	541	541	633	623	623	541	633
R-squared	0.053	0.062	0.052	0.049	0.055	0.057	0.056	0.055	0.054	0.056

Figure 1: Plots of RISK, investor protection and quality of government for 2008 and 2010

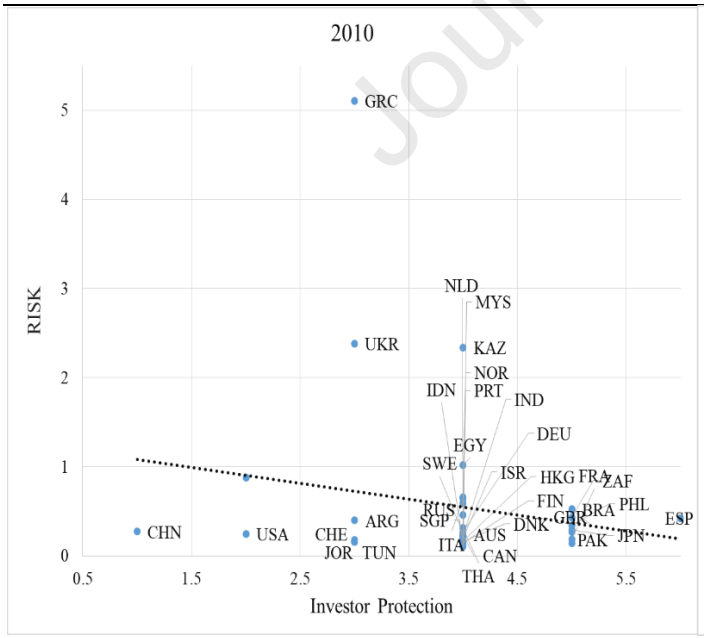
This figure shows the plots for investor protection and Quality of Government and RISK at country level. Investor protection is based on the Spamann (2010) corrected ADRI. The corrected ADRI is unavailable for China, Kazakhstan, Ukraine, Russia, Poland and Tunisia. We therefore use the Djankov et al. (2008) revised ADRI for these countries. Low scores indicate stronger directors' rights. Quality of Government Index is based on the aggregate of the six operationalized dimensions of Worldwide Governance Indicators (WGIs) available at the World Bank. A high score indicates high government quality. RISK proxies for bank risk-taking based on the standard deviation of the deviation of bank ROA from the global average ROA over a 5-year overlapping window and aggregated to country level. RISK is at country level.

Panel A: Plots of Global Financial Crisis year of 2008





Panel B**: Plots of Eurozone Crisis year of 2010**



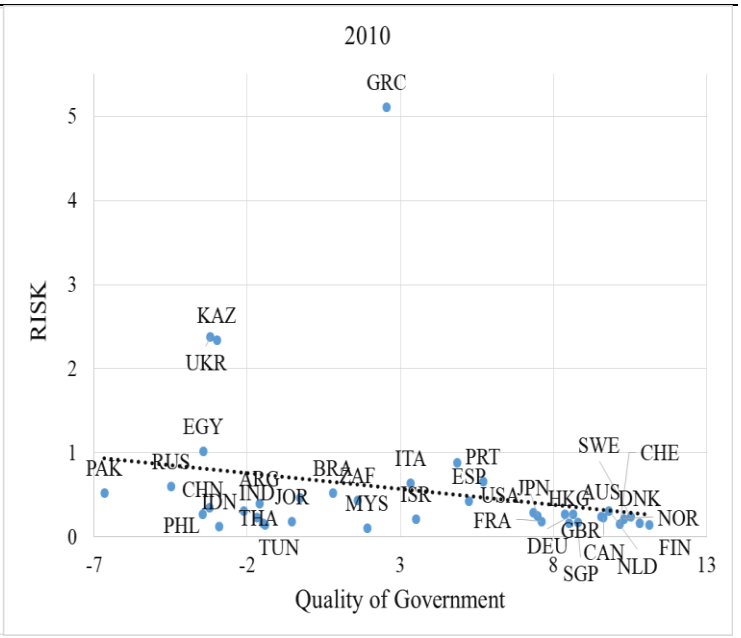
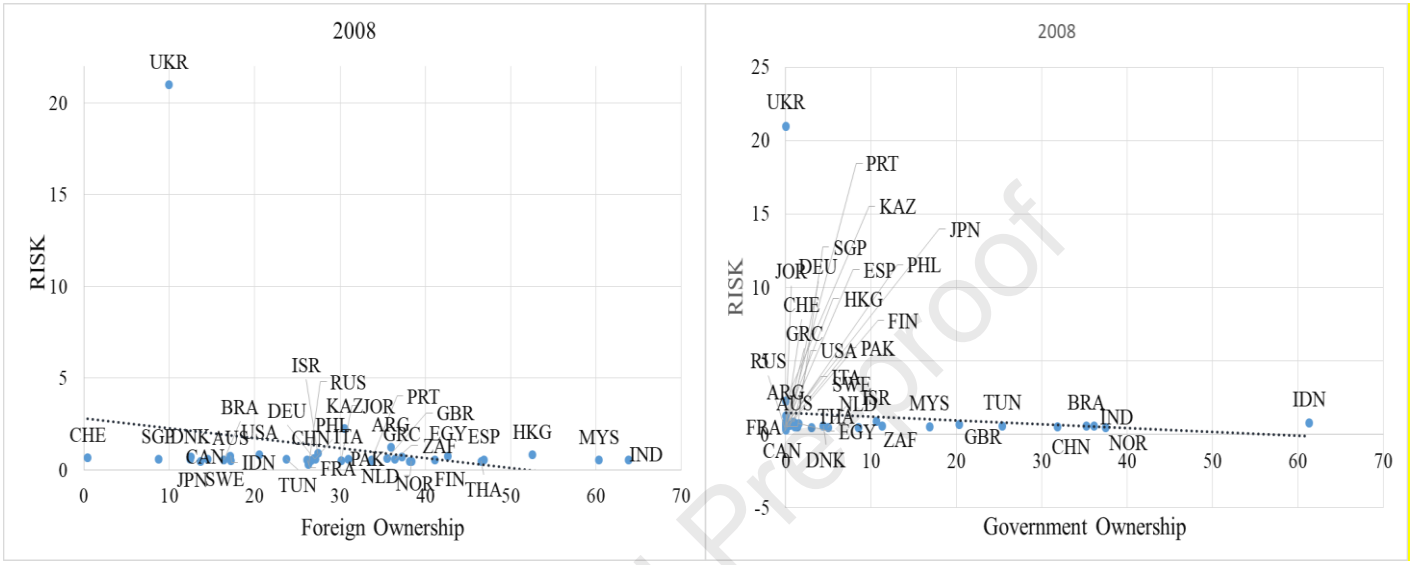


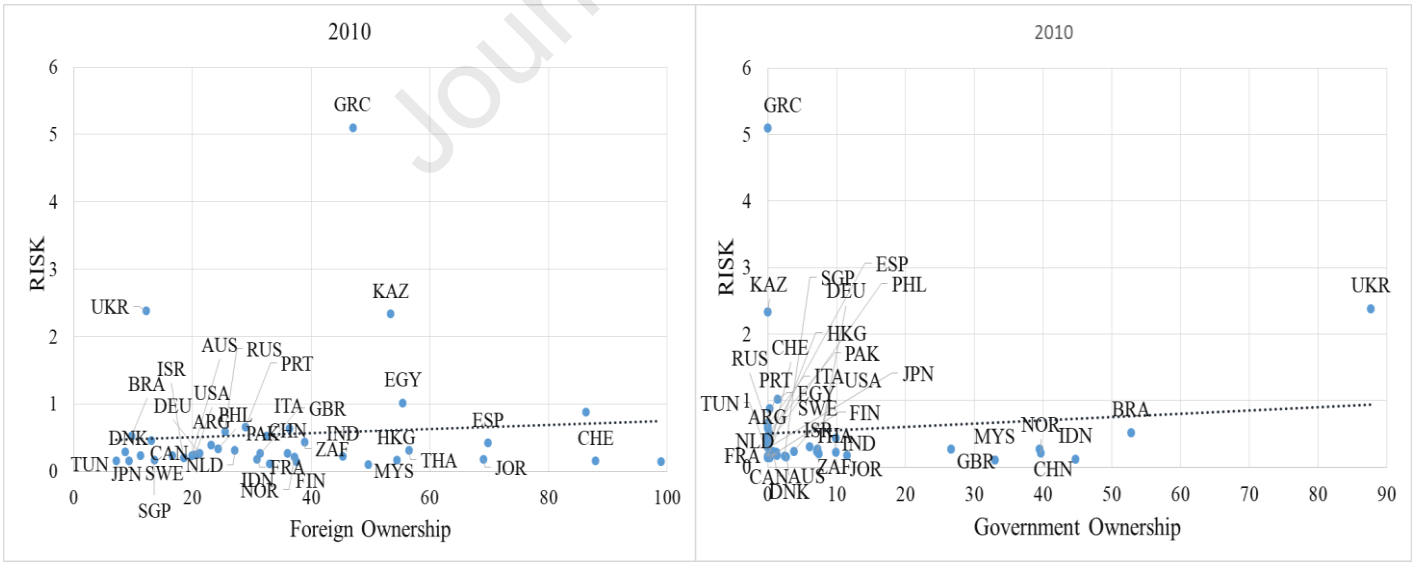
Figure 2: Plots of RISK and ownership for 2008 and 2010

The figure shows plots of average weighted percentage of foreign and government ownership and RISK at country level. Foreign corporate ultimate ownership is the average of foreign corporate ultimate ownership in a country weighted by bank total assets. Government ownership is the average of government ultimate ownership in a country weighted by bank total assets. RISK proxies for bank risk-taking based on the standard deviation of the deviation of bank ROA from the global average ROA over a 5-year overlapping window and aggregated to country level.

Panel A: Plots of Global Financial Crisis year of 2008



Panel B: Plots of Eurozone Crisis year of 2010



Institutional Mechanisms, Ownership and Bank Risk-taking during Crises

Highlights

- Contrary to prior results, investor protection, institution mechanisms and ownership reduced bank risk-taking around both the Global Financial Crisis and the Eurozone Crisis periods.
- Institution mechanisms had more pronounced effects on bank risk-taking compared to investor protection and banking regulation and supervision (BRS) rules
- Distance from bank default decreased the likelihood of the pre-crisis and crisis/post-crisis regimes and increased the likelihood of the tranquil regimes.
- Investor protection increased the likelihood of the pre-crisis and crisis/post-crisis regimes but this depended on the crisis period.
- Using a bivariate copula function, higher bank risk-taking increased the likelihood of the crisis events.