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A cross-country analysis of bank bankruptcy regimes^{*}

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Abstract

This article analyzes bank bankruptcy regimes across 142 countries. By employing factor analysis, we identify five main dimensions of bank bankruptcy frameworks: (1) Difficulty of forbearance & ease of court appeal, (2) Availability of supervisory tools, (3) Court involvement, (4) Supervisory powers with respect to managers, and (5) Supervisory powers with respect to shareholders & preinsolvency phase. We use cluster analysis to identify and group countries according to two prevalent types of bank bankruptcy frameworks: a court-led and administrative bank bankruptcy regime. Administrative bank bankruptcy regimes are associated with less court involvement in the resolution process, less likely forbearance, a higher possibility of court appeal, greater availability of supervisory tools, weaker supervisory powers with respect to managers and stronger supervisory powers with respect to shareholders, and a preinsolvency phase as opposed to the court-led bank bankruptcy regimes. Administrative bank bankruptcy regimes are also associated with fewer creditor rights, less government effectiveness, and lower institutional quality than court-led bank bankruptcy regimes. We find some evidence that the type and main dimensions of a bank bankruptcy regime are related to the occurrence and severity of the global financial crisis.

Keywords: bank bankruptcy law, bank insolvency regimes, bank failures, optimal resolution, financial crisis

JEL codes: G20, G21, G28, G33, E58, K23

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1. Introduction

At the onset of the global financial crisis, bank supervisors lacked the tools to deal with failing banks. For example, the UK had to swiftly enact the Banking (Special Provisions) Act 2008 to be able to nationalize failing Northern Rock. Belgium, Luxemburg, and the Netherlands needed to support Fortis Bank to prevent its uncontrolled unwinding. Fortis shareholders even initially opposed the takeover by BNP Paribas, and the Brussels Appeal Court suspended the transaction until shareholders' approval was reached. These examples indicate that bank bankruptcy regimes were often inadequate and had to be upgraded to allow swift intervention rather than forbearance or bailouts of ailing banks even in the midst of an epic crisis.¹ To address these shortcomings, a new framework for bank recovery and resolution was formed in the EU with a clear preference towards orderly resolution. As European Commissioner Michel Barnier argued, "Ensuring that failing banks can be wound down in a predictable and efficient way with minimum recourse to public money is fundamental to restoring confidence in Europe's financial sector. . . . With these new rules in place, massive public bail-outs of banks and their consequences for taxpayers will finally be a practice of the past."² An overview and international comparison of general features of bank bankruptcy regimes might make it possible to evaluate what is needed to successfully deal with banking crises.

Our first objective is to shed new light on the diversity of bank bankruptcy regimes in a systematic way by quantitatively analyzing the institutional, regulatory, and legal landscape of bank bankruptcy. We explore the World Bank (2013) database on bank regulation and supervision across 142 countries. Whereas Čihák et al. (2013) and Barth, Caprio, and Levine (2013, 2008, 2003, 2001) were the first to analyze the World Bank database,³ our focus is narrowed to a particular aspect of bank supervision: the bank bankruptcy regime. The large

¹ The dilemma between intervention and forbearance or bailouts was the most pronounced in the case of large financial institutions, which posed the greatest risk for stability in the financial system.

² See European Commission-MEMO/13/1140, 12/12/2013, http://europa.eu/rapid/press-release_MEMO-13-1140_en.htm?locale=en

³ Čihák et al. (2013) analyze whether bank regulation and supervision had an impact on how successfully banks weathered the global financial crisis. They show that crisis countries are characterized by lower but more complex capital requirements and fewer restrictions on activities. They also find that countries strengthen their resolution regimes as a response to the financial crisis. Our focus is on a bank bankruptcy regime and its relation with the global financial crisis.

number of survey questions allows us to dissect the main dimensions of bank bankruptcy regimes. Our second objective is to evaluate whether the general characteristics of a bank bankruptcy regime are associated with the occurrence and severity of a banking crisis.

We use several statistical techniques in our analysis. We employ the Bayesian iterative Markov chain Monte Carlo imputation technique to impute missing data. Explorative factor analysis is then applied to identify the main dimensions of bank bankruptcy regimes, followed by cluster analysis to ascertain the main types of bank bankruptcy regimes across countries. Using regression models, we relate the characteristics of a bank bankruptcy regime to the global financial crisis and to the quality of the legal and institutional environment.

The contribution of this paper is to empirically identify five main dimensions of bank bankruptcy regimes: (1) Difficulty of forbearance & ease of court appeal, (2) Availability of supervisory tools, (3) Court involvement, (4) Supervisory powers w.r.t. managers, and (5) Supervisory powers w.r.t. shareholders & preinsolvency phase. We group countries according to the two prevalent types of bank bankruptcy frameworks: a court-led bank bankruptcy regime and an administrative bank bankruptcy regime. An administrative bank bankruptcy regime is associated with less court involvement in the resolution process, less likely forbearance, higher possibility of court appeal, greater availability of supervisory tools, weaker supervisory powers w.r.t. managers, stronger supervisory powers w.r.t. shareholders, and a preinsolvency phase as opposed to a court-led bank bankruptcy regime.

We find some support that an administrative bank bankruptcy regime is positively associated with the presence of the global financial crisis compared to a court-led bank bankruptcy regime. On the other hand, court involvement in bank bankruptcy is associated with higher output loss and fiscal costs in the global financial crisis. This is aligned with the view that an administrative bank bankruptcy regime provides the supervisor with greater incentives to intervene in the failing bank compared to a court-led bank bankruptcy regime, increasing the probability but limiting the severity of a banking crisis. An administrative bank bankruptcy regime is also associated with reduced creditor rights, government efficiency, and institutional quality than a court-led bank bankruptcy regime.

This article is organized as follows. In Section 2, we review the extant literature on bank bankruptcy. In Section 3, we describe the World Bank (2013) database, focusing on cross-country comparison of bank bankruptcy frameworks. Section 4 outlines the empirical methodology. Section 5 presents the main empirical findings. Section 6 concludes the article.

2. Literature review and hypotheses formation

Bank supervisors face a trade-off when it comes to the handling of banking crises: while resolving distressed financial institutions may prevent future moral hazard and restore the health and functionality of the financial system, uncertainties and losses of various bank stakeholders arising from the resolution process may also trigger a systemic banking crisis (Marinč and Vlahu, 2012). As a consequence, forbearance may seem a rational choice for the supervisor hoping that improving macroeconomic conditions will repair bank balance sheets on their own, without the need for intrusive interventions. This, however, may aggravate systemic risk in the long run, due to higher moral hazard. Since preservation of financial stability is a key consideration in case of bank failures, the supervisors' dilemma has relevant implications for the design of bank bankruptcy regimes.

A starting point for our discussion of bank bankruptcy regimes comes from the notion that banks are considered special and that these special bank characteristics should be incorporated into the bankruptcy regime for banks. We then build hypotheses connecting features of the bank bankruptcy regime with the probability and severity of banking crises.

The large costs of systemic banking crises point to the need for a special bank bankruptcy framework. Without a special bank bankruptcy regime (or at least without special amendments to the general bankruptcy regime for systemically important banks; see Ayotte and Skeel, 2010), bank supervisors and policymakers might be forced to choose between several bad options. First, pushing a failing bank through the corporate bankruptcy regime might result in abrupt termination of bank operations with substantial costs of restructuring and potential systemic concerns. The resulting loss of confidence may trigger panic withdrawals in other banks, creating a systemic banking crisis with large repercussions for the real economy (see Dell'Ariccia, Detragiache, and Rajan, 2008).

Alternatively, the bank supervisor may engage in forbearance and allow insolvent banks to continue their operations (Boot and Thakor, 1993; Kane, 1987, 2005). Such “zombie” banks may then gamble for resurrection, impeding economic growth (Black and Hazelwood, 2013; Caballero, Hoshi, and Kashyap, 2008). Policymakers may even be forced to bail out banks that are too-big, too-complex, too-interconnected, or too-many to fail, further distorting competition and incentives in the banking system (Gropp, Hakenes, and Schnabel, 2010; Dam and Koetter, 2012; Duchin and Sosyura, 2013; Farhi and Tirole, 2012; Brown and Dinç, 2011; Cheng and Van Cayseele, 2010). Therefore, measures to deal with failing banks need to be designed with an objective of containing systemic stability in banking (Acharya, 2009; Acharya, Shin, and Yorulmazer, 2011).

Banks are considered special because they provide liquidity to depositors (but also to other clients; see Berger and Bouwman, 2009; Huang and Ratnovski, 2011). Liquidity provision makes banks inherently fragile institutions. Sudden withdrawals of deposits from a bank may trigger a full-scale bank run that may derail even a well-functioning bank.⁴ To prevent panic-based bank runs, which lead to an excessive number of bank failures, Rochet and Vives (2004) argue for (limited) bailout policies in the form of the lender of last resort (LOLR) lending in which the central bank lends to illiquid but solvent banks. Rochet and Vives (2004) suggest that LOLR lending needs to be complemented with a preinsolvency phase and with orderly resolution of bank failures to minimize the bank moral hazard problem.

Whereas bailouts are sometimes needed to prevent a systemic banking crisis, bank risk-taking incentives should be contained. Dell’Ariccia and Ratnovski (2013) argue that risk-taking may actually decrease if government support decreases systemic risk. In particular, if bailouts work to limit contagion, survival of a bank depends on its own actions (rather than on systemic instability) and prudent bank behavior becomes more attractive. This happens especially if bailout rents are small and the threat of contagion is high. Dell’Ariccia and Ratnovski (2013) argue that a good bankruptcy regime would work to minimize bailout rents rather than prevent them altogether. Ratnovski (2009) shows that bailout rents can be reduced through appropriately

⁴ As a cure for coordination problems between bank creditors (e.g., a bank run by uninsured depositors), corporate bankruptcy law would suggest freezing uninsured deposits (see White, 2011). However, an abrupt deposit freeze in bank bankruptcy derails the liquidity provision function of a bank and creates substantial liquidity costs for bank clients (Diamond and Dybvig, 1983).

designed lender-of-last-resort policies that charge more to banks with high quality bank assets (i.e., banks with high net worth).

In short, the supervisor faces the following basic tradeoff (see also Marinč and Vlahu, 2012). On the one hand, regulatory intervention may have detrimental effects on public confidence in the ailing bank and the banking system. The supervisor may then prefer to forbear, anticipating eventual economic recovery that would resolve problems within the banking system through a cyclical improvement in the quality of bank assets. On the other hand, there is also a chance that problems in a weak banking system may escalate if left unaddressed. In this case, losses may accumulate, forcing large and widespread government bailouts that can result in subsidization of bank shareholders and creditors en masse. Furthermore, banks may take excessive risks in anticipation of future bailouts, further increasing the costs of intervention. The optimal bank bankruptcy regime should then be designed to jointly minimize the severity and the probability of a banking crisis.⁵

The bank bankruptcy regime should set sufficient incentives for the supervisor to push an insolvent bank through bankruptcy rather than forbear. Acknowledging and addressing problems early may make restructuring/resolution of a weak bank less costly and more successful in comparison to a situation in which problems are postponed late into the insolvency of a failing bank. In contrast to bailout policies that may preclude bank failures altogether, early intervention reveals problems in weak banks but may also reveal wider problems in the banking system that could go unnoticed for a longer time in the case of late intervention. As a consequence, early intervention may inadvertently contribute to the frequency of banking crises because the threshold for systemic risk discovery is set lower, making periodic losses of confidence in the banking system more likely. On the other hand, we anticipate that the fiscal costs and output loss (i.e., the decline in a country's GDP) associated with a banking crisis discovered early are lower in comparison to a full-fledged banking crisis that may result from longstanding accumulated losses.

⁵ For further literature on the optimal design of a bank bankruptcy regime, see Bliss and Kaufman (2006, 2011), Beck et al. (2010), Claessens, Herring, and Schoenmaker (2010), Dewatripont and Freixas (2011), IMF and World Bank (2009).

Hypothesis 1: Early recognition and intervention incentives of the supervisor are associated with a higher probability but lower severity of a banking crisis.

The incentives of the supervisor to acknowledge problems within banks can be further increased by designing a preinsolvency phase that an undercapitalized bank is pushed into before it becomes insolvent (see Kaufman, 2006, 2011). A preinsolvency phase allows the supervisor to address problems early enough. On the one hand, a banking crisis may then be completely prevented. On the other hand, pushing a bank into the preinsolvency phase may reveal problems in the banking system and may act as an early trigger of a banking crisis. We anticipate that such an early triggered banking crisis will happen with less intensity (i.e., with lower output loss / fiscal costs) compared to the situation when the preinsolvency phase does not exist.

Hypothesis 2: Existence of a preinsolvency phase is associated with a higher probability of a banking crisis and lower output loss / fiscal costs in a banking crisis.

The role of a bankruptcy regime is to elicit correct incentives for managers, debtors, and creditors and, by doing this, improve access and reduce the cost of debt financing (Berkowitz and White, 2004; La Porta et al., 1997). In the ex-ante sense (i.e., long before bankruptcy occurs), bankruptcy law that is strict towards managers and debtors acts as a threat towards managers to exert sufficient effort, undertake a reduced level of risk, and take debt repayment seriously (e.g., not expropriate free cash flow from the firm; Jensen, 1986; see also Povel, 1999; Bebchuk, 2002; Acharya, Amihud, and Litov, 2011). Banks may be considered special in terms of their additional opaqueness and ability to quickly change their risk profiles (Morgan, 2002; Flannery, Kwan, and Nimalendran, 2013; Boot, 2014). This increases the need for correct ex-ante incentives and the supervisor needs to have sufficient powers with respect to the bank manager and shareholders.⁶ For example, the supervisor needs to have powers to suspend or remove bank managers and bank directors, to demand recapitalization from the controlling shareholder(s), or to withdraw the bank's license even before bank bankruptcy.

⁶ Korte (2014) provides evidence that a strict bank resolution regime has a positive impact on the real economy. A strict bank resolution regime creates a “catharsis effect,” in which bank credit is reallocated from low-quality firms to high-quality firms. Ignatowski and Korte (2014) further show that recent tightening of bank bankruptcy regime in the U.S. has led to significantly reduced risk taking by banks and their re-orientation to lower risk loan originations, with the exception of the largest, systemically important banks. This is aligned with the view that high capital requirements might actually be helpful for the banking system due to the cleansing effect, in which inefficient and risky banks lose market share to efficient and safe banks (Boot and Marinč, 2008; Berger and Bouwman, 2013).

The tensions between bank management, shareholders, and creditors may escalate after a bank becomes undercapitalized or even insolvent. The supervisor needs to be able to act quickly and swiftly remove bank managers or impose control over the supervisory board. Otherwise, the bank manager may postpone the start of the insolvency process (e.g., by concealing bank losses). A bail-in tool would allow the supervisor to also impose losses on uninsured bank creditors (especially on subordinated debtholders). This would limit the need for government bailout funds and would restore the incentives of the uninsured bank creditors to carefully monitor bank risks.

Sufficient supervisory tools are needed to restructure a failing bank in a timely manner. Establishing a bridge bank, to which bank assets or liabilities can be transferred, allows for smooth transition of viable bank operations and liquidation of redundant bank activities with a minimum threat to stability. For example, if the supervisor can swiftly move the deposit book from a failing bank to a purchasing bank or to a bridge bank, this can terminate panic withdrawals among bank depositors with a limited need for government funds.⁷

Ashcraft (2005) shows that open bank assistance has the fewest repercussions on the real economy, followed by a purchase & assumption transaction (which allows for the transfer of assets and liabilities of a failed bank in the U.S.), whereas bank liquidation has the greatest negative impact on the real economy. Ashcraft (2005) attributes this finding to the valuable bank-borrower relations that are lost in liquidation. In a purchase & assumption transaction, the bank-borrower relations can be partially preserved and transferred to a new purchaser. In open bank assistance, information and relationships are left intact.

James (1991) finds that liquidation is a costlier method of restructuring than a purchase & assumption transaction. In contrast to liquidation, a purchase & assumption transaction preserves the going concern value of the bank. Bennett and Unal (2009) show that a purchase & assumption transaction shortens the resolution process and reduces direct expenses compared to liquidation (i.e., the deposit payoff), although according to their evidence bank assets are sold for the same price through both methods. Laeven and Valencia (2013) find that recapitalization as

⁷ Kahn and Winton (2004) provide insight into how the bridge bank formation might add value. The formation of a good bank / bad bank structure limits the risk-shifting problem. In particular, a good bank is insulated from large downside losses of risky assets that are transferred to the bad bank. This preserves the monitoring incentives of the good bank. Diamond and Rajan (2011) analyze how a (voluntary or forced) sale of illiquid assets might cleanse the banking system and unfreeze asset and credit markets (see also Tirole, 2012).

well as all banking resolution policies jointly (i.e., guarantees, asset purchases, and liquidity support) positively impact the growth of financially dependent firms. Acharya and Yorulmazer (2008) argue that helping the acquiring bank (rather than the failing bank) through liquidity support reduces bank herding incentives and therefore reduces the probability of a systemic crisis.

In brief, supervisors are more likely to push a failing bank into restructuring or resolution if sufficient tools exist to deal with a failing bank. Such supervisory tools include removing bank management and shareholders, imposing haircuts on bank creditors, the ability to transfer contracts either to a bridge bank or to a private purchaser, and liquidity support to aid the restructuring process.

Hypothesis 3: Greater availability of supervisory tools in a bank bankruptcy regime is associated with a higher probability but lower output loss / fiscal costs of a banking crisis.

The question is: who is sufficiently apt to intervene in a timely manner and restructure failing banks, and at the same time safeguard systemic stability in banking? Marinč and Vlahu (2012) argue for an administrative process over a court-led process. In their view, the regulator/supervisor has more information and knowledge about banks' risk-taking and systemic stability than the court.⁸ It can react faster and lead the bank bankruptcy more efficiently. Especially if combined with early recognition and intervention incentives, an administrative process will then be associated with a higher probability of intervention (and consequently with a higher probability of a banking crisis) than a court-led process.

Hypothesis 4: An administrative bank bankruptcy regime is associated with a higher probability and lower output loss / fiscal costs in a banking crisis than a court-led bank bankruptcy regime.

DeYoung, Kowalik, and Reidhill (2013) model the bank resolution process in light of legal, financial, or technological advances as well as political or economic pressure on the bank supervisor. The supervisor chooses between closing or bailing out insolvent banks, weighing market discipline concerns of the bailout against repercussions of bank closures on the real

⁸ However, Bliss and Kaufman (2011) argue for a judicial structure of a U.S. bank bankruptcy regime for large complex financial institutions in which a court of law would be assisted by independent experts.

economy. Banks anticipate supervisory actions and choose the level of complexity of their lending techniques. DeYoung, Kowalik, and Reidhill (2013) argue that legal, financial, and technological advances reduce the technology constraints that prevent closures of banks (including the most complex ones). However, this effect can be watered down by political or economic pressure on the supervisor. Brown and Dinç (2005) confirm that political concerns directly shape the bank resolution process. In particular, they find that the proximity of elections postpones timely intervention in problematic banks but makes bank bailouts more probable.

An administrative bank bankruptcy regime might deal with banking crises more effectively than a court-led bank bankruptcy regime, especially if the legal system is underdeveloped. However, administrative bank bankruptcy regimes are more prone to political pressure or pressures from lobbying groups. Countries with an underdeveloped institutional framework, less efficient governments, and high levels of corruption may therefore implement administrative bank bankruptcy regimes in order to exert political influence through banks in restructuring.

Hypothesis 5: Greater government efficiency and higher quality of the institutional and legal environment are associated with a court-led bank bankruptcy regime rather than with an administrative bank bankruptcy regime.

3. Data description

Our analysis builds predominantly on the database “Bank regulation and supervision” gathered by the World Bank (see World Bank, 2013). We use the latest survey, conducted from 2010 to 2011, in which 791 responses were collected regarding various aspects of bank regulation and supervision. Our focus on bank bankruptcy regimes narrows down the database to forty questions from Part 11 (of the World Bank, 2013 database), entitled “Discipline/Problem institutions/Exit from 142 countries.”

The summary statistics in Table 1 provide insights about the general trends in bank bankruptcy regarding enforcement powers of supervisors, the early intervention framework, court

involvement in the resolution, court appeal process, and the availability of resolution instruments.⁹

Bank supervisors have several enforcement powers to deal with failing banks. In more than 90% of countries, cease-and-desist-type orders are available to limit improper business conduct (Question 1), the supervisor can demand supervisory requirements above the legal or regulatory minimum (Question 3), the supervisor can impose specific write-off and/or provisioning practices (e.g., provisioning to cover actual or potential losses; Questions 4 and 5), the supervisor can terminate a bank license (Question 7), restrict the types of business conducted by a bank (Question 6), demand asset restructuring or reducing a bank's risk profile (Question 7), lower dividends to shareholders (Question 9), and call off bank directors (Question 11) or managers (Question 12). Forbearance of regulatory and supervisory requirements is available to the supervisor in 67% of countries (Question 2), and the supervisor can reduce remuneration to bank directors in 72% of countries (Question 10) or demand recapitalization from the existing shareholders in 82% of countries (Question 13).

The possibility of a court appeal against the enforcement actions was rather limited. In the last five years, at least one enforcement action has been contested in court in 28% of countries (Question 15) and overturned by the court in only 10% of countries (Question 16).

The majority of countries (86%) implemented an early intervention framework that triggers automatic action when regulatory standards are breached (Question 17). Supervisors use breach of regulatory capital requirements (in 94% of countries; Question 18), breach of other regulatory requirements (in 87% of countries; Question 19), and assessment of non-viability (in 68% of countries; Question 20) as a trigger for the early intervention framework.

A majority of countries (69%) have a special bank bankruptcy regime that is distinct from the general bankruptcy regime for non-financial firms (Question 22). In 56% of countries there is an identical bank bankruptcy regime for bank holding companies and banks (Question 23).

Court involvement in bank resolution is described by Questions 24–28. Court approval is required: to declare insolvency in 56% of countries (Question 24), to supersede the rights of

⁹ We recoded seven variables into dummy variables to obtain the same weighting across variables in factor analysis.

shareholders in 34% of countries (Question 25), to remove bank directors or management in 4% of countries (Question 26), to use bank resolution tools in 12% of countries (Question 27), and to appoint and supervise a bank liquidator in 53% of countries (Question 28).

Countries generally have broad resolution instruments available. In bank bankruptcy, open bank assistance is available in 66% of countries, a purchase and assumption transaction in 72% of countries, government intervention in 62% of countries, and bridge bank formation in 42% of countries (see Questions 33–36).

The global financial crisis has strongly affected banking systems. In 30% of countries bank(s) were resolved, and in 29% of countries bank(s) were liquidated (Question 38 and 39). In 63% of countries it was confirmed that there was a change in the bank resolution framework (Question 40), indicating that countries responded to the crisis by upgrading their bank bankruptcy regimes.

4. Methodology

In our analysis, we first employ an imputation method to address the missing data problem, followed by factor analysis, which helps us discern the main dimensions of bank bankruptcy regimes. Cluster analysis then allows us to group countries together based on the similarity in bank bankruptcy regimes according to the uncovered dimensions. Finally, we use regression analysis to relate bank bankruptcy regimes to the global financial crisis as well as to the legal and institutional environment.

4.1. Imputation method

We first employ an imputation technique to deal with the missing variables problem within the World Bank (2013) database. Almost every variable within the World Bank (2013) database contains several missing values. Listwise elimination of countries with missing values would shrink the size of the database and render further analysis less informative. That is, we would lose all the information that is still present in non-missing values of the deleted observation.

Barth, Caprio, and Levine (2013) devote specific attention to the missing data in the World Bank (2013) database by gathering additional information from online and published sources and official documents. This approach, while preferred, is time-consuming. Sometimes the public

data are also unavailable. In this case, Barth, Caprio, and Levine (2013) employ mean imputation and replace missing responses from countries with the uniform bank regulation and supervisory regimes (e.g., the West African Monetary Union, Central African Economic and Monetary Community, and Eastern Caribbean Currency Union) based on responses from other countries within the same groups. We approach the problem of missing data from another perspective. Marinč, Mrak, and Rant (2013) show that European countries, despite having largely synchronized legal aspects of capital regulation, still differ substantially in the stringency of capital regulation. In contrast to Barth, Caprio, and Levine (2013), we employ multiple imputation to avoid substitution of missing values from the data of comparable countries.

We use the Bayesian iterative Markov chain Monte Carlo (MCMC) procedure to create imputed datasets based on assumed multivariate normal distribution of the data (see Little and Rubin, 2002; Schafer, 1997). In particular, a data augmentation procedure is used to impute the missing data based on the draws from the predictive distribution, where the predictive distribution is constructed from the observed data after the iteration process reaches a stationary distribution. Schafer (1997) suggests that the MCMC procedure can also be employed for categorical variables. Little and Rubin (2002) show that, if the data are missing completely at random, multiple imputation performs better than mean imputation, which may produce biased estimates and incorrect standard errors.¹⁰

The iteration process of the MCMC imputation procedure on our data converges after 155 iterations and yields the imputed correlation matrix in Table 3. The imputed correlation matrix serves as an input for factor analysis.

4.2. *Factor analysis*

Factor analysis allows us to reduce the number of variables by explaining the variability and covariation among observed variables through the use of latent variables called factors (see, e.g. Brown, 2006). Explorative factor analysis is used in order to derive the number of factors (and

¹⁰ Our results indicate that countries from the same group may differ in their bank bankruptcy regimes. For example, Ghana employs a court-led bank bankruptcy regime, whereas all other countries from the West African Monetary Union use administrative bank bankruptcy regimes (see Figure 7). This calls for the use of multiple imputation techniques (over the use of mean imputation).

their meaning) that best describe the main dimensions of bank bankruptcy regimes directly from the World Bank data in Table 1.

We employ a parallel analysis (Horn, 1965; Dinno, 2009) to estimate the optimal number of common factors. Following Horn (1965), we adjust for potential multicollinearity due to sampling error and least-squares bias. Following the Keiser rule (Keiser, 1960; Horn, 1965), we retain five factors with adjusted eigenvalues greater than one. In particular, we retain five factors with the eigenvalues based on observed data that are higher than the eigenvalues based on random data plus one (see Figure 1).

We apply the principal factor method with oblique promax rotation to account for relatively high correlation among unrotated factors.¹¹ That is, the correlation among several factors surpasses 0.8. This is far above the cutoff value of 0.32, which, according to Tabachnick and Fidell (2007, p. 646), demands the application of oblique rotation due to greater than 10% overlap in variance among factors.

4.3. *Cluster analysis*

Based on five factors obtained from the factor analysis, we seek to form natural groupings of countries with respect to their bank bankruptcy regimes. That is, we seek to identify the main types of bank bankruptcy regimes. We use hierarchical clustering on the basis of Ward's method (Ward, 1963).

Figure 2 presents a dendrogram of the cluster analysis based on oblique factors. Using the L2squared dissimilarity measure, we split countries into two main groups that present two distinct types of a bank bankruptcy regime. We set a dummy variable *group01* to zero if a country belongs to Group 0, and to one if a country belongs to Group 1.

¹¹ In the exploratory factor analysis, rotation is used to foster the interpretability of how factors are related to the indicators (i.e., in our case variables in Table 1). In contrast to orthogonal rotation, oblique rotation allows for correlated factors. Whereas several forms of oblique rotation exist, promax has often been used (see Tabachnick and Fidell, 2007 for further description of an explorative factor analysis). The meaning of factors remains qualitatively unchanged even if we use a different rotation method (e.g., orthogonal varimax rotation).

4.4. Regression analysis

Equipped with the revealed dimensions of bank bankruptcy regimes and the determination of the two main types of bank bankruptcy regimes, we run several regressions relating the types and dimensions of bank bankruptcy regimes; namely, for: (i) the probability of the global financial crisis; (ii) the costs of the global financial crisis, and (iii) the legal and institutional characteristics of countries.

In order to analyze relationships between the type of bank bankruptcy regimes, their dimensions, and the probability of the global financial crisis, we run the following two probit regressions:

For bank bankruptcy regime types versus crisis relationship:

$$\Pr[\text{crisis_08}_i=1] = F(\beta_1 \text{group01}_i + \sum_{j=1}^n \beta_{j+1} \text{CONTROL}_{i,j}) \quad (1)$$

For bank bankruptcy regime dimensions versus crisis relationship:

$$\Pr[\text{crisis_08}_i=1] = F(\sum_{j=1}^m \beta_j \text{FACTOR}_{i,j} + \sum_{k=1}^n \beta_{k+m} \text{CONTROL}_{i,k}) \quad (2)$$

In both regressions above, our dependent variable is the dummy variable crisis_08_i , which describes the presence of the global banking crisis in 2008 (from Laeven and Valencia, 2012) in country i .

In the first regression, dummy variable group01_i denotes the type of bank bankruptcy framework according to the results of our cluster analysis and $\text{CONTROL}_{i,j}$ are control variables, which include log of GDP per capita in purchasing power terms in 2008 (l_gdppc_2008), private credit to GDP in 2008, expressed in 2004 U.S. dollars ($\text{private_credit_gdp08_04}$), and financial system deposits to GDP in 2008 (fs_deposits_gdp08) in country i . Function $F(\cdot)$ is the cumulative distribution function of the standard normal distribution. See also Table 5 for definitions and sources of control variables.

The only difference in the second regression is that, instead of using bank bankruptcy type as the independent variable, we use the set of j independent variables $\text{FACTOR}_{i,j}$, which pertain to the most important factors (obtained from factor analysis) describing the main dimensions of bank bankruptcy regime in country i . We use the same control variables as in the first regression.

In a similar fashion, we also analyze relationships between the type of bank bankruptcy regimes, their dimensions, and the output loss/fiscal costs in the global financial crisis. We employ the following two ordinary least-squares (OLS) regressions:

For bank bankruptcy regime types versus output loss / fiscal costs relationship:

$$Y_i = \beta_0 + \beta_1 \text{group01}_i + \sum_{j=1}^n \beta_{i+1} \text{CONTROL}_{i,j} + \varepsilon \quad (3)$$

For bank bankruptcy regime dimensions versus output loss / fiscal costs relationship:

$$Y_i = \beta_0 + \sum_{j=1}^m \beta_j \text{FACTOR}_{i,j} + \sum_{j=1}^n \beta_{j+m} \text{CONTROL}_{i,j} + \varepsilon \quad (4)$$

In both regressions above, the dependent variable Y_i is output loss in the global financial crisis in 2008, measured in % change of GDP (output_loss; Laeven and Valencia, 2012) or, alternatively, fiscal costs in the global financial crisis in 2008 measured in % of GDP (fiscal_costs; Laeven and Valencia, 2012) in country i . ε is an error term. All other variables are defined in the same way as in the case of the earlier probit regressions.

Finally, we employ a probit regression to identify which characteristics of a country are related to its type of bank bankruptcy regime.

$$\text{Pr}[\text{group01}=1] = F(\beta_1 \text{QUALITY}_i + \sum_{j=1}^n \beta_{j+1} \text{CONTROL}_{i,j}) \quad (5)$$

In this case, the grouping dummy variable group01 is our dependent variable. Function $F(\cdot)$ is the cumulative distribution function of the standard normal distribution. Table 5 lists the independent variables that we use (and their summary statistics). We include variables describing the quality of legal and institutional environment and the governmental effectiveness in country i as the dependent variable QUALITY_i . To measure the quality of the legal environment, we include the aggregate score of creditor rights (creditor_rights; obtained from Djankov et al., 2007), the type of legal origin—UK, French, German, and Scandinavian (legal_origin_UK, legal_origin_FR, legal_origin_GE, legal_origin_SC)—according to La Porta et al. (2008), and the world governance indicator from Kaufman et al. (2010), which measures the rule of law (rule_of_law). To measure institutional quality and government effectiveness, we include the score of economic freedom within each country (score_h; from www.heritage.org) and its more detailed decomposition (financial_freedom and monetary_freedom), government effectiveness

(government_effectiveness; World Governance indicators from Kaufmann et al., 2010), and indicators from the Global Competitiveness Report from the World Economic Forum (2013) (diversion_of_public_funds, absence_of_bribes, low_burden_of_government_regulation, property_rights). We include log of GDP per capita in purchasing power terms in 2008 (\ln_gdp_2008) as control variables $CONTROL_{i,j}$ in country i . We employ robust standard errors across all regressions.

5. Results

5.1. *The main dimensions of bank bankruptcy regimes*

On the basis of factor analysis, oblique rotation, and parallel analysis, we identify five most important dimensions (i.e., factors) of bank bankruptcy regimes across countries. Table 1 (columns 8–12) shows the factor loadings of all five factors for variables in the World Bank (2013) database. Factor loadings, being essentially the correlations between the observed variables and underlying factors, allow us to interpret the meaning of each factor. The focus is especially on factor loadings greater than 0.3 in absolute terms (see Kline, 2002, p. 52).

Factor 1 has the highest and positive factor loadings for questions that indicate whether the enforcement actions of the supervisory agency were contested in court (Question 15) or overturned by the court in the last five years (Question 16). Factor 1 is positively related to the question of whether an appeal by shareholders was made to the court against a resolution in the past five years (Question 30), whether such an appeal was successful (Question 31), and whether court approval is required to appoint and oversee a bank liquidator (Question 28). Factor 1 is negatively related to the question of whether the insolvency framework is the same for bank holding companies and banks (Question 23). Factor 1 is negatively related to the question that indicates whether forbearance (i.e., to waive regulatory and supervisory requirements) is available to the supervisor (Question 2). From these factor loadings, it can be seen that Factor 1 mainly describes court involvement in the appeal process and measures the difficulty of forbearance. Hence, we name Factor 1 Difficulty of forbearance & ease of court appeal.

Factor 2 has the highest factor loadings for Questions 33 to 36, which describe whether specific supervisory tools (e.g., an open bank assistance, purchase and assumption transaction, government intervention, and bridge bank) are available. Factor 2 is also positively related to the question of whether a resolution action against a bank continues if a court action is filed (Question 32). Factor 2 is negatively related to the question of whether shareholders can appeal to the court against a resolution decision (Question 29). We name Factor 2 Availability of supervisory tools.

Factor 3 has the highest factor loadings for Questions 24 to 28, which describe whether court approval is required to declare insolvency, supersede shareholders' rights, remove and replace bank senior management, undertake a bank resolution mechanism, and appoint and oversee a bank liquidator. Factor 3 is also positively related to the question of whether the breach of other than capital regulatory criteria is used for initiating automatic actions (Question 19). Factor 3 is negatively related to the question of whether a separate bank insolvency framework exists that is distinct from that of non-financial firms (Question 22). We name Factor 3 Court involvement.

Factor 4 has the highest factor loadings for questions that describe whether the supervisory agency can require a bank to meet supervisory requirements that are stricter than the legal or regulatory minimum (Question 3), restrict or place conditions on the types of business conducted by a bank (Question 6), suspend or remove bank directors (Question 11), and suspend or remove bank managers (Question 12). Factor 4 is also positively affected if the supervisory agency can require banks to restructure their operations (Question 8), reduce dividends (Question 9), or reduce the remuneration of bank directors (Question 10). Hence, we name Factor 4 Supervisory powers w.r.t. managers.

Factor 5 has the highest factor loadings for questions that describe whether the supervisory agency can require a bank to apply specific provisioning and write-off policies (Question 4), constitute provisions to cover actual or potential losses (Question 5), require commitment from controlling shareholders to support the bank with additional capital (Question 13), and operate an early intervention framework that forces automatic action if regulatory thresholds are breached (Question 17). Factor 5 is negatively related to Question 40, in which a country confirmed whether there was a change in the bank resolution framework. We name Factor 5 Supervisory powers w.r.t. shareholders & preinsolvency phase.

Factors contain a clearly expressed economic meaning and they can easily be matched with the observations from the literature review in Section 2 on which we build the hypotheses. For example, Factor 1 Difficulty of forbearance & ease of court appeal indicates how high the incentives of the supervisor are to restructure a failing bank through insolvency procedures. High factor scores on Factor 2 Availability of supervisory tools shows whether a country's bank bankruptcy regime is aligned with the observation that the regulator/supervisor should have strong powers when restructuring a failing bank.

Factor 3 Court involvement indicates how much the court is involved in the process of bank restructuring and how close a country's bank bankruptcy regime is to the general bankruptcy regime. Low factor scores of Factor 3 indicate that the country's bank bankruptcy regime is aligned with the observation that bank bankruptcy regime should be administrative-based.

Factor 4 Supervisory powers w.r.t. managers and Factor 5 Supervisory powers w.r.t. shareholders & preinsolvency phase indicate how much a bank bankruptcy regime is aligned with the observation that claims that the supervisor should have strong powers in the bank bankruptcy regime. Factor 5 also indicates how much the observation that promotes the existence of a preinsolvency phase is fulfilled.

In short, high factor scores on Difficulty of forbearance & ease of court appeal, Availability of supervisory tools, Supervisory powers w.r.t. managers, and Supervisory powers w.r.t. shareholders & preinsolvency phase and low factor scores on Court involvement indicate that a country's bank bankruptcy regime is aligned with general prescriptions on how to design bank bankruptcy.

5.2. Two main types of bank bankruptcy regimes

Having identified the main dimensions of bank bankruptcy regimes, we now analyze the main groupings of countries to discover the most prevalent types of bank bankruptcy regimes. Cluster analysis identifies two main clusters (two main types) of bank bankruptcy regimes. We denote them by dummy variable group01 (Group 0 as group01 = 0 and Group 1 as group01 = 1).

Table 4 provides a comparison of factor score means across the two groups. The *t*-test shows that all five factors are statistically significant across the groups. Figure 3 provides a graphic

presentation of the differences across factors between the two groups. In countries from Group 0, forbearance is less and court appeal is more difficult, there are fewer supervisory tools available, court involvement is stronger, supervisory powers w.r.t. managers are stronger, and supervisory powers w.r.t. shareholders and preinsolvency phase are weaker than in countries from Group 1. More specifically, the type of bank bankruptcy regime in Group 0 is court-based with limited court appeal, powerful towards management, and weak towards shareholders. We call this a *court-led bank bankruptcy regime*. In contrast, the type of bank bankruptcy regime in Group 1 is administrative-based with limited forbearance, with little court involvement but with more common subsequent court appeal, and with weaker supervisory powers towards management but stronger supervisory powers towards shareholders and preinsolvency phase. We call this an administrative bank bankruptcy regime. Figures 4 to 7 graphically depict how the main dimensions of a bank bankruptcy regime differ among the two types of bank bankruptcy regimes.

Figure 7 provides geographic mapping of countries according to the clustering variable group01, which denotes whether a country belongs to the court-led (Group 0) or administrative bank bankruptcy regime (Group 1). The majority of countries from the Americas and the eastern European countries, including Russia, but also France, Italy, the UK, Denmark, and the Netherlands, are in Group 1. Countries geographically close to Germany, but also Spain, Ireland, Finland, China, India, Australia, New Zealand, and several African countries are included in Group 0.

Administrative bank bankruptcy regimes seem to be more aligned with the literature on the optimal bank bankruptcy regime as described in Section 2 than court-led bank bankruptcy regimes. In administrative bank bankruptcy regimes, factor scores are higher for Difficulty of forbearance & ease of court appeal, Availability of supervisory tools, and Supervisory powers w.r.t. shareholders & preinsolvency phase, and lower for Court involvement. A notable exception is Supervisory powers w.r.t. managers, which are weaker in administrative bank bankruptcy regimes than in court-led bank bankruptcy regimes.

5.3. *Characteristics of a bank bankruptcy framework and the global financial crisis*

Now we analyze whether the type and main characteristics of bank bankruptcy regimes are related to the probability and severity of the global financial crisis in a given country.

Table 7 presents the regression results with the global crisis dummy *crisis_08* as a dependent variable and the type (*group01*) and the main characteristics of bank bankruptcy regime (factors from factor analysis) as independent variables. An administrative bank bankruptcy regime is positively and significantly related to the appearance of the global financial crisis (Column 1 of Table 6). This yields support for the first part of Hypothesis 1, which states that administrative bank bankruptcy regimes are positively related to the probability of a banking crisis.

Columns 2 and 3 of Table 6 show that an administrative bank bankruptcy regime is not significantly associated with greater output loss and fiscal costs. This finding does not yield support for the second part of our Hypothesis 1, which states that administrative bank bankruptcy regimes are negatively related to the output loss and fiscal costs in a banking crisis, compared to court-led bank bankruptcy regimes.

Column 4 of Table 6 shows that factors Difficulty of forbearance & ease of court appeal, Availability of supervisory tools, and Supervisory powers w.r.t. shareholders & preinsolvency phase are positively and significantly associated with the occurrence of the global financial crisis. This finding provides support for the first parts of Hypotheses 1, 2 and 3, which argue that supervisory incentives to intervene, the existence of a preinsolvency phase, and supervisory tools shape the probability of regulatory intervention and the appearance of a banking crisis.

Columns 4 and 6 of Table 6 show that Court involvement (as well as Supervisory powers w.r.t. managers) is positively and significantly associated with output loss and fiscal costs in the global financial crisis. This lends some support for Hypothesis 4, which states that court-led bank bankruptcy regimes are associated with higher output loss and fiscal costs in a banking crisis.

Table 6 also shows that factors that are more expressed in an administrative bank bankruptcy regime (Difficulty of forbearance & ease of court appeal, Availability of supervisory tools, and Supervisory powers w.r.t. shareholders & preinsolvency phase) are positively associated with the appearance of the global financial crisis in a given country. In contrast, factors that are more

expressed in a court-led bank bankruptcy regime (Court involvement and Supervisory powers w.r.t. managers) are associated with higher output loss and fiscal costs in the global financial crisis. This provides further support for Hypothesis 4.

A caveat of our analysis is that it only establishes relationships between the characteristics of bank bankruptcy regime and the probability and severity of a banking crisis, but not the causality. Countries have recently been implementing and changing their bank bankruptcy regimes. Whereas in 2008 only eighteen countries reported having separate bank insolvency law, in 2010/11 the proportion of countries with a separate bank insolvency law increased to 69%. In addition, 63% of countries confirmed that there was a change in the bank resolution framework in the period from 2007 to 2010 (see Question 40 in Table 1). To partially limit the reverse causality problem, we focus only on the global financial crisis and not on other banking crises. Future work might address the causality issue more rigorously; for example, by combining the data on bank bankruptcy regimes with the bank-level data on bank failures and associated losses.

5.4. The determinants of the type of bank bankruptcy regime

Finally, we seek to identify the main external country characteristics that are associated with the court-type bankruptcy regime versus the ones associated with the administrative-type bank bankruptcy regime.

Table 7 presents the results of the probit regression with the cluster variable group01 as the dependent variable and country characteristics as independent variables. Countries within Group 1 are statistically significantly (mostly at 1%) associated with weaker creditor rights than countries within Group 0. This is in line with our identification of the two main types of bank bankruptcy regimes (i.e., a court-led bank bankruptcy regime in Group 0 and an administrative bank bankruptcy regime in Group 1).

We find no impact of legal origins (UK, French, German, or Scandinavian legal origin) on the type of bank bankruptcy regime. This indicates that the main characteristics of bank bankruptcy regimes are fairly autonomous from the historic developments of the legal system of a country. This is expected because in the large majority of countries bank bankruptcy legislation has only been developed in the last decade.

We find a negative (and statistically significant at 5%) relationship between economic freedom scores and the type of bank bankruptcy regime. That is, countries within Group 1 (with an administrative bank bankruptcy regime) are associated with lower economic freedom scores than countries within Group 0 (with a court-led bank bankruptcy regime). Decomposing the index of economic freedom in further detail, countries within group 1 (with an administrative bank bankruptcy regime) are generally characterized by less financial freedom and less monetary freedom than countries within Group 0 (with a court-led bank bankruptcy regime).

We also find a negative and significant relationship between the type of bank bankruptcy regime and government effectiveness. Countries within Group 1 (with an administrative bank bankruptcy regime) are associated with lower government effectiveness expressed through higher diversion of public funds, bribes, and burden of government regulation than countries within Group 0 (with a court-led bank bankruptcy regime). In addition, countries with an administrative bank bankruptcy regime are associated with less rule of law and fewer property rights than countries with a court-led bank bankruptcy regime.

Our findings provide support for Hypothesis 5, which claims that a bank bankruptcy regime is shaped by the quality of the institutional and legal environment. In particular, countries with administrative bank bankruptcy regimes are associated with lower government effectiveness and lower quality of the institutional and legal environment.

6. Conclusions

This article uses explorative factor analysis and missing data techniques on the World Bank (2013) database to identify five main dimensions of bank bankruptcy regimes: (1) Difficulty of forbearance & ease of court appeal, (2) Availability of supervisory tools, (3) Court involvement, (4) Supervisory powers w.r.t. managers, and (5) Supervisory powers w.r.t. shareholders & preinsolvency phase. We employ cluster analysis to identify two main types of bank bankruptcy regimes—a court-led and an administrative bank bankruptcy regime.

Based on the literature on optimal bank bankruptcy regime we hypothesize that an administrative bank bankruptcy regime provides the supervisor with greater incentives to intervene compared to a court-led bank bankruptcy regime, increasing the probability but limiting the severity of a

banking crisis. We find some support that administrative bank bankruptcy regimes are positively associated with the occurrence of the global financial crisis. Characteristics that are more pronounced in an administrative bank bankruptcy regime—Difficulty of forbearance & ease of court appeal, Availability of supervisory tools, and Supervisory powers w.r.t. shareholders & preinsolvency phase—are positively related to the presence of the global financial crisis in a country. In contrast, characteristics that are more pronounced in court-led bank bankruptcy regimes—Court involvement and Supervisory powers w.r.t. managers—are positively related to the output loss and fiscal costs in the global financial crisis.

We find that administrative bank bankruptcy regimes are associated with higher powers of bank supervisors (e.g., higher availability of supervisory tools) but also with lower institutional quality: we find that administrative bank bankruptcy regimes are associated with weaker creditor rights, lower economic freedom scores, and lower institutional quality than court-led bank bankruptcy regimes. A potential danger may arise from this dichotomy. High powers in an administrative bank bankruptcy regime may further aggravate the drawbacks of insufficient institutional quality. What this shows is that further improvement of institutional and legal quality is crucial, and that this may be especially important in countries with administrative bank bankruptcy regimes.

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Table 1: Summary of statistics and factor loadings for variables from World Bank (2012) (Yes = 1, No = 0)

Variable		Obs	Mean	Std. Dev.	Min	Max	Factor1	Factor2	Factor3	Factor4	Factor5
1 q11_01_00_01	11.1 Please indicate whether the following enforcement powers are available to the supervisory agency: a.Cease and desist-type orders for imprudent bank practices	138	0.96	0.20	0	1	0.108	-0.006	-0.014	0.032	-0.046
2 q11_01_00_02	11.1 Please indicate b.Forbearance (i.e. to waive regulatory and supervisory requirements)	137	0.67	0.47	0	1	-0.347	-0.103	0.204	0.032	-0.016
3 q11_01_00_03	11.1 Please indicate c.Require a bank to meet supervisory requirements (e.g. capital, liquidity etc.) that are stricter than the legal or regulatory minimum	139	0.96	0.19	0	1	0.032	0.046	-0.122	0.670	-0.189
4 q11_01_00_05	11.1 Please indicate e.Require bank to apply specific provisioning and/or write-off policies	138	0.93	0.25	0	1	-0.144	-0.012	-0.098	-0.072	0.573
5 q11_01_00_06	11.1 Please indicate f. Require banks to constitute provisions to cover actual or potential losses	139	0.97	0.17	0	1	-0.067	-0.041	-0.029	0.013	0.540
6 q11_01_00_07	11.1 Please indicate g.Restrict or place conditions on the types of business conducted by bank	138	0.96	0.20	0	1	0.076	0.055	0.029	0.632	0.066
7 q11_01_00_08	11.1 Please indicate h.Withdraw the bank's license	139	0.97	0.17	0	1	0.016	-0.019	-0.208	-0.070	0.008
8 q11_01_00_09	11.1 Please indicate i.Require banks to reduce/restructure their operations (e.g. via asset sales and branch closures) and adjust their risk profile	135	0.97	0.17	0	1	0.202	-0.074	0.159	0.306	0.004
9 q11_01_00_10	11.1 Please indicate j.Require banks to reduce or suspend dividends to shareholders	139	0.94	0.25	0	1	0.190	0.029	-0.037	0.334	0.222
10 q11_01_00_11	11.1 Please indicate k.Require banks to reduce or suspend bonuses and other remuneration to bank directors and managers	137	0.72	0.45	0	1	-0.186	-0.087	-0.025	0.370	0.092
11 q11_01_00_12	11.1 Please indicate l.Suspend or remove bank directors	139	0.93	0.26	0	1	0.093	-0.024	0.033	0.497	0.096
12 q11_01_00_13	11.1 Please indicate m.Suspend or remove managers	140	0.90	0.30	0	1	0.004	-0.012	0.095	0.485	0.372
13 q11_01_00_14	11.1 Please indicate n.Require commitment/action from controlling shareholder(s) to support the bank with new equity (e.g. capital restoration plan)	140	0.82	0.38	0	1	-0.077	0.065	-0.116	0.103	0.570
14 q11_01_01	11.1.1 Are bank regulators/supervisors required to make public formal enforcement actions, which include cease and desist orders and written agreements between a reg./supervis. And bank?	141	0.28	0.45	0	1	-0.248	0.069	-0.038	0.025	0.044
15 q11_02_00_01ADJ	11.2 Please indicate whether any of the above enforcement actions have been contested in court in the last 5 years (2006-2010)	106	0.32	0.47	0	1	0.800	-0.134	0.024	0.106	0.051
16 q11_02_00_02ADJ	11.2 Please indicate whether any of the above enforcement actions have been overturned by the court in the last 5 years (2006-2010)	101	0.10	0.30	0	1	0.780	-0.265	0.045	0.028	-0.271
17 q11_03_00	11.3 Does the supervisory agency operate an early intervention framework (e.g. prompt corrective action) that forces automatic action when certain regulatory triggers/thresholds are breached?	139	0.86	0.35	0	1	0.072	-0.172	-0.071	-0.079	0.401
18 q11_03_01_01	11.3.1 If so, what triggers/thresholds are used for initiating automatic actions? a.Breach of minimum regulatory capital adequacy ratio	118	0.94	0.24	0	1	0.120	0.257	0.260	-0.011	-0.042
19 q11_03_01_02	11.3.1 If so, what triggers/thresholds are used for initiating automatic actions? b.Breach of other regulatory requirements (e.g. liquidity ratio, fit and proper criteria)	118	0.87	0.33	0	1	0.097	0.243	0.406	0.031	0.073
20 q11_03_01_03	11.3.1 If so, what triggers/thresholds are used for initiating automatic actions? c.Evaluation of likely non-viability given trends and risk factors	125	0.68	0.47	0	1	0.128	0.047	0.135	-0.015	0.280
21 q11_03_01_04	11.3.1 If so, what triggers/thresholds are used for initiating automatic actions? d.Other (please specify)	114	0.26	0.44	0	1	0.128	-0.106	-0.043	0.054	0.098
22 q11_04_00	11.4 Is there a separate bank insolvency framework that is distinct from that of non-financial firms?	137	0.69	0.47	0	1	0.115	0.121	-0.466	-0.077	0.175
23 q11_04_01	11.4.1 Is the insolvency framework the same for bank holding companies and banks? If not please explain the differences	131	0.56	0.50	0	1	-0.310	-0.063	0.227	0.075	-0.164
24 q11_06_00_01	11.6 Is court approval required for the following bank resolution activities? a.Declare insolvency	141	0.56	0.50	0	1	0.171	0.032	0.603	-0.070	-0.099
25 q11_06_00_02	11.6 Is court approval required for the following bank resolution activities? b.Supersede shareholders' rights	137	0.34	0.47	0	1	-0.174	-0.019	0.575	0.029	0.032
26 q11_06_00_03	11.6 Is court approval required for the following bank resolution activities? c.Remove and replace bank senior management and directors	138	0.04	0.20	0	1	-0.061	-0.032	0.452	-0.185	0.160
27 q11_06_00_04	11.6 Is court approval required for the following bank resolution activities? d.Undertake bank resolution mechanisms	137	0.12	0.32	0	1	-0.097	-0.101	0.529	0.026	-0.175
28 q11_06_00_05	11.6 Is court approval required for the following bank resolution activities? e.Appoint and oversee a bank liquidator/receiver	137	0.53	0.50	0	1	0.300	-0.048	0.506	-0.018	-0.068
29 q11_07_00	11.7 Can the bank shareholders appeal to the court against a resolution decision of the banking supervisor?	141	0.84	0.36	0	1	-0.227	-0.305	0.018	0.204	0.062
30 q11_07_01ADJ	11.7.1 If 1, was there any appeal made in the past 5 years (2006-2010)?	115	0.97	0.35	0	1	0.324	-0.001	-0.013	-0.052	0.362
31 q11_07_01_01ADJ	11.7.1.1 Of which, was any successful?	107	0.07	0.28	0	1	0.387	-0.047	-0.020	-0.332	0.164
32 q11_08_00	11.8 Can a resolution action against a bank continue if a court action is filed, or does the court appeal lead to the suspension of such action until a ruling is made?	123	0.73	0.44	0	1	-0.011	0.306	0.045	0.042	0.114
33 q11_09_00_01	a.Open bank assistance 11.9 Which mechanisms are provided in existing legislation to resolve a problem bank prior to its closure and liquidation?	136	0.66	0.47	0	1	-0.111	0.632	-0.003	0.083	-0.071
34 q11_09_00_02	b.Purchase and assumption transaction (with or without government support) 11.9 Which mechanisms are provided in existing legislation to resolve a problem bank prior to its closure and liquidation?	134	0.72	0.45	0	1	-0.146	0.746	-0.037	0.174	0.081
35 q11_09_00_03	c.Government intervention (e.g. via conservatorship or nationalization) 11.9 Which mechanisms are provided in existing legislation to resolve a problem bank prior to its closure and liquidation?	133	0.62	0.49	0	1	-0.128	0.725	-0.033	-0.127	-0.197
36 q11_09_00_04	d.Bridge bank 11.9 Which mechanisms are provided in existing legislation to resolve a problem bank prior to its closure and liquidation?	130	0.42	0.49	0	1	-0.181	0.654	-0.012	-0.039	0.173
37 q11_09_00_05	e.Other (please specify) 11.9 Which mechanisms are provided in existing legislation to resolve a problem bank prior to its closure and liquidation?	96	0.44	0.50	0	1	-0.130	-0.218	-0.245	0.142	-0.060
38 q11_10_01_01ADJ	Was there any bank resolved in 2008/9/10?	128	0.30	0.46	0	1	-0.136	0.059	0.051	-0.047	0.065
39 q11_10_02_01ADJ	Was there any bank liquidated in 2008/9/10?	130	0.29	0.46	0	1	0.416	0.151	0.000	0.026	-0.080
40 q11_12_00ADJ	11.12 The country confirmed that there was a change in the bank resolution framework?	142	0.63	0.48	0	1	0.267	0.271	-0.145	0.263	-0.329

Source: World Bank (2013), own computation. Factors are computed based on factor analysis (using the principal factor method and oblique promax rotation) on the imputed correlation matrix, obtained by the multivariate normal regression imputation method.

Table 2: Correlation matrix (before imputation)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40							
1 q11_01_00_01	1.00																																														
2 q11_01_00_02	0.00	1.00																																													
3 q11_01_00_03	-0.04	-0.05	1.00																																												
4 q11_01_00_05	0.09	0.07	-0.05	1.00																																											
5 q11_01_00_06	-0.04	-0.03	-0.03	0.48***	1.00																																										
6 q11_01_00_07	-0.05	0.00	0.53***	0.10	0.17**	1.00																																									
7 q11_01_00_08	-0.04	0.07	-0.03	0.13	-0.03	-0.03	1.00																																								
8 q11_01_00_09	0.17**	0.07	0.20**	-0.05	-0.03	0.39***	-0.03	1.00																																							
9 q11_01_00_10	-0.06	-0.12	0.11	0.05	0.13	0.23***	-0.05	0.30***	1.00																																						
10 q11_01_00_11	0.02	0.22**	0.14	-0.04	-0.01	0.10	-0.01	0.18**	0.22***	1.00																																					
11 q11_01_00_12	0.08	0.04	0.10	-0.07	-0.05	0.08	-0.05	-0.05	0.15*	0.26***	1.00																																				
12 q11_01_00_13	0.05	0.12	0.19**	0.11	0.09	0.16*	-0.06	-0.06	0.01	0.16*	0.35***	1.00																																			
13 q11_01_00_14	-0.01	-0.05	-0.09	0.18**	0.26***	0.08	0.03	0.03	0.36***	0.08	0.16*	0.29***	1.00																																		
14 q11_01_01	0.14	0.10	0.12	0.10	0.01	0.05	0.11	0.01	-0.06	0.09	-0.07	0.00	-0.01	1.00																																	
15 q11_02_00_01ADJ	0.06	-0.21**	0.12	-0.03	0.12	0.10	0.03	0.12	0.10	-0.01	-0.03	0.09	-0.08	-0.15	1.00																																
16 q11_02_00_02ADJ	0.08	-0.18*	0.06	-0.15	0.06	0.05	0.07	0.06	0.09	0.08	0.09	-0.11	-0.19*	0.01	0.52***	1.00																															
17 q11_03_00	0.02	-0.15*	-0.08	0.23***	0.30***	0.01	0.05	-0.07	-0.03	0.02	-0.03	0.09	0.18**	0.08	0.07	0.05	1.00																														
18 q11_03_01_01	-0.05	-0.09	-0.05	-0.06	-0.03	-0.06	-0.04	-0.05	0.07	0.04	-0.07	-0.08	0.08	-0.06	0.03	0.07	-0.05	1.00																													
19 q11_03_01_02	-0.08	0.03	-0.08	0.03	-0.05	-0.09	-0.06	-0.08	0.10	-0.15	-0.02	0.14	0.04	-0.07	0.06	-0.18*	-0.07	0.33***	1.00																												
20 q11_03_01_03	0.04	-0.06	0.03	0.16*	0.05	-0.08	0.11	0.17*	0.10	-0.03	0.00	0.03	0.04	-0.05	0.04	-0.07	-0.02	0.20**	0.37***	1.00																											
21 q11_03_01_04	0.03	-0.12	-0.06	0.06	0.08	0.05	-0.02	0.12	0.01	0.02	0.10	0.06	0.11	0.04	-0.04	-0.01	0.00	-0.18*	-0.06	-0.02	1.00																										
22 q11_04_00	0.08	-0.20**	0.07	0.14	0.07	-0.05	0.07	-0.12	0.07	-0.07	-0.11	0.01	0.26***	0.08	0.03	-0.05	0.01	-0.02	0.01	0.02	0.07	1.00																									
23 q11_04_01	0.02	0.21**	0.06	-0.17*	-0.07	-0.05	-0.07	-0.02	-0.03	0.18**	-0.00	-0.07	-0.18**	0.08	-0.19*	-0.07	-0.08	0.12	0.07	0.08	-0.10	-0.44***	1.00																								
24 q11_06_00_01	0.02	0.07	-0.10	-0.12	-0.07	0.10	-0.07	0.20**	0.00	-0.16*	-0.13	-0.11	-0.08	0.05	0.06	-0.02	-0.06	0.12	0.19**	0.13	-0.06	-0.31***	-0.04	1.00																							
25 q11_06_00_02	-0.02	0.20**	-0.06	0.05	0.00	-0.02	-0.15*	0.03	-0.06	0.13	0.05	0.04	-0.17**	0.09	-0.09	-0.05	-0.07	0.11	0.23**	0.06	0.02	-0.28***	0.23***	0.30***	1.00																						
26 q11_06_00_03	0.04	0.07	-0.17**	0.05	0.03	-0.15*	-0.17**	0.04	0.06	0.05	0.05	-0.07	0.01	0.02	0.00	0.08	0.08	0.06	0.09	0.16*	-0.05	-0.09	0.12	0.12	0.30***	1.00																					
27 q11_06_00_04	-0.03	0.16*	0.06	-0.20**	-0.10	0.07	0.06	0.06	-0.27***	-0.03	-0.09	0.03	-0.08	0.03	-0.06	-0.07	0.09	0.14	0.07	-0.09	-0.26***	0.20**	0.24***	0.33***	0.37***	1.00																					
28 q11_06_00_05	0.15*	0.03	-0.17*	-0.08	-0.08	0.05	-0.08	0.10	-0.02	-0.15*	0.11	0.12	-0.12	-0.05	0.06	0.09	-0.04	-0.05	0.16*	-0.03	0.01	-0.15*	-0.18**	0.49***	0.16*	0.20**	0.17**	1.00																			
29 q11_07_00	0.01	0.14	0.05	-0.03	0.05	0.13	-0.07	-0.08	-0.11	0.23***	0.05	0.13	-0.04	0.14*	0.10	0.01	-0.01	-0.09	-0.05	-0.16*	-0.06	-0.12	0.24***	-0.15*	0.13	-0.01	0.10	-0.06	1.00																		
30 q11_07_01ADJ	0.05	-0.13	-0.21**	0.06	0.09	0.01	0.10	0.08	0.15	-0.03	-0.02	0.07	0.12	-0.09	0.46***	0.18*	0.10	-0.10	0.06	0.16	-0.03	0.03	-0.11	-0.00	0.07	-0.02	-0.06	-0.02	0.13	1.00																	
31 q11_07_01_01ADJ	0.04	-0.11	-0.52***	0.07	0.04	-0.14	0.05	0.04	0.07	-0.07	-0.12	-0.07	0.11	-0.06	0.08	0.31***	0.10	0.05	-0.05	0.09	0.10	0.06	-0.06	-0.00	0.00	-0.06	-0.09	-0.04	0.06	0.47***	1.00																
32 q11_08_00	-0.03	-0.04	-0.01	0.06	0.02	-0.03	-0.01	-0.01	0.05	-0.09	0.07	0.01	-0.00	0.05	0.03	0.06	-0.09	-0.08	0.01	-0.05	0.03	0.05	-0.06	-0.03	0.03	0.05	0.06	0.09	0.05	0.22**	0.03	1.00															
33 q11_09_00_01	0.08	-0.05	0.03	-0.06	-0.03	0.08	-0.03	-0.03	0.07	0.02	-0.08	-0.04	-0.01	-0.08	-0.02	-0.03	-0.07	0.06	-0.01	-0.08	-0.09	0.12	-0.09	0.03	0.06	-0.03	-0.06	-0.01	-0.18**	0.12	0.01	0.16*	1.00														
34 q11_09_00_02	-0.05	-0.16*	-0.01	-0.02	-0.01	0.06	-0.01	-0.11	0.04	0.13	0.08	0.15*	0.09	0.10	0.07	-0.07	0.04	0.21**	-0.19*	0.12	-0.02	0.07	-0.07	0.01	-0.02	-0.09	-0.12	-0.10	-0.17**	0.13	0.07	0.21**	0.47***	1.00													
35 q11_09_00_03	0.20**	-0.11	-0.05	-0.07	-0.05	0.01	0.04	0.04	-0.07	-0.15*	-0.09	-0.16*	-0.10	0.11	-0.08	-0.10	-0.12	0.04	-0.05	0.01	-0.01	0.07	-0.05	0.03	-0.03	-0.04	-0.06	0.05	-0.30***	0.07	0.13	0.21**	0.43***	0.37***	1.00												
36 q11_09_00_04	0.03	-0.18**	-0.03	0.15*	0.09	-0.03	-0.03	0.09	-0.15*	0.03	0.00	0.13	0.03	-0.07	-0.11	0.01	0.02	0.01	-0.04	-0.19*	0.12	-0.05	-0.02	-0.17*	0.03	-0.20**	0.08	-0.20**	0.12	0.02	0.21**	0.33***	0.43***	0.42***	1.00												
37 q11_09_00_05	0.19*	0.11	0.04	0.05	-0.02	0.02	0.19*	0.19*	0.02	-0.06	0.08	-0.01	0.13	0.08	-0.18	-0.30***	0.06	-0.22**	-0.08	0.01	0.22*	0.06	0.11	-0.14	-0.08	-0.08	0.01	-0.09	0.08	0.02	-0.17	-0.26**	-0.10	-0.18*	-0.07	-0.09	1.00										
38 q11_10_01_01ADJ	-0.10	0.15*	-0.04	-0.11	0.10	-0.04	0.02	0.12	0.03	0.12	0.07	-0.10	0.11	-0.10	-0.07	-0.06	0.10	-0.01	-0.15	-0.06	0.01	-0.06	0.17*	-0.02	-0.07	0.13	0.03	-0.10	0.04	0.00	0.01	0.08	0.01	-0.05	0.06	0.12	-0.04	1.00									
39 q11_10_02_01ADJ	0.14	-0.20**	0.04	-0.03	-0.08	0.06	-0.08	0.02	0.02	-0.21**	0.06	-0.03	-0.02	0.07	0.11	0.20*	0.02	0.14	0.01	0.07	-0.05	0.19**	-0.15	0.07	-0.05	0.02	-0.07	0.18**	-0.22**	0.18*	0.19*	0.03	0.14	0.10	0.19**	0.14	0.00	-0.03	1.00								
40 q11_12_00ADJ	0.06	-0.08	0.09	-0.																																											

Table 3: Correlation matrix (after imputation)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40							
1 q11_01_00_01	1.00																																														
2 q11_01_00_02	-0.00	1.00																																													
3 q11_01_00_03	-0.04	-0.06	1.00																																												
4 q11_01_00_05	0.09	0.05	-0.05	1.00																																											
5 q11_01_00_06	-0.04	-0.03	-0.03	0.47	1.00																																										
6 q11_01_00_07	-0.04	0.01	0.52	0.07	0.17	1.00																																									
7 q11_01_00_08	-0.04	0.05	-0.04	0.15	-0.03	-0.05	1.00																																								
8 q11_01_00_09	0.17	0.07	0.19	-0.05	-0.03	0.38	-0.03	1.00																																							
9 q11_01_00_10	-0.06	-0.11	0.11	0.05	0.13	0.24	-0.04	0.30	1.00																																						
10 q11_01_00_11	0.02	0.21	0.13	-0.03	-0.01	0.10	-0.01	0.18	0.22	1.00																																					
11 q11_01_00_12	0.07	0.04	0.09	-0.07	-0.05	0.08	-0.04	-0.05	0.15	0.25	1.00																																				
12 q11_01_00_13	0.04	0.11	0.19	0.11	0.08	0.16	-0.05	-0.06	0.00	0.15	0.54	1.00																																			
13 q11_01_00_14	-0.01	-0.05	-0.09	0.18	0.25	0.08	0.04	0.02	0.25	0.08	0.15	0.29	1.00																																		
14 q11_01_01	0.13	0.10	0.11	0.12	0.01	0.04	0.13	0.01	-0.08	0.07	-0.08	0.01	-0.01	1.00																																	
15 q11_02_00_01ADJ	0.06	-0.26	0.04	-0.01	0.09	0.05	0.03	0.09	0.09	-0.13	0.01	0.08	-0.01	-0.18	1.00																																
16 q11_02_00_02ADJ	0.10	-0.13	0.03	-0.12	-0.00	-0.04	0.05	0.02	0.07	0.03	0.08	-0.11	-0.20	-0.11	0.51	1.00																															
17 q11_03_00	0.02	-0.16	-0.08	0.22	0.28	0.01	0.05	-0.07	-0.03	0.02	-0.01	0.11	0.17	0.07	0.07	0.03	1.00																														
18 q11_03_01_01	-0.07	-0.14	-0.03	-0.07	0.01	-0.03	-0.06	-0.03	0.04	-0.03	-0.07	-0.01	0.10	-0.07	0.08	0.09	-0.04	1.00																													
19 q11_03_01_02	-0.07	-0.06	-0.04	-0.02	-0.04	-0.05	-0.14	-0.04	0.08	-0.19	-0.00	0.16	0.05	-0.11	0.14	-0.07	-0.14	0.36	1.00																												
20 q11_03_01_03	0.08	-0.04	0.02	0.24	0.05	-0.09	0.12	0.13	0.06	-0.00	-0.01	0.06	0.08	-0.03	0.08	0.04	0.21	0.17	0.32	1.00																											
21 q11_03_01_04	0.03	-0.08	-0.04	0.07	0.11	0.05	-0.03	0.09	-0.01	-0.02	0.06	0.07	0.09	0.01	0.08	0.00	-0.06	-0.11	0.00	0.00	1.00																										
22 q11_04_00	0.08	-0.20	0.03	0.12	0.07	-0.08	0.06	-0.12	0.07	-0.07	-0.11	-0.01	0.26	0.07	0.06	-0.03	0.02	-0.01	0.01	0.05	0.06	1.00																									
23 q11_04_01	0.05	0.17	0.06	-0.15	-0.07	-0.03	-0.06	0.02	0.02	0.18	0.05	-0.05	-0.19	0.06	-0.21	-0.06	-0.06	0.06	0.02	0.04	-0.11	-0.43	1.00																								
24 q11_06_00_01	0.03	0.08	-0.09	-0.12	-0.07	0.10	-0.07	0.20	0.01	-0.16	-0.12	-0.11	-0.08	0.06	0.11	0.05	-0.06	0.15	0.22	0.09	0.02	-0.30	-0.05	1.00																							
25 q11_06_00_02	0.01	0.20	-0.05	0.05	0.03	-0.02	-0.15	0.03	-0.05	0.14	0.08	0.07	-0.17	0.10	-0.12	-0.06	-0.07	0.07	0.16	0.01	0.06	-0.28	0.23	0.29	1.00																						
26 q11_06_00_03	0.03	0.06	-0.19	0.07	0.05	-0.17	-0.17	0.04	0.06	0.04	0.01	-0.07	0.02	0.02	-0.01	0.07	0.10	0.04	0.05	0.16	-0.04	-0.07	0.10	0.12	0.29	1.00																					
27 q11_06_00_04	-0.03	0.16	0.10	-0.20	-0.11	0.10	0.06	0.07	-0.25	-0.03	-0.04	0.05	-0.09	0.03	-0.09	0.02	-0.07	0.10	0.11	-0.04	-0.10	-0.28	0.20	0.23	0.33	0.35	1.00																				
28 q11_06_00_05	0.14	0.05	-0.16	-0.08	-0.08	0.03	-0.08	0.09	-0.01	-0.16	0.11	0.13	-0.09	-0.08	0.15	0.16	-0.03	0.01	0.20	-0.05	0.04	-0.15	-0.19	0.49	0.16	0.19	0.18	1.00																			
29 q11_07_00	0.00	0.15	0.11	-0.07	0.04	0.18	-0.11	-0.07	-0.11	0.25	0.09	0.16	-0.05	0.15	-0.07	-0.14	-0.02	-0.16	-0.14	-0.16	-0.17	-0.13	0.25	-0.16	0.14	-0.03	0.11	-0.06	1.00																		
30 q11_07_01ADJ	-0.07	-0.14	-0.17	0.04	0.06	0.01	0.07	0.08	0.13	-0.07	-0.01	0.10	0.16	-0.05	0.42	0.06	0.13	-0.14	0.02	0.10	-0.05	0.06	-0.11	0.01	0.04	-0.01	-0.09	-0.01	0.06	1.00																	
31 q11_07_01_01ADJ	0.08	-0.13	-0.42	0.03	-0.00	-0.13	0.03	0.10	0.04	-0.10	-0.09	-0.04	0.10	-0.05	0.14	0.25	0.08	0.10	-0.04	0.09	0.02	0.10	-0.05	0.01	-0.02	-0.01	-0.10	-0.02	-0.07	0.41	1.00																
32 q11_08_00	-0.06	-0.07	0.00	0.09	0.05	-0.01	0.01	-0.00	0.05	-0.10	0.07	0.05	0.03	0.03	0.04	0.03	-0.05	-0.06	0.03	-0.02	0.03	0.05	-0.07	-0.02	-0.00	0.04	0.05	0.06	-0.01	0.18	-0.01	1.00															
33 q11_09_00_01	0.07	-0.04	0.02	-0.05	-0.03	0.08	-0.03	-0.03	0.07	0.02	-0.08	-0.04	-0.01	-0.09	0.01	0.01	-0.08	0.07	0.04	-0.04	-0.03	0.09	-0.10	0.02	0.05	-0.02	-0.05	0.00	-0.16	0.12	0.03	0.15	1.00														
34 q11_09_00_02	-0.06	-0.15	-0.02	-0.01	-0.01	0.04	0.00	-0.10	0.02	0.11	0.06	0.14	0.09	0.08	0.08	-0.05	0.03	0.19	0.16	0.15	-0.00	0.06	-0.08	0.00	-0.03	-0.09	-0.12	-0.11	-0.14	0.11	0.07	0.21	0.46	1.00													
35 q11_09_00_03	0.19	-0.08	-0.12	-0.08	-0.04	-0.07	0.06	0.05	-0.10	-0.16	-0.11	-0.18	-0.08	0.09	0.02	-0.10	-0.15	0.06	0.01	0.01	0.00	0.05	-0.06	0.05	-0.04	0.03	-0.08	0.06	-0.31	0.10	0.14	0.14	0.43	0.37	1.00												
36 q11_09_00_04	0.03	-0.14	-0.08	0.14	0.14	0.03	-0.00	-0.02	0.06	-0.14	-0.01	-0.03	0.14	0.01	0.04	-0.08	-0.01	0.09	0.09	-0.01	-0.13	0.09	-0.04	-0.01	-0.14	0.08	-0.16	0.08	-0.19	0.14	0.04	0.18	0.32	0.42	0.41	1.00											
37 q11_09_00_05	0.20	0.08	-0.00	-0.04	-0.03	-0.02	0.09	0.11	0.03	0.07	0.12	0.03	0.05	0.07	-0.13	-0.19	-0.00	-0.18	-0.07	-0.03	0.18	0.01	0.17	-0.16	-0.04	-0.11	0.02	-0.12	0.14	0.01	-0.13	-0.22	-0.10	-0.14	-0.03	-0.14	1.00										
38 q11_10_01_01ADJ	-0.08	0.13	-0.02	-0.12	0.05	-0.05	0.01	0.12	0.04	0.11	0.08	-0.09	0.09	-0.09	-0.04	-0.04	0.05	-0.01	-0.15	-0.06	-0.02	-0.06	0.12	-0.02	-0.06	0.15	0.04	-0.09	0.04	0.06	0.04	0.10	0.02	-0.04	0.10	0.11	-0.13	1.00									
39 q11_10_02_01ADJ	0.13	-0.18	0.05	-0.03	-0.07	0.06	-0.08	0.01	0.04	-0.17	0.07	-0.05	-0.01	0.05	0.21	0.24	0.03	0.17	0.08	0.05	-0.01	0.18	-0.14	0.03	-0.05	0.00	-0.05	0.15	-0.18	0.18	0.23	0.07	0.13	0.07	0.15	0.11	-0.11	0.03	1.00								
40 q11_12_00ADJ	0.06	-0.07	0.09	-0.07	-0.13	0.06	0.14	-0.03</																																							

Table 4: Comparison of factor score means across two clusters

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
	Difficulty of forbearance & ease of court appeal	Availability of supervisory tools	Court involvement	Supervisory powers w.r.t. managers	Supervisory powers w.r.t. shareholders & preinsolvency phase
Group 0 (mean)	0.1357	0.4155	0.6372	1.4222	0.7850
Group 1 (mean)	0.4184	0.9610	0.3940	1.2979	1.0748
t-test (mean 0 - mean 1)	-4.7181	-9.6509	3.9595	2.9329	-6.2517
Pr(T > t)	0.0000	0.0000	0.0001	0.0039	0.0000

Source: Our own analysis based on World Bank (2013). Group 0 is identified as a court-led bank bankruptcy regime and Group 1 is identified as an administrative bank bankruptcy regime.

Table 5: Summary statistics, data description, and data sources for additional variables

Variable	Obs	<i>M</i>	<i>SD</i>	Min	Max	Database
creditor_rights	106	1.85	1.12	0	4	Creditor rights aggregate score, 2003. Djankov et al. (2007)
l_gdppc_2008	118	8.26	1.63	5.01	11.36	Log of GDP per capita in purchasing power terms in 2008 (World Dev. Indicators)
legal_origin_UK	124	0.31	0.46	0	1	UK Legal Origin (LaPorta et al., 2008)
legal_origin_FR	124	0.52	0.50	0	1	French Legal Origin (LaPorta et al., 2008)
legal_origin_GE	124	0.13	0.34	0	1	German Legal Origin (LaPorta et al., 2008)
legal_origin_SC	124	0.03	0.18	0	1	Scandinavian Legal Origin (LaPorta et al., 2008)
score_h	117	61.66	9.43	28.60	82.60	Economic freedom for 2012 (http://www.heritage.org/index/)
financial_freedom	119	77.46	12.04	39.80	99.90	http://www.heritage.org/index/ (for 2012)
monetary_freedom	118	74.12	9.80	0	86.20	http://www.heritage.org/index/ (for 2012)
government_effectiveness	124	0.10	0.93	-1.53	2.21	GE.EST; World Governance Index (2002–2012) from Kaufmann et al. (2010)
diversion_of_public_funds	112	3.64	1.22	1.59	6.51	EOSQ146; The Global Competitiveness Report (the most recent available)
absence_of_bribes	112	4.17	1.16	2.27	6.71	BRIBEIDX; The Global Competitiveness Report (the most recent available)
low_burden_of_government_regulation	112	3.22	0.57	1.90	4.57	EOSQ048; The Global Competitiveness Report (the most recent available)
rule_of_law	124	0.01	0.97	-1.69	1.95	RL.EST; World Governance Index (2002–2012) from Kaufmann et al. (2010)
property_rights	112	4.45	1.03	2.00	6.48	EOSQ051; The Global Competitiveness Report (the most recent available)
private_credit_gdp08_04	109	13.72	20.00	-37.11	99.35	Private credit to GDP in 2008 in 2004 U.S. dollars; GDPPC08; WorldBank: Global Financial Development 04–08 (Čihák et al. 2012)
fs_deposits_gdp08	114	51.66	46.87	4.71	394.6	Financial system deposits to GDP in 2008; GFDDDI08; WorldBank: Global Financial Development 04–08 (Čihák et al. 2012)
liquidity_support	124	1.86	5.51	0	42.34	Liquidity support (banking crisis 2008–); % of GDP (Laeven and Valencia, 2012)
recapitalization_costs	124	1.23	4.99	0	40.70	Recapitalization costs (banking crisis 2008–); % of GDP (Laeven and Valencia, 2012)
crisis_08	124	0.18	0.38	0	1	The presence of a banking crisis in 2008– (Laeven and Valencia, 2012)
output_loss	124	5.79	16.89	0	106.00	Output loss in a banking crisis in 2008– in % of GDP (Laeven and Valencia, 2012)
fiscal_costs	124	1.62	6.16	0	44.20	Fiscal costs in a banking crises in 2008– in % of GDP (Laeven and Valencia, 2012)

Table 6: The dimensions of bank bankruptcy regimes and probability, output loss, and fiscal costs of a crisis

	(1)	(2)	(3)	(4)	(5)	(6)
	crisis_08	output_loss	fiscal_costs	crisis_08	output_loss	fiscal_costs
l_gdppc_2008	0.657*** (2.83)	2.174*** (2.98)	0.601 (1.43)	0.830*** (3.25)	3.048*** (2.83)	0.770 (1.34)
private_credit_gdp08_04	0.0346*** (2.96)	0.556*** (3.26)	0.159** (2.27)	0.0424*** (3.42)	0.535*** (3.36)	0.151** (2.35)
fs_deposits_gdp08	-0.00227 (-0.42)	-0.0319 (-0.71)	-0.00727 (-0.47)	-0.00571 (-1.00)	-0.0566 (-1.22)	-0.0130 (-0.92)
group01	1.054* (2.51)	3.958 (1.54)	1.045 (0.86)			
Difficulty of forbearance & ease of court appeal				1.614** (2.36)	4.668 (1.61)	0.384 (0.36)
Availability of supervisory tools				0.980* (1.71)	1.628 (0.67)	1.099 (0.77)
Court involvement				0.431 (0.65)	6.564** (2.04)	1.838* (1.67)
Supervisory powers w.r.t. managers				0.985 (1.60)	9.136** (2.51)	2.427* (1.72)
Supervisory powers w.r.t. shareholders & preinsolvency phase				1.202** (2.02)	4.816 (0.83)	0.666 (0.26)
liquidity_support						
recapitalization_costs						
_cons	-7.937*** (-3.63)	-19.73*** (-3.62)	-5.567 (-1.54)	-12.84*** (-4.43)	-45.72*** (-3.09)	-11.64 (-1.44)
<i>N</i>	106	106	106	106	106	106
Estimation method	Probit	OLS	OLS	Probit	OLS	OLS
Adjusted R ² (pseudo R ² for probit)	0.479	0.439	0.255	0.566	0.446	0.239
chi2	26.56			29.68		
<i>p</i>	0.0000244			0.000241		

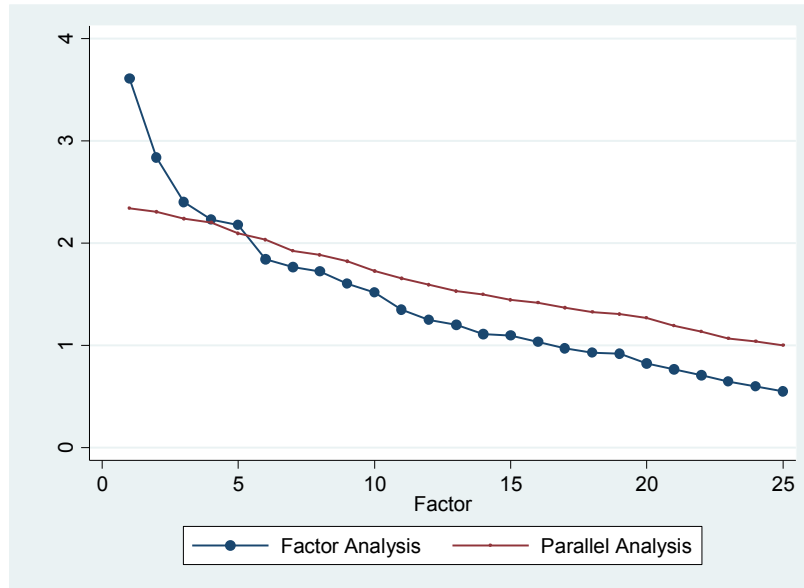
Notes: Dependent variables are crisis_08, output_loss, and fiscal_costs. Independent variables are the dimensions of bank bankruptcy frameworks (Difficulty of forbearance & ease of court appeal, Availability of supervisory tools, Court involvement, Supervisory powers w.r.t. managers, Supervisory powers w.r.t. shareholders & preinsolvency phase) and control variables are l_gdppc_2008, private_credit_gdp08_04, and fs_deposits_gdp08 (see Table 5 for definitions). *t* statistics are in parentheses. Robust standard errors are used. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Determinants that impact the type of bank bankruptcy framework: Probit analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
l_gdppc_2008	-0.14 (-1.58)	-0.16* (-1.74)	-0.16* (-1.66)	0.032 (0.28)	0.030 (0.27)	-0.071 (-0.78)	0.15 (0.81)	0.063 (0.52)	0.10 (0.69)	-0.11 (-1.26)	0.096 (0.65)	0.13 (1.05)
creditor_rights	-0.35*** (-2.84)	-0.32** (-2.43)	-0.32** (-2.33)	-0.39*** (-2.98)	-0.37*** (-2.87)	-0.40*** (-3.00)	-0.35*** (-2.68)	-0.34*** (-2.66)	-0.35*** (-2.71)	-0.38*** (-3.08)	-0.37*** (-2.86)	-0.38*** (-2.90)
legal_origin_UK		-0.35 (-1.11)										
legal_origin_FR			0.37 (1.10)									
legal_origin_GE			0.26 (0.58)									
legal_origin_SC			0.62 (0.66)									
score_h				-0.039** (-1.97)								
financial_freedom					-0.023** (-2.18)							
monetary_freedom						-0.028* (-1.80)						
government_effectiveness							-0.57* (-1.83)					
diversion_of_public_funds								-0.34* (-1.92)				
absence_of_bribes									-0.39* (-1.82)			
low_burden_of_government_regulation										-0.62** (-2.34)		
rule_of_law											-0.47* (-1.88)	
property_rights												-0.55** (-2.42)
_cons	2.31*** (2.99)	2.49*** (3.17)	2.15** (2.52)	3.34*** (3.32)	2.17*** (2.75)	3.90*** (3.00)	0.022 (0.02)	1.78** (2.26)	1.90** (2.38)	4.08*** (3.55)	0.42 (0.35)	2.49*** (3.06)
N	101	101	101	98	99	99	101	96	96	96	101	96
pseudo R ²	0.095	0.11	0.11	0.12	0.13	0.11	0.13	0.12	0.12	0.13	0.12	0.14
p (chi2)	0.0030	0.0054	0.024	0.0034	0.0030	0.0050	0.0038	0.0053	0.0046	0.00087	0.0031	0.0030

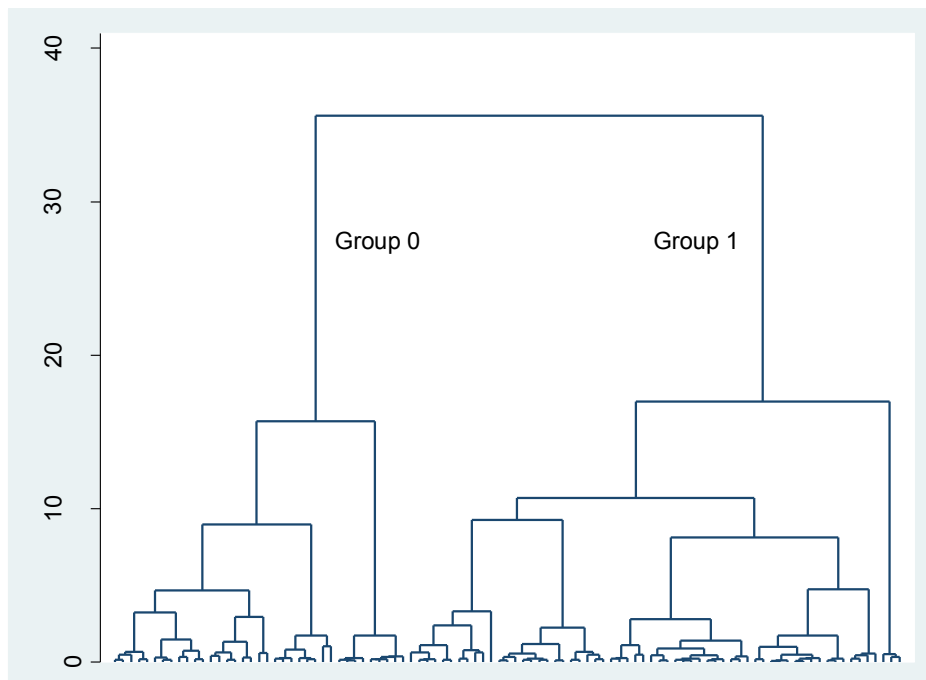
The dependent variable is cluster variable group01, which denotes the type of bank bankruptcy regime (i.e., group01 = 0 denotes a court-led bank bankruptcy regime and group01 = 1 denotes an administrative bank bankruptcy regime). Independent variables are defined in Table 5. *t* statistics are in parenthesis. Robust standard errors are used; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 1: Parallel analysis (based on Horn, 1965; Dinno, 2009) of the imputed data



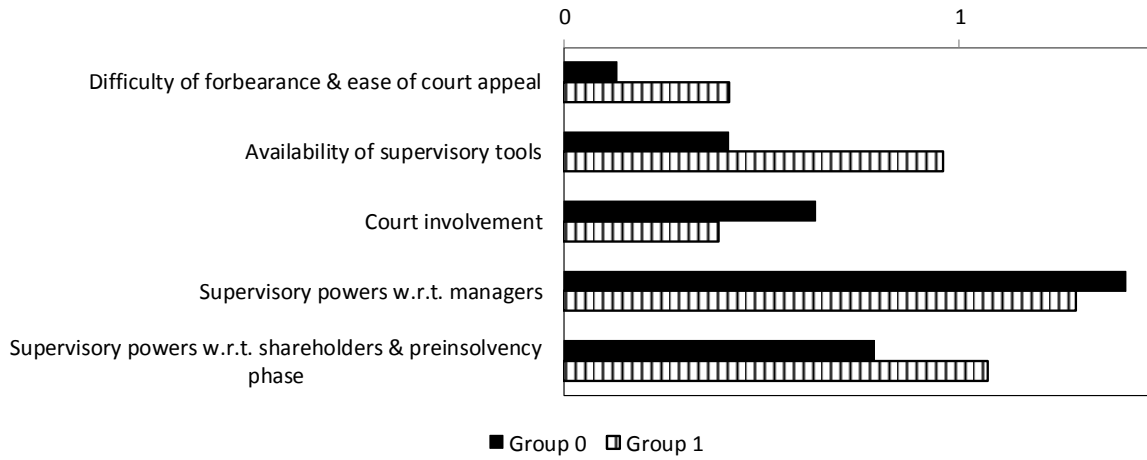
Source: Our own analysis based on World Bank (2013).

Figure 2: Dendrogram of cluster analysis (Ward method) based on oblique factors



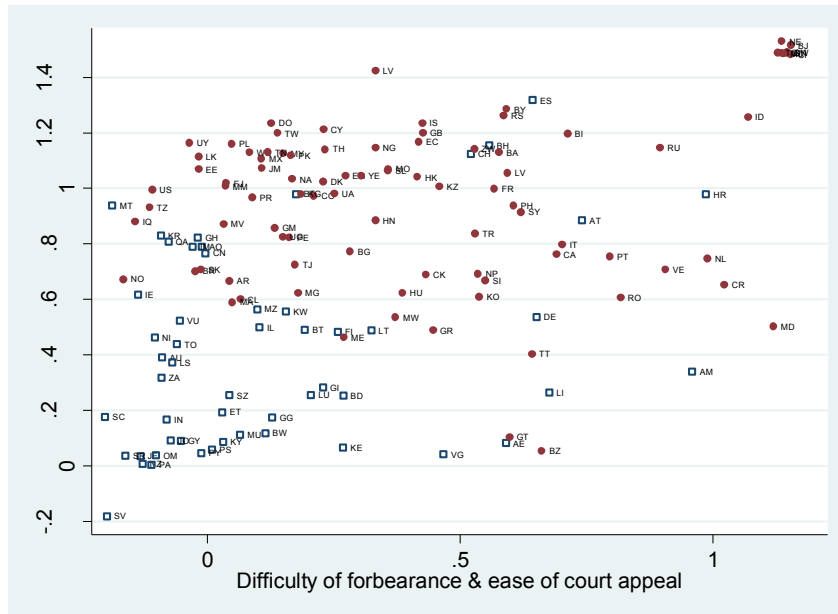
Source: Our own analysis based on World Bank (2013). Group 0 is identified as a court-led bank bankruptcy regime and Group 1 is identified as an administrative bank bankruptcy regime.

Figure 3: Means of factor scores across two groups defined by cluster analysis



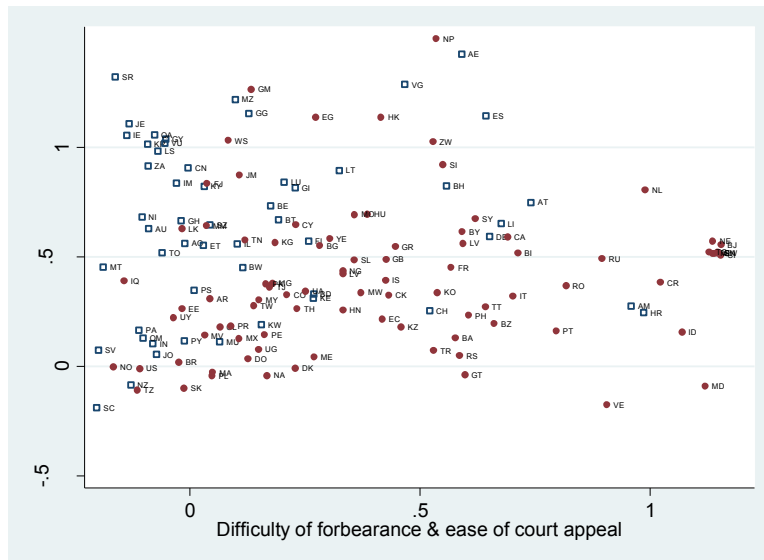
Source: Our own analysis based on World Bank (2013). Group 0 is identified as a court-led bank bankruptcy regime and Group 1 is identified as an administrative bank bankruptcy regime.

Figure 4: Factor scores of countries (Availability of supervisory tools vs. Difficulty of forbearance & ease of court appeal)



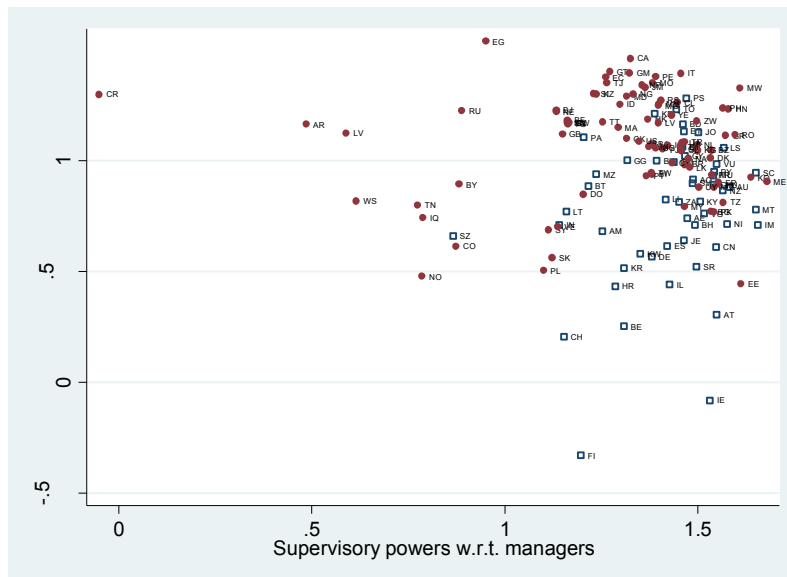
Source: Our own analysis based on World Bank (2013). Squares are court-led bank bankruptcy regimes (group01 = 0). Dots denote administrative-based bank bankruptcy regimes (group01 = 1).

Figure 5: Factor scores of countries (Court involvement vs. Difficulty of forbearance & ease of court appeal)



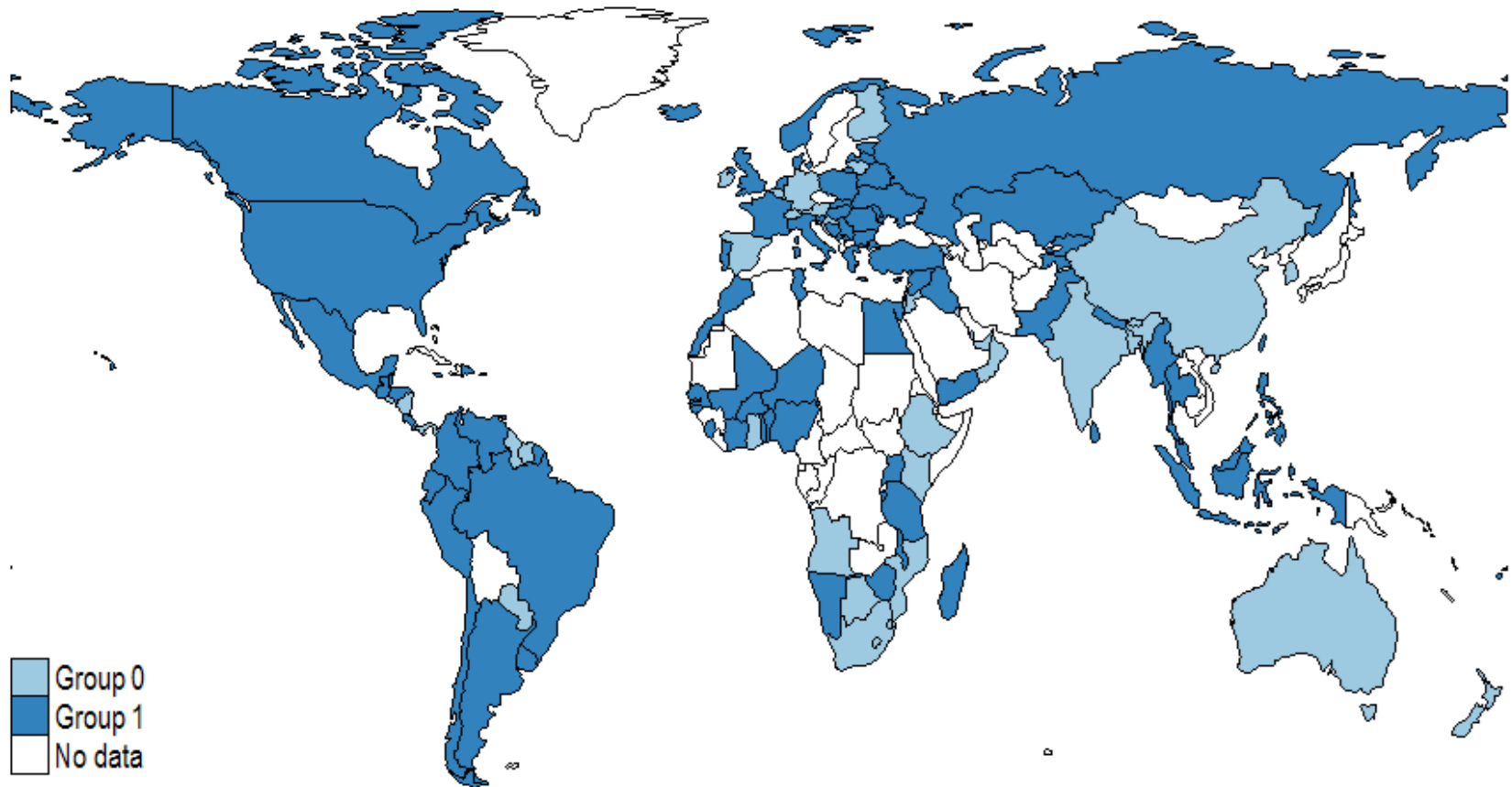
Source: Our own analysis based on World Bank (2013). Squares are court-led bank bankruptcy regimes (group01 = 0). Dots denote administrative-based bank bankruptcy regimes (group01 = 1).

Figure 6: Factor scores of countries (Supervisory powers w.r.t. shareholders & preinsolvency phase vs. Supervisory powers w.r.t. managers)



Source: Our own analysis based on World Bank (2013). Squares are court-led bank bankruptcy regimes (group01 = 0). Dots denote administrative-based bank bankruptcy regimes (group01 = 1).

Figure 7: Geographic representation of countries w.r.t. the cluster variable group01 denoting the type of bank bankruptcy regime



Source: Our own analysis based on World Bank (2013). Group 0 is identified as a court-led bank bankruptcy regime and Group 1 is identified as an administrative bank bankruptcy regime.