

Banking on the principles: Compliance with Basel Core Principles and bank soundness[☆]

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Abstract

This study finds that banks receive more favorable Moody's financial strength ratings in countries with better compliance with Basel Core Principles related to information provision. The results are robust to controlling for broad indexes of institutional quality, macroeconomic variables, sovereign ratings, and reverse causality. Compliance with other Core Principles does not affect ratings robustly. Measuring bank soundness through Z-scores yields broadly similar results for advanced and emerging markets. Countries aiming to upgrade banking regulation and supervision should consider giving priority to information provision over other elements of the core principles.

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1. Introduction

With increasing deregulation and globalization beginning in the 1980s, banking systems have become more fragile and banking crises have proliferated, causing or aggravating economic

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downturns and leading to significant fiscal costs (Caprio and Klingebiel, 1996). To improve crisis prevention and management, many countries are working to upgrade their bank regulation and supervision. This is a complex and difficult process, particularly in developing countries, where the required expertise may be scarce, the legal environment weak, and governance problems may lead to regulatory capture. But what exactly is good regulation and supervision? How can countries do it with limited resources? What should reforms focus on?

To answer the first question, in 1997 a group of representatives of bank supervisors from advanced countries—the Basel Committee on Banking Supervision—issued the Core Principles for Effective Bank Supervision (BCPs), a document summarizing best practices in the field (Table 1).¹ Most countries in the world have endorsed the BCPs and have undertaken to comply with them, making them an almost universal standard for bank regulators. Since 1999, the IMF and the World Bank have conducted evaluations of member countries' compliance with this standard, mainly within their joint Financial Sector Assessment Program (FSAP).² These assessments provide a unique source of information about the quality of supervision and regulation around the world.

This paper relies on assessments of compliance with the BCPs to study whether better banking supervision and regulation is associated with sounder banks. In addition, we look at which elements of the regulatory framework are most closely related to soundness. The goal is to shed light on how to prioritize efforts to improve supervision.

BCP compliance ratings have several advantages as measures of the quality of banking supervision and regulation. First, the BCPs are accepted as the blueprint of good supervision and regulation worldwide. Second, the assessment takes into account not only which laws and regulations are on the books, but also the extent to which they are implemented in practice. This is an important distinction. Third, separate compliance assessments are available for the 25 core principles, so that it is possible to separate out different aspects of supervision. The measure is only on a four-point scale, but to cut finer distinctions would likely be unrealistic. Because the evaluation reflects the judgment of the assessors, it inevitably contains an element of subjectivity. To limit subjectivity and ensure cross-country comparability, the Basel Committee has developed a standardized methodology.³ In addition, evaluations are conducted by expert supervisors from foreign countries and reviewed by internal teams at the IMF and the World Bank. In any case, to the extent that measurement error is independent of bank soundness, it should not bias our results.

We measure bank soundness using Moody's financial strength ratings. This is a comprehensive measure of the ability of a bank to meet its obligations to depositors and other creditors as viewed by specialized analysts. To the extent that Moody's analysts have access to both quantitative and qualitative information about banks and their operating environment, ratings should be a more accurate measure of bank soundness than indicators built using only balance sheet vari-

¹ The countries represented on the committee are Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The committee consults widely with supervisors from non-member countries.

² FSAPs are a comprehensive evaluation of the financial sector and include assessments of compliance with several standards and codes. Many FSAPs are published and available on the IMF and World Bank websites.

³ The assessment methodology was first published by the Basel Committee in 1999 and was revised in April 2006.

Table 1

Basel Core Principles—Definitions

Chapter 1: Preconditions For Effective Banking Supervision

Principle 1. Objectives, autonomy, powers, and resources.

Principle 1(1). There should be clear responsibilities and objectives set by legislations for each supervisory agency.

Principle 1(2). Each supervisory agency should possess adequate resources to meet the objective set, provided on terms that do not undermine the autonomy, integrity and independence of supervisory agency.

Principle 1(3). A suitable framework of banking laws, setting bank minimum standard, including provisions related to authorization of banking establishments and their supervision.

Principle 1(4). The legal framework should provide power to address compliance with laws as well as safety and soundness concerns.

Principle 1(5). The legal framework should provide protection of supervisors for actions taken in good faith in the course of performing supervisory duties.

Principle 1(6). There should be arrangements of interagency cooperation, including with foreign supervisors, for sharing information and protecting the confidentiality of such information.

Chapter 2: Licensing and Structure

Principle 2. Definition of permissible activities.

Principle 3. Right to set licensing criteria and reject applications for establishments that do meet the standard sets.

Principle 4. Authority to review and reject proposals of significant ownership changes.

Principle 5. Authority to establish criteria for reviewing major acquisitions or investments.

Chapter 3: Prudential Regulations and Requirements

Principle 6. Prudent and appropriate risk adjusted capital adequacy ratios must be set.

Principle 7. Supervisors should evaluate banks' credit policies.

Principle 8. Banks should adhere to adequate loan evaluation and loan-loss provisioning policies.

Principle 9. Supervisors should set limits to restrict large exposures, and concentration in bank portfolios should be identifiable.

Principle 10. Supervisors must have in place requirements to mitigate the risks associated with related lending.

Principle 11. Policies must be in place to identify, monitor and control country risks, and to maintain reserves against such risks.

Principle 12. Systems must be in place to accurately measure, monitor and adequately control markets risks and supervisors should have powers to impose limits or capital charge on such exposures.

Principle 13. Banks must have in place a comprehensive risk management process to identify, measure, monitor and control all other material risks and, if needed, hold capital against such risks.

Principle 14. Banks should have internal control and audit systems in place.

Principle 15. Adequate policies, practices and procedures should be in place to promote high ethical and professional standards and prevent the bank being used by criminal elements.

Chapter 4: Methods of On-Going Supervision

Principle 16. An effective supervisory system should consist of on-site and off-site supervision.

Principle 17. Supervisors should have regular contact with bank management.

Principle 18. Supervisors must have a means of collecting, reviewing and analyzing prudential reports and statistics returns from banks on a solo and consolidated basis.

Principle 19. Supervisors must have a means of independent validation of supervisory information either through on-site examinations or use of external auditors.

Principle 20. Supervisors must have the ability to supervise banking groups on a consolidated basis.

Chapter 5: Information Requirements

Principle 21. Each bank must maintain adequate records that enable the supervisor to obtain a true and fair view of the financial condition of the bank of the bank, and must publish on a regular basis financial statements that fairly reflect its condition.

Chapter 6: Formal Powers of Supervisors

Principle 22. Adequate supervisory measures must be in place to bring about corrective action when banks fail to meet prudential requirement when there are regulatory violations, or when depositors are threatened in any other way. This should include the ability to revoke the banking license or recommend its revocation.

(continued on next page)

Table 1 (continued)

Chapter 7: Cross-Border Banking

Principle 23. Supervisors must practice global consolidated supervision over internationally active banks, adequately monitor and apply prudential norms to all aspects of the business conducted by these banks.

Principle 24. Consolidated supervision should include establishing contact and information exchange with the various supervisors involved, primarily host country supervisory authorities.

Principle 25. Supervisors must require the local operations of foreign banks to be conducted at the same standards as required of domestic institutions, and must have powers to share information needed by the home country supervisors of those banks.

Source: Basel Committee on Banking Supervision (1997).

ables (such as reported nonperforming loans, profitability, or Z-scores).⁴ Another advantage of Moody's ratings is that they evaluate bank solvency independent of the safety net, so that cross-country differences in the safety net, which are difficult to observe and measure, should not affect the results. A limitation of using Moody's ratings is that smaller banks and banks from lower income countries are not rated and cannot be included in the sample. To address this limitation, we also repeat our analysis using a different measure of risk, the Z-score, which is available for a broader sample of banks and countries.

Because data to date on BCP compliance are available only at one point in time, our study cannot rely on time series variation. This limitation forces us to be very careful in controlling for other potential sources of cross-sectional variation as well as joint endogeneity, although we acknowledge that such concerns can never be fully laid to rest. One important problem is that the BCP compliance indicator may be associated with bank soundness because it proxies for the overall quality of the institutional and macroeconomic environment, so we perform extensive robustness tests controlling for broad indexes of institutional quality, macroeconomic variables, and sovereign credit ratings.

A second concern is the endogeneity of supervision. The level of compliance with the BCPs is chosen by the countries themselves, and countries with sounder banks may face less opposition in enacting more rigorous supervision than countries with distressed banks.⁵ On the other hand, it can also be argued that countries that have experienced episodes of distress, and whose banks are still weak, may have the strongest incentives to upgrade their supervisory capacity. So in principle the endogeneity of supervision may bias the relationship with soundness in either direction. To take endogeneity into account, we resort to instrumental variables estimation.

We find that an index of overall compliance with the BCPs is positively correlated with bank soundness as measured by Moody's ratings after controlling for institutional quality, the macroe-

⁴ In support of this view, Sironi (2003) finds that credit ratings outperform the balance sheet variable in predicting spreads on bank subordinated notes and debentures in Europe. Other studies have shown that changes in credit ratings cause changes in equity prices of banks in the United States (Schweitzer et al., 1992; Billet et al., 1998) and in Europe (Gropp and Richards, 2001), indicating that rating agencies are believed by the market to have superior information. In emerging markets, however, this does not seem to be the case (Richards and Deddouche, 1999). Rating agencies have been faulted for failing to give advance warnings of bank fragility before the East Asia crisis. Our testing strategy does not rely on the suitability of ratings as early warning signals.

⁵ Another source of endogeneity bias might be that assessors may unconsciously tend to give higher compliance ratings to countries whose banks are known to be financially sound. This type of perception bias which is called the "halo effect," occurs when survey respondents respond more favorably to questions about richer countries, as explained in Glaeser et al. (2004).

conomic environment, and bank characteristics. However, this relationship is not very robust. When we distinguish among groups of BCPs, on the other hand, we find a very robust positive relationship between compliance with information provision (BCP No. 21) and bank soundness. More specifically, countries where banks have to regularly and accurately report their financial data to regulators and market participants have sounder banks. This result holds even after we perform numerous sensitivity tests, including controlling for joint endogeneity of soundness and compliance through instrumental variables, and when we measure bank soundness using Z-scores.⁶

Using the Z-score as a measure of bank risk allows us to extend the sample to include non-rated banks. In this broader sample, we find a positive relationship between bank soundness and compliance with information provision, but the relationship weakens once we include low income countries in the sample.

The paper is organized as follows: the next section contains a review of the related literature. Section 3 presents the methodology and data. Section 4 describes the empirical results. Section 5 concludes.

2. Literature review

In their empirical studies of bank crisis determinants, [Demirgüç-Kunt and Detragiache \(1998, 2002\)](#) find that countries with better institutions are less likely to experience banking crises and are less affected by moral hazard due to deposit insurance. They interpret institutional variables such as rule of law and quality of bureaucracy as proxies for supervision and regulation, but do not include direct measures of this dimension, which were not available at the time.

[Barth et al. \(2001\)](#) assembled the first extensive cross-country database on the characteristics of the supervisory and regulatory framework. The data come from a survey of bank supervisors, and measure the presence or absence of a series of regulatory features. In the first comprehensive theoretical and empirical study of alternative approaches to bank supervision, [Barth et al. \(2004\)](#) find that regulatory and supervisory practices that force accurate information disclosure, empower private sector monitoring of banks, and foster incentives for private agents to exert corporate control work best to promote bank performance and stability. Specifically, in a cross-country setting they show that regulatory and supervisory regimes with these features have suffered fewer crises in the past two decades, have lower non-performing loans, and have deeper credit markets.

One limitation of this study is that survey information reflects whether laws or regulations are on the books, but not to what extent they are implemented in practice. Judging from FSAP reports, implementation is a serious concern in many countries. BCP compliance assessments allow us to better capture this important dimension, at least to the extent the assessors are able to evaluate it. Another difference between our approach and that of Barth, Caprio, and Levine, is that we use bank ratings as measures of bank soundness in cross-sectional regressions, while they use the occurrence of systemic banking crises and non-performing loans. Because systemic crises are rare events, in the analysis by [Barth et al. \(2001\)](#) crises predate information on bank regulation

⁶ A narrower interpretation of our results is that better compliance with information provision results in more favorable ratings for banks even if it is not associated to more soundness. For this to be the case, there must be a systematic bias of rating agencies in favor of banks from countries with better compliance. Using a non-subjective measure of bank risk, the Z-score, in robustness tests helps us shed light on this issue.

and supervision which is available only for the end of the sample period. To the extent that bank regulation and supervision may have evolved over the sample, the relationships identified may not be accurate. Nonperforming loans do not suffer from this problem, but are difficult to compare across countries, since rules for classifying loans as nonperforming are not uniform (Barth et al., 2006). On the other hand, an advantage of the latter's survey data is that it does not rely on the subjective views of compliance assessors.

Three papers to date have used information on BCP compliance to study bank performance: Sundararajan et al. (2001) uses a sample of 25 countries to examine the relationship between an overall index of BCP compliance and non-performing loans (NPLs) and loan spreads. They found BCP compliance not to be a significant determinant of soundness. Podpiera (2004) extends the set of countries and finds that better BCP compliance lowers NPLs. Das et al. (2005) relates bank soundness to a broader concept of regulatory governance, which encompasses both compliance with the BCPs and with standards and codes for monetary and financial policies. Better regulatory governance is found to be associated with sounder banks, particularly in countries with better institutions.

We claim that bank ratings are a more accurate measure of bank soundness across countries than those utilized in previous studies, namely NPLs, loan spreads, interest margins, and capital adequacy. Because different countries have different reporting rules, NPLs are notoriously difficult to compare across countries, as already discussed. On the other hand, loan spreads or interest margins, and capitalization are affected by a variety of forces other than fragility, such as market structure, differences in risk-free interest rates and operating costs, and varying capital regulation. Thus, we believe our work improves upon existing studies by using a more accurate measure of bank soundness.

Another departure from existing studies is that we conduct much more extensive robustness tests to separate out the effects of banking regulation from those of other country characteristics, such as institutional quality and macroeconomic performance. Finally, and perhaps most importantly in light of the results, our work is the first to explore how compliance with different components of the BCPs affects soundness.

Our study is also related to the growing literature on transparency in financial markets. Patel et al. (2002) compare transparency and disclosure in emerging markets corporations. Mitton (2002) argues that transparency helps weather financial crises, as East Asian companies with auditors from major international accounting firms were found to have better stock performance after the crisis of 1997–1998. Glennerster and Shin (2004) shows that countries that disclose more information to the IMF and the markets are rewarded through lower borrowing costs. More transparency also attracts more foreign portfolio investment (Gelos and Wei, 2004). Yu (2005) finds that better disclosure lower corporate credit spreads, particularly for short-term bonds. Perotti and Von Thadden (2005) study how the presence of a dominant investor affects a firm decision of how much to disclose. On the issue of transparency, this result makes a lot of sense and is similar to one found in the corporate bond/credit spreads literature. Another recent theoretical study is Feltenstein and Lagunoff (2005), which takes up the question of whether bank information disclosure should be voluntary, verified by a national auditor (such as a central bank), or by an international auditor (such as an international institution). The finding is that an international auditor is the best institutional setup.

3. Methodology and data

3.1. Basic econometric model

The dependent variable is the bank's financial strength rating by Moody's, and the explanatory variable of interest is the country's BCP compliance score. The latter is available only at one point in time, so the empirical model is a cross-sectional one. The regression equations we estimate are of the form:

$$Y_{ij} = \alpha + \beta_1 X_j^1 + \beta_2 X_{ij}^2 + \beta_3 X_j^3 + \varepsilon_{ij}, \quad (1)$$

where the subscript j denotes the country and the subscript i denotes the bank. Y_{ij} is the financial strength rating, X_j^1 is the BCP compliance score, X_{ij}^2 is a vector of bank characteristics, X_j^3 is a vector of country characteristics, and ε_{ij} is a random disturbance.

Moody's rates banks' financial strength on a 15-point scale, ranging from E– (least sound) to A+ (most sound). Since this is a limited dependent variable, we estimated the baseline specification using an ordered probit econometric model. In a robustness test, we transform the ratings in a numerical index (ranging from 1 to 15) and estimate an OLS model. Standard errors are clustered by country to allow for correlated residuals within each country.

The variable of interest is X_j^1 , is the BCP compliance score. The data come from IMF and the World Bank BCP assessments conducted from 1999 to 2003.⁷ Assessors rate compliance with each of the 25 principles using a four-point scale: non compliant, materially non compliant, largely compliant, and compliant. We assign numerical values to each of these ratings from 0 (non-compliant) to 3 (compliant). To obtain an overall index of compliance, we sum the numerical ratings for all the principles, and standardize the sum to obtain an index that varies between zero and one.

To differentiate among the various dimensions of regulation and supervision, we also compute aggregate compliance indexes for each of the subgroups of principles following the grouping by chapters used by the Basel Committee (see Table 1 and Appendix A). Also in this case, we sum the numerical ratings for each principle and divide by the total to obtain subindexes varying from 0 to 1. Compliance for each chapter is used as an alternative variable of interest. In a robustness test, we also compute an alternative index of overall BCP compliance as the percentage of principle for which the country is rated compliant. This index should not be affected by the presence of nonlinearities in the assessment process.

The first set of control variables includes various bank characteristics that might affect financial strength: size, measured by the logarithm of bank assets; profitability, measured alternatively as return on assets or return on equity; capitalization, measured as the ratio of equity to total assets; and the ratio of bank loans to total assets. These data come from the Fitch's Bankscope database. We also control for whether the bank is owned by the government or by foreigners and for whether the bank is not a commercial bank. Information about bank ownership is obtained from Bankscope and other miscellaneous sources. Banks are considered state-owned if the government has a controlling share or is the sole owner, and similarly for foreign-owned banks.⁸

⁷ Some assessments are publicly available through the IMF and World Bank websites. A number of them, however, are kept confidential by the country's authorities.

⁸ The sample includes a few mutual banks, investment houses, and similar institutions. Excluding non-commercial banks does not change the results.

A second group of control variables captures the overall quality of the institutions in the country. Combining information from a variety of available indexes, Kaufman et al. (2003) create various broad measures of perception of institutional quality which have been widely used in empirical studies. In our baseline specification, we use an index capturing the extent to which the rule of law is respected. This index is strongly correlated with other institutional indexes from the same source, such as lack of corruption, contract enforcement, etc., and we obtain similar results using these alternative indexes, an average of the indexes, or GDP per capita.

Bank soundness is also affected by the macroeconomic outlook, as slow output growth, high inflation, a depreciating currency, high real interest rates, and rapid credit expansion have been found to be associated with bank instability (see, for instance, Demirgüç-Kunt and Detragiache, 1998). Thus, in robustness tests we employ various combination of these macroeconomic variables in alternative specifications. We also use S&P's sovereign rating as a comprehensive indicator of the quality of macroeconomic policies and institutions which might affect bank stability in a country. Macroeconomic variables are mainly from the IMF's International Financial Statistics. Detailed variable definitions and sources are reported in Table B.1 in the appendix.

Moody's ratings dates are matched with the dates of BCP assessment, and therefore range from 1999 to 2003. All bank level and country level control variables are measured in the same year as Moody's rating.

The final sample covers 39 countries and 203 banks (Table 2).⁹ Not surprisingly, coverage is best for developed countries and emerging markets, while low income countries are not represented. Some countries have only one or two banks in the sample, but since we are not relying on intra-country variation to identify the relationship of interest this should not be a major limitation. In a robustness test, we extend the sample to banks that do not receive a rating and measure risk using Z-scores.

3.2. A first look at the data

Fig. 1 shows the overall compliance index by region and level of development. As expected, advanced countries have the highest compliance. Among the other countries, East Asia and Sub-Saharan Africa are closer to meeting the Basel standards, while South Asia, the Middle East and North Africa and Latin America lag behind. If we examine subgroups of chapters, the highest compliance is with principles concerning the licensing of banks and the structure of the banking market (Fig. 2). At the other extreme, principles regarding the formal powers of supervisors were implemented to the least degree. Differences in compliance are not very large across different categories of principles, but averages across countries may hide larger discrepancies within each country.

Table 3 presents correlations about compliance levels in different subgroups of chapters. Compliance levels are all significantly and positively correlated. The strongest correlation (over 80 percent) is between compliance with principles concerning prudential regulation and those concerning methods of ongoing supervision. Other correlations are considerably weaker, even falling below 50 percent in the case of principles regarding the formal powers of supervisors. All in all, these correlations suggest that there is enough variation in compliance across chapters to investigate the effect of various aspects of supervision separately.

⁹ The BCP assessment data covers 67 countries, but only 39 of these countries have banks large enough to receive a rating from Moody's.

Table 2
Descriptive statistics by country

Countries	Sovereign rating	GDP per capita	Rule of law	Growth	Depreciation	Avg. bank rating	ROAA	ROAE	NLTA	ETA	LogTA	No. of banks	Foreign-owned	State-owned
Bahrain	0.56	10591	0.86	0.01	0.00	0.44	1.5	14.2	37.4	10.3	16.3	3	0	1
Brazil	0.19	4580	−0.19	0.01	0.20	0.37	2.1	24.6	27.1	8.9	15.2	10	4	2
Bulgaria	0.38	1541	−0.09	0.04	0.88	0.25	1.6	14.2	52.4	12.2	12.0	4	1	0
Canada	1.00	22745	1.89	0.03	0.02	0.67	0.5	9.4	54.3	5.3	17.0	3	0	0
Colombia	0.31	2278	−0.63	0.01	0.11	0.36	−0.2	−4.3	56.0	14.5	7.4	3	1	0
Croatia	0.44	5023	−0.07	0.04	0.10	0.40	1.1	11.8	35.0	7.9	13.3	1	0	0
Czech Rep.	0.75	5387	0.64	0.00	0.08	0.37	1.1	14.9	38.1	7.2	11.5	2	2	0
Egypt	0.38	1211	0.18	0.03	0.00	0.32	0.8	12.8	51.4	5.5	14.5	6	1	5
Estonia	0.75	3787	0.60	0.06	0.08	0.44	2.3	16.9	59.3	12.5	11.2	3	2	0
Finland	1.00	31222	2.04	0.03	–	0.67	0.5	10.8	59.0	4.6	16.1	3	0	0
France	1.00	29935	1.46	0.02	–	0.64	0.5	8.0	32.3	5.6	17.4	14	1	0
Hong Kong	0.75	24483	1.58	0.02	0.00	0.45	1.2	11.7	51.6	11.0	13.6	5	0	0
Hungary	0.75	5368	0.79	0.04	0.13	0.49	2.8	21.9	51.3	14.3	9.6	3	1	0
India	0.44	465	0.13	0.04	0.09	0.33	0.9	17.7	45.9	5.2	12.7	5	0	4
Indonesia	0.13	1010	−0.75	0.02	0.34	0.22	−1.4	28.5	29.5	9.4	6.7	5	0	1
Ireland	1.00	27466	1.77	0.08	–	0.47	0.3	6.6	20.4	3.6	15.3	4	0	0
Israel	0.69	17254	1.06	0.01	0.06	0.48	0.4	6.1	57.6	5.9	15.5	5	0	2
Japan	1.00	44459	1.62	0.01	0.02	0.30	−0.3	−16.8	65.0	4.6	13.0	23	0	1
Kazakhstan	0.44	1552	−0.79	0.06	0.18	0.24	2.0	16.3	57.9	10.9	8.0	9	0	0
Korea, Rep. of	0.63	12962	0.78	0.04	0.08	0.29	0.4	6.0	64.3	4.8	10.1	7	0	1
Kuwait	0.69	12392	0.94	−0.03	0.01	0.44	1.9	18.0	39.9	12.3	16.9	6	1	0
Latvia	0.69	2620	0.24	0.07	0.02	0.33	1.2	12.6	61.7	9.6	13.8	2	0	1
Mauritius	0.50	4198	0.85	0.04	0.08	0.37	2.2	19.9	70.3	11.2	10.9	2	0	0
Mexico	0.56	3720	−0.27	0.04	0.08	0.47	0.6	8.3	62.8	8.8	14.9	3	1	0
Morocco	0.38	1394	0.29	0.02	0.05	0.42	1.0	9.3	50.1	10.6	12.5	3	1	0
Peru	0.25	2314	−0.43	0.02	0.09	0.33	0.3	3.3	52.1	9.7	13.9	2	1	0
Philippines	0.19	1163	−0.29	0.01	0.12	0.29	1.4	25.5	49.7	11.4	11.3	6	0	2
Poland	0.69	3643	0.57	0.04	0.08	0.28	−0.8	−18.2	54.6	8.5	13.9	7	2	1
Russian Fed.	0.44	2905	−0.80	0.04	0.50	0.21	1.8	13.7	48.9	17.0	10.7	11	0	2
Slovakia	0.69	4293	0.24	0.04	0.09	0.33	0.5	16.3	29.5	5.8	10.4	2	2	0
Slovenia	0.81	11641	0.84	0.04	0.14	0.43	−1.1	−12.3	44.6	9.9	8.8	2	1	1
South Africa	0.56	3913	0.26	0.00	0.14	0.53	1.0	15.3	72.9	5.2	14.5	2	1	0

(continued on next page)

Table 2 (continued)

Countries	Sovereign rating	GDP per capita	Rule of law	Growth	Depreciation	Avg. bank rating	ROAA	ROAE	NLTA	ETA	LogTA	No. of banks	Foreign-owned	State-owned
Sweden	1.00	32523	1.94	0.03	0.01	0.73	−0.1	−1.5	43.6	4.6	15.7	1	0	0
Thailand	0.56	2805	0.40	0.01	0.10	0.26	−1.2	−46.0	67.0	4.5	12.6	7	1	0
Turkey	0.19	2903	0.07	0.00	0.72	0.36	0.3	−2.8	29.8	12.3	15.5	8	1	0
Ukraine	0.19	891	−0.72	0.04	0.26	0.20	1.5	15.9	55.1	8.6	12.1	1	0	0
United Arab Em.	0.75	18409	1.10	0.01	0.00	0.47	2.5	16.2	64.4	15.8	14.0	4	0	2
UK	1.00	22164	1.91	0.03	0.01	0.63	0.7	11.9	58.3	7.0	16.6	13	2	0
Average/total	0.63	13843	0.63	0.02	0.15	0.39	0.8	6.1	50.9	8.6	13.4	203	28	27

Table 3
Correlations between BCP chapters

	Overall index	Preconditions effective supervision	Licensing and structure	Prudential regulations and requirements	Methods of ongoing supervision	Information requirements	Formal powers of supervisors	Cross-border banking
Overall index	1.00							
Preconditions effective supervision	0.77 <i>0.00</i>	1.00						
Licensing and structure	0.78 <i>0.00</i>	0.65 <i>0.00</i>	1.00					
Prudential regulations and requirements	0.94 <i>0.00</i>	0.64 <i>0.00</i>	0.71 <i>0.00</i>	1.00				
Methods of ongoing supervision	0.90 <i>0.00</i>	0.60 <i>0.00</i>	0.63 <i>0.00</i>	0.84 <i>0.00</i>	1.00			
Information requirements	0.77 <i>0.00</i>	0.61 <i>0.00</i>	0.58 <i>0.00</i>	0.67 <i>0.00</i>	0.77 <i>0.00</i>	1.00		
Formal powers of supervisors	0.61 <i>0.00</i>	0.57 <i>0.00</i>	0.47 <i>0.00</i>	0.51 <i>0.00</i>	0.46 <i>0.00</i>	0.43 <i>0.00</i>	1.00	
Cross-border banking	0.83 <i>0.00</i>	0.71 <i>0.00</i>	0.64 <i>0.00</i>	0.69 <i>0.00</i>	0.69 <i>0.00</i>	0.64 <i>0.00</i>	0.48 <i>0.00</i>	1.00

Note: *p*-values in italics.

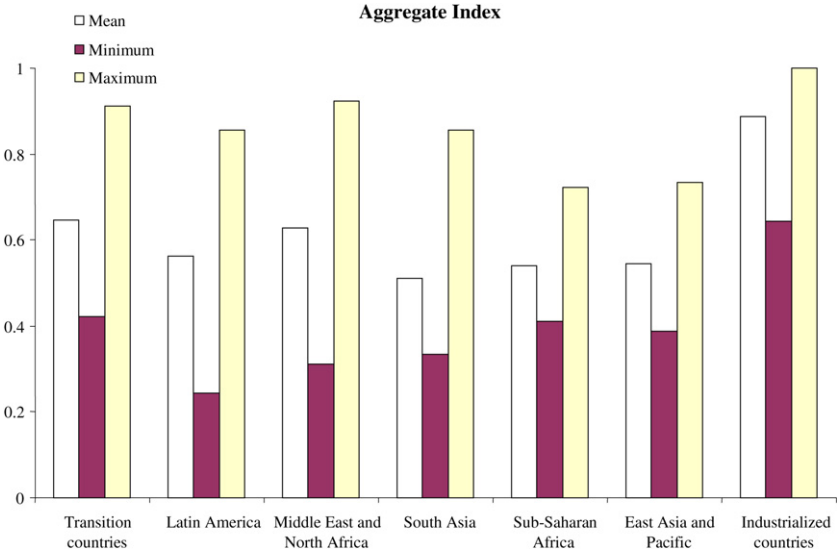


Fig. 1. Compliance with the BCPs (by region).

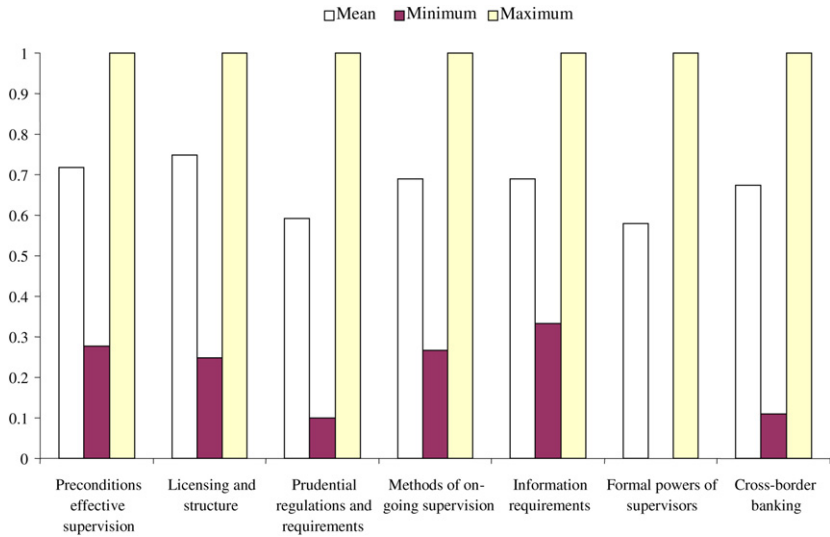


Fig. 2. Average compliance with the BCPs (by chapter).

Turning now to bank ratings, Table 4 presents correlations between ratings and bank level variables. There is a strong positive correlation between bank size and bank soundness, as larger, better diversified banks are seen as more stable. This correlation may be partly driven by the fact that larger banks tend to be located in more advanced countries, which have more stable economies. More profitable and better capitalized banks with a lower ratio of loans to assets also receive higher ratings. State banks are seen as more vulnerable, while the presence of large liquid assets is associated with a less favorable rating. This may reflect the existence of high

Table 4
Correlations among bank characteristics

	Bank rating	ROAA	ROAE	NLTA	ETA	logTA	Foreign-owned	State-owned
Bank rating	1.00							
Return on assets	0.04 <i>0.54</i>	1.00						
Return on equity	0.16 <i>0.02</i>	0.77 <i>0.00</i>	1.00					
Net loans-to-assets	−0.22 <i>0.00</i>	−0.16 <i>0.02</i>	−0.23 <i>0.00</i>	1.00				
Capitalization	−0.14 <i>0.04</i>	0.41 <i>0.00</i>	0.20 <i>0.00</i>	−0.18 <i>0.01</i>	1.00			
Total assets (logs)	0.63 <i>0.00</i>	−0.02 <i>0.73</i>	0.01 <i>0.86</i>	−0.23 <i>0.00</i>	0.30 <i>0.00</i>	1.00		
Foreign owned	0.05 <i>0.50</i>	−0.05 <i>0.52</i>	−0.02 <i>0.78</i>	−0.04 <i>0.56</i>	0.04 <i>0.59</i>	−0.05 <i>0.45</i>	1.00	
State owned	−0.19 <i>0.01</i>	0.03 <i>0.68</i>	0.07 <i>0.29</i>	−0.02 <i>0.82</i>	−0.07 <i>0.35</i>	0.01 <i>0.87</i>	−0.16 <i>0.03</i>	1.00

Note: *p*-values are in italics.

compulsory liquidity requirements or lack of opportunities to lend in some unstable emerging markets. Interestingly, foreign-owned banks do not receive significantly higher ratings.

Among country level variables (Table 5), bank ratings have a strong positive correlation with the country sovereign rating, the index of rule of law, and GDP per capita. Rapid exchange rate depreciation is associated with lower ratings. The correlation with the variable of interest, compliance with the BCPs, is positive, large, and significant.

4. The results

4.1. Results using the aggregate index and their robustness

Regressions of bank financial strength ratings on the overall index of BCP compliance are in Table 6. The index enters the regressions positively and significantly both by itself and when bank characteristics are controlled for. Controlling for institutional development with GDP per capita does not alter the relationship, while when we control for the sovereign rating the coefficient of compliance becomes smaller and statistical significance drops from one percent to five percent. When the quality of institutions is controlled for through the rule of law index, the coefficient of compliance becomes even smaller and significance drops to ten percent, suggesting that rule of law is an important control variable. We take the specification including rule of law as the baseline in the rest of the paper.¹⁰

Excluding advanced country banks from the sample does not change regression results much. However, when we exclude extreme observations, the coefficient of compliance becomes quite small and is no longer significant, suggesting that the relationship is not robust. Significance

¹⁰ Using an average of the Kaufman et al. (2003) institutional indexes rather than rule of law does not change any of the results.

Table 5
Correlations among country-level variables

	Avg. bank rating	Country rating	BCP index	Rule of law	GDP per capita	Depreciation	Growth	Percent foreign- owned	Percent state- owned	Lack re- strictions (BCL)	Auditing (BCL)	Disclosure (BCL)	Discipline (BCL)
Avg. bank rating	1.00												
Country rating	0.69 <i>0.00</i>	1.00											
BCP index	0.58 <i>0.00</i>	0.52 <i>0.00</i>	1.00										
Rule of law	0.76 <i>0.00</i>	0.89 <i>0.00</i>	0.60 <i>0.00</i>	1.00									
GDP per capita	0.63 <i>0.00</i>	0.80 <i>0.00</i>	0.56 <i>0.00</i>	0.85 <i>0.00</i>	1.00								
Depreciation	−0.43 <i>0.01</i>	−0.51 <i>0.00</i>	−0.14 <i>0.40</i>	−0.49 <i>0.00</i>	−0.35 <i>0.03</i>	1.00							
Growth	−0.05 <i>0.77</i>	0.20 <i>0.21</i>	0.19 <i>0.25</i>	0.00 <i>0.99</i>	−0.06 <i>0.73</i>	−0.04 <i>0.84</i>	1.00						
Percent foreign owned	−0.04 <i>0.81</i>	−0.02 <i>0.91</i>	−0.26 <i>0.11</i>	−0.17 <i>0.30</i>	−0.32 <i>0.04</i>	−0.04 <i>0.82</i>	−0.07 <i>0.68</i>	1.00					
Percent state owned	−0.21 <i>0.20</i>	−0.19 <i>0.25</i>	0.16 <i>0.32</i>	−0.14 <i>0.41</i>	−0.20 <i>0.23</i>	−0.13 <i>0.46</i>	0.03 <i>0.87</i>	−0.21 <i>0.19</i>	1.00				
Lack restrictions (BCL)	0.30 <i>0.06</i>	0.18 <i>0.28</i>	0.35 <i>0.03</i>	0.22 <i>0.17</i>	0.19 <i>0.23</i>	0.10 <i>0.54</i>	0.05 <i>0.76</i>	−0.13 <i>0.43</i>	−0.19 <i>0.25</i>	1.00			
Auditing (BCL)	0.21 <i>0.19</i>	0.07 <i>0.69</i>	0.16 <i>0.33</i>	0.08 <i>0.61</i>	0.04 <i>0.82</i>	−0.13 <i>0.43</i>	0.09 <i>0.58</i>	0.22 <i>0.19</i>	−0.10 <i>0.54</i>	−0.03 <i>0.88</i>	1.00		
Disclosure (BCL)	0.33 <i>0.04</i>	0.39 <i>0.02</i>	0.42 <i>0.01</i>	0.48 <i>0.00</i>	0.35 <i>0.03</i>	−0.35 <i>0.04</i>	−0.01 <i>0.95</i>	0.04 <i>0.81</i>	−0.02 <i>0.91</i>	0.52 <i>0.00</i>	0.26 <i>0.11</i>	1.00	
Discipline (BCL)	−0.24 <i>0.15</i>	−0.16 <i>0.34</i>	−0.05 <i>0.76</i>	−0.15 <i>0.35</i>	−0.23 <i>0.15</i>	−0.25 <i>0.15</i>	0.09 <i>0.57</i>	0.08 <i>0.62</i>	0.18 <i>0.26</i>	0.03 <i>0.84</i>	0.14 <i>0.41</i>	0.39 <i>0.01</i>	1.00

Note: *p*-values are in italics.

Table 6

Impact of overall index of compliance with BCPs on Bank rating

	(1)	(2)	(3)	(4)	(5)	(6)	(7) Baseline	(8) LDCs	(9) Tails excluded	(10) OLS	(11) Percent compliant
Index of compliance with BCPs	4.363	4.125	2.626	2.805	2.824	1.647	1.448	1.855	0.686	0.14	1.359
	[5.18] ^{***}	[4.98] ^{***}	[3.10] ^{***}	[3.41] ^{***}	[2.94] ^{***}	[2.01] ^{**}	[1.66] [*]	[1.75] [*]	[0.69]	[1.48]	[2.55] ^{**}
Foreign-owned	0.261	0.261	0.286	0.277	0.25	0.381	0.406	0.308	0.433	0.036	0.4
	[1.31]	[1.35]	[1.50]	[1.43]	[1.49]	[2.33] ^{**}	[2.48] ^{**}	[1.59]	[2.50] ^{**}	[1.87] [*]	[2.51] ^{**}
State-owned	−0.702	−0.709	−0.724	−0.677	−0.772	−0.505	−0.515	−0.521	−0.499	−0.065	−0.495
	[2.90] ^{***}	[2.71] ^{***}	[2.77] ^{***}	[2.54] ^{**}	[2.63] ^{***}	[2.09] ^{**}	[2.02] ^{**}	[1.96] [*]	[1.98] ^{**}	[2.58] ^{**}	[2.09] ^{**}
Other banking institutions	0.392	0.377	0.293	0.284	0.338	0.073	0.14	0.069	0.123	0.022	0.17
	[2.38] ^{**}	[2.07] ^{**}	[1.50]	[1.49]	[1.50]	[0.36]	[0.71]	[0.21]	[0.65]	[0.91]	[0.86]
Return on equity	0.005	0.005	0.006		0.006	0.008	0.008	0.001	0.014	0.001	0.008
	[0.87]	[0.89]	[1.22]		[1.34]	[1.55]	[1.59]	[0.32]	[2.62] ^{***}	[1.65]	[1.56]
Capitalization	0.011	−0.01	0.013	0.018	0.01	0.028	0.032	0.029	0.026	0.002	0.036
	[1.15]	[0.35]	[0.53]	[0.65]	[0.46]	[1.13]	[1.52]	[1.03]	[1.27]	[1.12]	[1.75] [*]
Net loans-to-assets		−0.007	−0.002	−0.003	−0.001	−0.006	−0.006	−0.005	−0.006	−0.001	−0.004
		[1.08]	[0.26]	[0.50]	[0.21]	[1.06]	[1.06]	[0.74]	[0.98]	[0.93]	[0.77]
Total assets			0.214	0.205	0.213	0.216	0.188	0.074	0.165	0.022	0.183
			[3.81] ^{***}	[3.81] ^{***}	[3.80] ^{***}	[4.07] ^{***}	[3.14] ^{***}	[1.28]	[2.82] ^{***}	[2.90] ^{***}	[3.27] ^{***}
Return on assets				0.017							
				[0.32]							
GDP per capita					−3.4E−06						
					[0.31]						
Index of sovereign rating						1.284					
						[1.90] [*]					
Index of rule of law							0.509	0.883	0.568	0.056	0.421
							[1.97] ^{**}	[3.28] ^{***}	[2.14] ^{**}	[2.15] ^{***}	[1.58]
Observations	206	203	203	203	203	205	203	132	180	203	203
Pseudo- R^2 or R^2	0.11	0.11	0.15	0.15	0.15	0.18	0.17	0.12	0.15	0.55	0.18

Note: Robust Z-statistics in brackets, observations are clustered by country.

* Significant at the 10% level.

** Idem, 5%.

*** Idem, 1%.

also disappears if we estimate the model using OLS instead of ordered probit.¹¹ Finally, in an additional robustness test we use as a measure of BCP compliance the percentage of principles for which the country is rated as compliant (Table 6, column (11)). The coefficient of this measure is not much different from the baseline, but significance is higher.¹²

As far as the control variables, larger banks are rated significantly higher and state-owned banks are considered more vulnerable. Foreign-owned banks are also rated more favorably and the coefficient is significant in the specification that includes the overall institutional quality of the country, but not if we restrict the sample to developing countries.¹³ These results suggest that once we control for bank size, ownership, and institutions, the additional explanatory power of bank balance sheet variables is small.

We conclude that while there is a positive correlation between bank soundness and the overall index of BCP compliance, this result is sensitive to controlling for the institutional quality of the country and to the exclusion of outliers. An interesting question is whether different principles that make up the overall BCP index affect bank soundness differently. We turn to this issue next.

4.2. Results by group of principles

In Table 7 we investigate the impact of different core principles as summarized by the seven chapters by including them in our baseline specification one at a time. Our results indicate that principles related to licensing and structure (Chapter 2) and information requirements (Chapter 5) are the most significantly associated with higher bank ratings at one percent significance. At the ten percent level, preconditions for effective bank supervision (Chapter 1) also enter significantly.

To check if these results are robust we control for compliance with the rest of the principles. Thus we create three aggregate indexes excluding Chapters 1, 2, and 5 respectively. When we include these aggregate indexes in the relevant regressions, we see that only compliance with information requirements (Chapter 5) remains significant. As an additional robustness test, we rerun these three specifications excluding individual countries one by one. The last three columns of Table 7 report the regressions that result in the largest standard error for the compliance variable of interest. The results show that Chapter 5, the principle measuring compliance with transparency, is the only principle that remains significantly associated with bank soundness.

Assessing the magnitude of the effect of Chapter 5 compliance on ratings is somewhat complicated by the fact that the econometric model is non-linear and that the compliance indicator is discrete. Nonetheless, computing marginal effects at the sample mean of the regressors, and assuming a constant elasticity around the mean, a decline in compliance from largely compliant to materially non-compliant would lower by one notch the rating of a bank rated D (from D to D-).

¹¹ Extreme observations are identified by dropping the top one percent from the top and bottom of the distribution of each of the five bank characteristics. This results in a loss of about ten percent of the observations.

¹² We have redone all other empirical tests in the paper using this alternative measure of compliance and found that by-and-large all the results go through.

¹³ The baseline specification excludes liquidity variables to preserve sample size. However including liquidity throughout does not change the results.

Table 7
Impact of individual chapters

								Dropping countries one by one ^a		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign-owned	0.427 [2.65]***	0.309 [1.94]*	0.409 [2.24]**	0.394 [2.52]**	0.38 [2.80]***	0.397 [2.63]***	0.403 [2.37]**	0.449 [2.37]***	0.186 [1.03]	0.295 [1.8]*
State-owned	−0.52 [2.07]**	−0.575 [2.07]**	−0.443 [1.82]*	−0.381 [1.51]	−0.673 [2.35]**	−0.406 [1.64]	−0.447 [1.75]*	−0.498 [−1.86]*	−0.639 [−2.16]**	−0.691 [−2.14]**
Other banking institutions	0.105 [0.56]	0.234 [1.29]	0.099 [0.50]	0.083 [0.41]	0.252 [1.25]	0.093 [0.45]	0.124 [0.62]	0.077 [0.4]	0.296 [1.64]	0.340 [1.51]
Return on equity	0.008 [1.57]	0.008 [1.58]	0.013 [1.83]*	0.01 [1.91]*	0.007 [1.40]	0.01 [1.99]**	0.009 [1.82]*	0.013 [1.73]*	0.002 [0.31]	0.002 [0.56]
Capitalization	−0.005 [1.00]	−0.006 [1.01]	−0.006 [0.98]	−0.007 [1.38]	−0.009 [1.61]	−0.008 [1.39]	−0.005 [0.95]	−0.004 [−0.63]	−0.001 [−0.14]	0.560 [−0.77]
Net loans-to-assets	0.03 [1.42]	0.036 [1.60]	0.03 [1.39]	0.035 [1.60]	0.028 [1.52]	0.038 [1.70]*	0.039 [1.86]*	0.027 [1.26]	0.013 [0.54]	0.013 [0.64]
Total assets	0.2 [3.47]***	0.211 [3.74]***	0.195 [3.04]***	0.221 [3.22]***	0.212 [3.59]***	0.205 [3.38]***	0.206 [3.52]***	0.210 [3.34]***	0.184 [2.65]***	0.184 [2.85]***
Index of rule of law	0.551 [2.26]**	0.5 [2.03]**	0.603 [2.25]**	0.724 [3.68]***	0.434 [1.79]*	0.744 [4.05]***	0.576 [2.28]**	0.575 [2.21]**	0.939 [4.05]***	0.858 [3.85]***
Index Chapter 1	1.14 [1.73]*							1.379 [1.07]		
Index Chapter 2		2.538 [3.71]***							1.491 [1.39]	
Index Chapter 3			0.568 [0.56]							
Index Chapter 4				−0.632 [0.59]						
Index Chapter 5					2.037 [3.17]***					1.573 [2.13]**
Index Chapter 6						−0.509 [0.90]				
Index Chapter 7							0.682 [1.31]			

(continued on next page)

Table 7 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Dropping countries one by one ^a		
								(8)	(9)	(10)
Av. chapters, excl. Chapter 1								–0.399		
								[–0.26]		
Av. chapters, excl. Chapter 2									0.116	
									[0.07]	
Av. chapters, excl. Chapter 5										0.326
										[0.33]
Observations	203	203	189	203	203	203	203	186	166	175
Pseudo- R^2	0.17	0.18	0.17	0.17	0.19	0.17	0.17	0.1736	0.2432	0.25
Method of estimation	Ordered probit	Ordered probit	Ordered probit	Ordered probit	Ordered probit	Ordered probit	Ordered probit	Ordered probit	Ordered probit	Ordered probit

Note: Robust Z-statistics in brackets, observations are clustered by country.

^a Regression with the largest standard error for the variable of interest.

* Significant at the 10% level.

** Idem, 5%.

*** Idem, 1%.

4.3. Robustness of the relationship between bank ratings and compliance with information provision

In this section we conduct additional robustness checks on the empirical relationship between information disclosure and bank soundness and investigate reverse causality.

Compliance with Chapter 5 of the BCPs is positively and significantly associated with bank ratings also when we exclude from the sample advanced countries or extreme observations (Table 8). In further robustness tests, we add to the baseline regression additional macroeconomic controls, which have been found in the literature to be associated with bank fragility (Demirgüç-Kunt and Detragiache, 1998, 2005): depreciation of the nominal exchange rate, the inflation rate and its standard deviation, real credit growth, real GDP per capita growth.¹⁴ Among the macro variables, exchange rate depreciation and inflation volatility are negatively and significantly associated with bank ratings, while the level of inflation, real GDP growth, and real credit growth are not significant (results not reported). Compliance with information requirements remains significant and positive throughout these different specifications, confirming that the impact of this principle is not sensitive to omitted macro controls.

In yet another specification, we include in the regressions two measures of the frequency and timeliness of macroeconomic data release obtained from IMF's Special Data Dissemination Standards (Allum and Agca, 2001). These measures might help us control for unobservable characteristics that make a country more transparent. The frequency index is positive and significant, while the timeliness is not (result not reported). More importantly, compliance with Chapter 5 remains significant and positive also in these regressions. We also try to separate out compliance with Chapter 5 from other design features of supervision and regulation by introducing as regressors three indexes constructed using the survey of bank regulators by Barth et al. (2001). Specifically, these indexes measure the presence in the laws and regulations of various provisions related to discipline, information disclosure, and auditing requirements. Among the latter's variables, only the disclosure index has a significant impact on ratings once compliance with Chapter 5 is controlled for. Surprisingly, however, its coefficient is negative, perhaps suggesting that having many disclosure requirements but not enforcing them is detrimental to bank soundness.

Next, we also allow for the effect to differ between countries that have experienced a banking crisis in the previous five years and countries that did not, to test whether the compliance variable capture just heterogeneity between countries with weak banks and countries with strong banks. Interestingly, we find that the coefficient of compliance with Chapter 5 is positive, significant, and of similar magnitude for the two groups of countries.

Additional robustness test are in Table 9. Controlling for the development of the stock market does not change the results. Furthermore, compliance with Chapter 5 continues to be a significant determinant of bank ratings even after we control for the quality of accounting standards, an index of financial freedom, and the degree of central bank independence.

4.4. Endogeneity of BCP compliance

In this paper, we use individual bank level information to test the impact of compliance with the BCPs. Since an individual bank's soundness rating is unlikely to have an impact on country-level measures of supervisory quality, reverse causality should not be a serious concern. However,

¹⁴ For detailed variable definitions and sources see Appendix B.

Table 8 (continued)

	(1)	(2) No tails	(3) LDCs	(4) OLS	(5)	(6)	(7)	(8)	(9)
Observations	189	167	118	189	176	167	189	189	189
Pseudo- R^2	0.19	0.19	0.15	0.59	0.2	0.19	0.2	0.22	0.2

Note: Robust Z-statistics in brackets, observations are clustered by country.

* Significant at the 10% level.

** Idem, 5%.

*** Idem, 1%.

Table 9

Impact of information requirements (Chapter 5)—Additional robustness tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Compliance with Chapter 5	2.03	1.933	2.081	1.77	4.014	2.299	2.041
	[2.59]***	[2.42]**	[2.48]**	[2.46]**	[3.94]***	[2.96]***	[2.79]***
Foreign owned	0.444	0.407	0.413	0.226	0.309	0.388	0.33
	[2.67]***	[2.55]**	[2.43]**	[1.39]	[1.27]	[2.52]**	[2.21]**
State owned	−0.493	−0.514	−0.544	−0.517	−1.195	−0.58	−0.666
	[1.74]*	[1.78]*	[1.91]*	[1.72]*	[−4.74]***	[1.95]*	[2.39]**
Other banking institutions	0.19	0.172	0.176	0.297	0.713	0.266	0.188
	[0.89]	[0.80]	[0.83]	[1.51]	[3.07]***	[1.31]	[0.90]
Return on equity	0.01	0.011	0.011	0.011	0.005	0.012	0.011
	[1.63]	[1.57]	[1.63]	[1.53]	[0.58]	[1.65]*	[1.60]
Net loans-to-assets	−0.009	−0.009	−0.009	−0.008	−0.012	−0.009	−0.009
	[1.67]*	[1.58]	[1.52]	[1.29]	[1.62]	[1.62]	[1.50]
Capitalization	0.036	0.031	0.036	0.025	0.003	0.026	0.021
	[1.80]*	[1.67]*	[1.58]	[1.28]	[0.07]	[1.35]	[1.13]
Total assets	0.237	0.227	0.233	0.22	0.283	0.219	0.209
	[3.32]***	[3.46]***	[3.16]***	[3.68]***	[2.95]***	[3.33]***	[3.20]***
Index of rule of law	0.416	0.471	0.504	0.417	−0.45142	0.504	0.763
	[1.69]*	[1.94]*	[2.15]**	[1.93]*	[−1.25]	[2.29]**	[3.04]***
BCP compliance	−0.709	−0.557	−0.564	−0.407	1.728631	−0.631	−0.361
(excl. Chapter 5)	[0.58]	[0.48]	[0.46]	[0.36]	[1.08]	[0.57]	[0.31]
Total value traded/GDP	0.383						
	[1.51]						
Stock market cap./GDP		0.147					
		[0.81]					
Turnover ratio			0.098				
			[0.55]				
Index financial freedom				0.01			
(heritage foundation)				[1.87]*			
Accounting standards					0.044		
(La Porta et al., 1998)					[3.2]***		
Central Bank Independence						−0.511	
(BCL)						[0.99]	
Private credit/GDP							−0.007
							[1.78]*
Observations	180	180	180	189	117	186	189
Pseudo- R^2	0.19	0.19	0.19	0.2	0.24	0.2	0.2

Note: Robust Z-statistics in brackets, standard errors clustered by country.

* Significant at the 10% level.

** Idem, 5%.

*** Idem, 1%.

soundness ratings are correlated within countries, so it is possible that assessors may assign better compliance ratings to countries whose banks are generally considered to be financially sound. Furthermore, since the level of compliance is a policy choice made by the countries themselves, countries with sounder banks may face less political opposition in adopting more rigorous regulatory and supervisory processes compared to those countries with distressed banks. On the other hand, it can also be argued that countries with weak banks coming out of a financial crisis may have the strongest incentives and political support to reform their regulation and supervision. So

in principle the endogeneity of supervision may bias the relationship with soundness in either direction.

Endogeneity concerns should not be overblown, particularly because we focus on the relationship between soundness and transparency, using compliance with the other BCP chapters as a control variable. The latter variable should work as a comprehensive control for unobserved country characteristics or shocks that make the country more likely to comply with Barth et al. (2001). It is only omitted factors specific to compliance with information disclosure that remain to be controlled for.

To address endogeneity of compliance with Chapter 5, we use instrumental variables estimation. The suitability of instruments is a concern in many economic problems, and this case is no exception, so we acknowledge that this approach cannot fully lay to rest concerns about reverse causality. Nonetheless, we follow the established practice in the literature on institutions and use legal origin dummy variables as instruments.¹⁵ The idea is that fundamental historical country characteristics, such as legal origin, affect a country's institutions, and thus have a bearing on the particular institutions of bank regulation and supervision. On the other hand, bank soundness is unlikely to be affected by these historical characteristics, particularly after controlling for broad institutional quality and supervision itself.

The 2SLS estimation results are in Table 10. First, legal origin variables are jointly highly significant in the first stage regressions. In all specifications the *F*-test for the joint significance of the instruments is well above 10, suggesting that there is no concern about weak instruments (Stock and Yogo, 2005). In the second stage, compliance with information provision remains positive and significant in all specification.¹⁶ Following Moreira (2003), we have also computed CLR confidence intervals, which should be robust to weak instruments. Based on these confidence intervals, compliance with Chapter 5 has once again a positive and significant effect on bank ratings. Using religion as an alternative instrument gives similar results. On the other hand, other basic country characteristics, such as latitude or ethnic fractionalization, have poor predictive power for BCP compliance.¹⁷ When the overall index of compliance with the BCP is instrumented in the same way, coefficient on the overall index becomes insignificant, which is not surprising given the lack of robustness already highlighted by other robustness tests.¹⁸

While these IV regressions show that our main result is robust, we recognize that there is no unambiguous test to show that the instruments we use are good enough from a theoretical perspective. Thus, as in many economic problems, also in this case it is difficult to establish causality beyond reasonable doubt.

4.5. Measuring bank soundness with Z-scores

As discussed in the introduction, Moody's ratings are an appealing measure of bank financial strength, as they are prepared by specialists with access to variety of sources of information and whose business is to make accurate assessments. On the other hand, ratings are subjective, and it may be argued that analysts may be better disposed toward bank that provide more accurate

¹⁵ See Beck et al. (2003) for a discussion of alternative instruments of financial institution development.

¹⁶ The coefficient of the IV regression is larger than the OLS regression, which could reflect measurement errors.

¹⁷ Barth et al. (2004) use religion and latitude as instruments for bank supervision.

¹⁸ This regression is available from the authors upon request.

Table 10

Bank ratings and information transparency: Instrumental Variables regressions (2SLS)

Second stage	(1)	(2)	(3)	(4)	(5)	(6)
Compliance with Chapter 5	0.623 [2.86] ^{***}	0.496 [2.49] ^{**}	0.715 [3.00] ^{***}	0.536 [2.37] ^{**}	0.689 [2.73] ^{***}	0.715 [2.83] ^{***}
Foreign-owned	0.020 [0.83]	0.019 [0.94]	0.021 [0.76]	0.029 [1.39]	0.021 [0.73]	0.018 [0.61]
State-owned	−0.124 [2.78] ^{***}	−0.113 [3.02] ^{***}	−0.116 [2.43] ^{**}	−0.096 [2.49] ^{**}	−0.103 [2.23] ^{**}	−0.138 [2.62] ^{***}
Return on equity	0.000 [0.21]	0.000 [0.22]	0.000 [0.48]	0.000 [0.20]	0.000 [0.25]	0.000 [0.49]
Net loans-to-assets	−0.001 [1.28]	−0.001 [1.36]	−0.001 [1.19]	−0.002 [1.49]	−0.001 [1.45]	−0.001 [1.21]
Total assets	0.023 [2.89] ^{***}	0.023 [2.60] ^{***}	0.017 [2.02] ^{**}	0.018 [2.56] ^{**}	0.011 [1.28]	0.023 [2.62] ^{***}
Capitalization	−0.001 [0.16]	0.000 [0.11]	0.001 [0.36]	0.002 [0.71]	0.002 [0.72]	0.003 [0.96]
Index of rule of law	−0.024 [0.69]		−0.044 [1.15]			−0.031 [0.84]
Inflation						0.000 [0.31]
Standard deviation of inflation						−0.002 [3.64] ^{***}
Index of sovereign rating				0.103 [1.24]	0.025 [0.31]	
Depreciation			−0.092 [1.24]		−0.042 [0.44]	
Observations	203	203	181	203	181	190
R-squared	0.360	0.470	0.200	0.460	0.220	0.340
Hansen J test	1.260	3.150	2.060	4.360	1.410	0.660
p-value	0.740	0.370	0.560	0.230	0.700	0.880
95 percent confidence interval						
CLR ^a	[0.726, 0.747]	[0.527, 0.542]	[0.694, 0.714]	[0.725, 0.745]	[0.746, 0.766]	[0.781, 0.804]
First stage (excluded IVs)	(1)	(3)	(4)	(5)	(6)	(7)
French legal origin	−0.099 [−1.08]	−0.171 [−2.08] ^{**}	−0.050 [−0.47]	−0.121 [−1.18]	−0.013 [−0.1]	−0.063 [−0.57]
German legal origin	−0.215 [−2.1] ^{**}	−0.154 [−1.37]	−0.212 [−1.91] [*]	−0.193 [−1.97] ^{**}	−0.223 [−2.39] ^{***}	−0.192 [−1.63]
Scandinavian legal origin	0.111 [1.32]	0.132 [1.51]	0.145 [1.37]	0.119 [1.48]	0.136 [1.59]	0.143 [1.42]
Socialist legal origin	−0.143 [−0.96]	−0.232 [−1.64] [*]	−0.107 [−0.64]	−0.230 [−1.69] [*]	−0.191 [−1.34]	−0.124 [−0.76]
Partial R-squared	0.14	0.17	0.11	0.1635	0.14	0.12
F statistic (excluded IVs)	22.67	21.53	19.34	15.59	13.36	21.45
p-value	0	0	0	0	0	0

Note: Robust Z-statistics in brackets, observations are clustered by country.

^a Confidence interval robust to weak instruments (Moreira, 2003).

* Significant at the 10% level.

** Idem, 5%.

*** Idem, 1%.

and timely information even though these banks are not necessarily more sound. To address these concerns, in an additional set of robustness tests we measure bank soundness using an alternative, objective, and commonly used indicator of bank risk, the Z-score. First, we compute Z-scores for the banks in our sample and investigate if we continue to find evidence that compliance with information requirements is a significant correlate to bank soundness. Second, we rerun the main regressions for the same sample of countries but including all commercial banks, even non-rated ones. Third, we extend the sample to include all countries and commercial banks for which we have data.

The Z-score is defined as $(\text{average return on assets} + \text{equity/assets})/(\text{standard deviation of the return on assets})$. It can be interpreted as the number of standard deviations below the mean by which returns would have to fall to wipe out bank equity (see [Boyd and Runkle, 1993](#)). The average and standard deviation of bank returns are computed 1995–2003 whenever data are available. Since coverage varies across banks, the average number of years used is slightly above 6 years. In the regressions, we use as the dependent variable $\ln(1 + \text{Z-score})$ to smooth out higher values of the Z score and to avoid truncating the dependent variable at zero. Control variables are computed as average over the 1995–2003 period. The specification is broadly similar to the previous baseline. Equity and return on assets were dropped from the set of regressors since these variables are now used to compute the left-hand-side variable, but we control for bank cost efficiency and liquidity.¹⁹

In our baseline sample, the Z-scores have a positive and statistically significant correlation with Moody's ratings, but the correlation is not very high (about 20 percent). Nonetheless, the relationship between bank soundness and BCP compliance remains remarkably similar to the one uncovered using Moody's ratings ([Table 11](#), columns (1)–(3)): the overall compliance index is positive but not significant, and when we examine individual chapters the only one that is robust is Chapter 5 on information provision. Additional tests using more macroeconomic control variables (exchange rate depreciation, inflation, inflation volatility) confirm this finding. These results indicate that the relationships identified are unlikely to be mainly driven by bias in the rating process in favor of countries where there is a lot of information disclosure by banks.

Broadening the sample to include all commercial banks brings the sample size to 834, a substantial increase. In this new sample, the coefficient of compliance with Chapter 5 declines in magnitude but remains significantly associated with higher Z-scores ([Table 11](#), columns (4)–(6)).²⁰

Finally, we extend the sample to include countries with no rated banks. The new sample includes an additional 27 countries, mainly low income ones ([Table B.2](#)). The number of banks, however, does not increase apace (from 834 to 1060) as the new countries have on average only few banks. In this new sample, the coefficient of Chapter 5 compliance declines further and loses significance.

All in all, these results indicate that the relationship between compliance with information disclosure and bank soundness is robust to measuring soundness through Z-scores rather than

¹⁹ These bank characteristics were not significant in the regressions using ratings as the dependent variable, but are generally significant in those using Z-scores.

²⁰ To limit bank heterogeneity, this sample includes only commercial banks.

Table 11
Bank Z-scores and compliance with BCP Chapter 5

	Rated banks			All commercial banks			All countries and all commercial banks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Index Chapter 5	2.014 [3.58] ^{***}	1.728 [2.50] ^{**}	2.014 [3.26] ^{***}	0.429 [1.76] [*]	0.479 [2.35] ^{**}	0.428 [1.70] [*]	0.21 [1.02]	0.209 [1.02]	0.217 [0.99]
Foreign owned	−0.041 [0.15]	−0.123 [0.45]	−0.29 [1.30]	−0.193 [2.09] ^{**}	−0.179 [1.97] [*]	−0.193 [2.10] ^{**}	−0.255 [3.56] ^{***}	−0.247 [3.51] ^{***}	−0.255 [3.60] ^{***}
State owned	−0.066 [0.35]	−0.136 [0.71]	−0.085 [0.44]	−0.066 [0.34]	−0.097 [0.51]	−0.065 [0.34]	−0.176 [1.07]	−0.209 [1.26]	−0.178 [1.08]
Other banking institution	0.324 [1.45]	0.393 [1.68]	0.525 [2.00] [*]						
LogTA	0.088 [2.53] ^{**}	0.088 [2.48] ^{***}	0.073 [1.90] [*]	−0.035 [1.99] [*]	−0.036 [2.04] ^{**}	−0.035 [1.97] [*]	−0.019 [1.16]	−0.019 [1.15]	−0.018 [1.13]
Overheads/Total assets	−9.261 [1.87] [*]	−8.994 [1.85] [*]	−5.097 [1.09]	−1.626 [1.65]	−1.613 [1.63]	−1.628 [1.65]	−2.142 [1.98] [*]	−2.118 [1.96] [*]	−2.13 [1.96] [*]
Index of rule of law	−0.154 [1.20]	−0.273 [1.95] [*]	−0.275 [1.82] [*]	0.203 [3.97] ^{***}	0.234 [3.83] ^{***}	0.204 [3.42] ^{***}	0.226 [4.96] ^{***}	0.233 [4.22] ^{***}	0.221 [3.80] ^{***}
Inflation		−0.003 [0.33]			0.01 [1.02]			0.004 [0.51]	
Standard deviation of inflation		−0.05 [1.39]			−0.004 [1.08]			−0.002 [0.63]	
Exchange rate depreciation			−1.51 [2.13] ^{**}			0.012 [0.05]			−0.043 [0.20]
Observations	160	153	143	834	823	834	1231	1220	1231
R-squared	0.23	0.22	0.27	0.07	0.07	0.07	0.1	0.1	0.1

Note: Robust Z-statistics in brackets, observations are clustered by country.

* Significant at the 10% level.

** Idem, 5%.

*** Idem, 1%.

Moody's ratings and to extending the sample to non rated banks. However, the relationship breaks down when banks from lower income countries (all of which are not rated) are included in the sample.²¹ The latter finding may indicate that accounting-based measures of risk, such as Z-scores, do not accurately capture bank soundness in low income countries, where accounting standards are probably poor.

5. Conclusions

Strong regulation and supervision plays an essential part in ensuring a safe and sound banking system. To curb bank fragility and improve crisis management, many countries are in the process of strengthening their regulatory and supervisory systems, a complex and costly process for many developing countries where human resources are scarce and other supporting institutions are weak. What type of regulation and supervisory practices are most effective in ensuring bank soundness? This is the question that we have addressed in this study.

Using bank-level investor ratings for 39 countries, we have explored whether countries that comply more closely with the Basel Core Principles (BCPs)—the universally accepted standard of best practices in bank supervision—have sounder banks, as measured by Moody's financial strength ratings. BCP compliance assessments, carried out under the auspices of the World Bank and IMF Financial Sector Assessment Program, provide a unique source of information about the quality of bank supervision and regulation around the world.

An important aspect of our study is the attempt to differentiate among different elements of the regulatory framework to help prioritize reform efforts. We find a significant and positive relationship between compliance with information provision and bank soundness ratings. This relationship is robust to controlling for broad indexes of institutional quality, macroeconomic variables, sovereign ratings, and reverse causality. Specifically, countries that require their banks to regularly and accurately report their financial data to regulators and market participants have more highly rated banks, as timely disclosure of high quality information strengthens monitoring by regulators and markets alike.

When we measure bank soundness with an accounting measure of risk (the Z-score) rather than Moody's rating, we find evidence that compliance with information provision improves bank soundness in high income and emerging markets, but not in other countries. This may indicate that in such countries there are other more important determinants of soundness or that Z-scores are not accurate measures of bank risk.

Our results suggest that countries aiming to upgrade banking regulation and supervision should consider giving priority to information provision over other elements of the core principles. Because information provision is a necessary condition for effective discipline, this policy recommendation is consistent with the approach to regulation and supervision recommended by Barth et al. (2006), who stress the importance of mechanisms to empower market discipline and are skeptical of structures that assign too much power to regulators.

²¹ Re-estimating the Z-score regressions for a sample of high income countries and emerging markets confirms this result.

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Appendix A. Basel Core Principles—Information Requirements of Banking Organizations

Principle 21: Banking supervisors must be satisfied that each bank maintains adequate records drawn up in accordance with consistent accounting policies and practices that enable the supervisor to obtain a true and fair view of the financial condition of the bank and the profitability of its business, and that the bank publishes on a regular basis financial statements that fairly reflect its condition.

For banking supervisors to conduct effective off-site supervision of banks and to evaluate the condition of the local banking market, they must receive financial information at regular intervals and this information must be verified periodically through on-site examinations or external audits. Banking supervisors must ensure that each bank maintains adequate accounting records drawn up in accordance with consistent accounting policies and practices that enable the supervisor to obtain a true and fair view of the financial condition of the bank and the profitability of its business. In order that the accounts portray a true and fair view, it is essential that assets are recorded at values that are realistic and consistent, taking account of current values, where relevant, and that profit reflects what, on a net basis, is likely to be received and takes into account likely transfers to loan loss reserves. It is important that banks submit information in a format that makes comparisons among banks possible although, for certain purposes, data derived from internal management information systems may also be helpful to supervisors. At a minimum, periodic reporting should include a bank's balance sheet, contingent liabilities and income statement, with supporting details and key risk exposures. Supervisors can be obstructed or misled when banks knowingly or recklessly provide false information of material importance to the supervisory process. If a bank provides information to the supervisor knowing that it is materially false or misleading, or it does so recklessly, supervisory and/or criminal action should be taken against both the individuals involved and the institution.

1. Accounting standards

In order to ensure that the information submitted by banks is of a comparable nature and its meaning is clear, the supervisory agency will need to provide report instructions that clearly establish the accounting standards to be used in preparing the reports. These standards should be based on accounting principles and rules that command wide international acceptance and be aimed specifically at banking institutions.

2. Scope and frequency of reporting

The supervisory agency needs to have powers to determine the scope and frequency of reporting to reflect the volatility of the business and to enable the agency to track what is

happening at individual banks on both a solo and consolidated basis, as well as with the banking system as a whole. The supervisors should develop a series of informational reports for banks to prepare and submit at regular intervals. While some reports may be filed as often as monthly, others may be filed quarterly or annually. In addition, some reports may be “event generated,” meaning they are filed only if a particular event occurs (e.g. investment in a new affiliate). Supervisors should be sensitive to the burden that reporting imposes. Consequently, they may determine that it is not necessary for every bank to file every report. Filing status can be based on the organizational structure of the bank, its size, and the types of activities it conducts.

3. Confirmation of the accuracy of information submitted

It is the responsibility of bank management to ensure the accuracy, completeness and timeliness of prudential, financial, and other reports submitted to the supervisors. Therefore, bank management must ensure that reports are verified and that external auditors determine that the reporting systems in place are adequate and provide reliable data. External auditors should express an opinion on the annual accounts and management report supplied to shareholders and the general public. Weaknesses in bank auditing standards in a particular country may require that banking supervisors become involved in establishing clear guidelines concerning the scope and content of the audit program as well as the standards to be used. In extreme cases where supervisors cannot be satisfied with the quality of the annual accounts or regulatory reports, or with the work done by external auditors, they should have the ability to use supervisory measures to bring about timely corrective action, and they may need to reserve the right to approve the issue of accounts to the public. In assessing the nature and adequacy of work done by auditors, and the degree of reliance that can be placed on this work, supervisors will need to consider the extent to which the audit program has examined such areas as the loan portfolio, loan loss reserves, nonperforming assets (including the treatment of interest on such assets), asset valuations, trading and other securities activities, derivatives, asset securitizations, and the adequacy of internal controls over financial reporting. Where it is competent and independent of management, internal audits can be relied upon as a source of information and may contribute usefully to the supervisors’ understanding.

4. Confidentiality of supervisory information

Although market participants should have access to correct and timely information, there are certain types of sensitive information that should be held confidential by banking supervisors. In order for a relationship of mutual trust to develop, banks need to know that such sensitive information will be held confidential by the banking supervisory agency and its appropriate counterparts at other domestic and foreign supervisory agencies.

5. Disclosure

In order for market forces to work effectively, thereby fostering a stable and efficient financial system, market participants need access to correct and timely information. Disclosure, therefore, is a complement to supervision. For this reason, banks should be required to disclose to the public information regarding their activities and financial position that is comprehensive and not misleading. This information should be timely and sufficient for market participants to assess the risk inherent in any individual banking organization.

Appendix B

Table B.1
Variable, definitions, and source task

Variable	Definition	Source
ROAE	Return over average equity	Bankscope
ROAA	Return over average assets	Bankscope
NLTA	Net loans, in percent of total assets	Bankscope
LogTA	Log of total bank assets	Bankscope
ETA	Equity in percent of total assets	Bankscope
LA	Liquid assets/customer and short-term funding	Bankscope
Index of rule of law	Average 1996–2002 of index of rule of law	Kaufman et al. (2003)
Depreciation	Average annual depreciation of the nominal exchange over the previous 5 years	IMF, International Financial Statistics
Index of sovereign rating	S&P sovereign rating	S&P
Inflation	Average annual inflation rate over the previous 5 years	IMF, International Financial Statistics
Real credit growth	Average annual real credit growth over the previous 5 years	IMF, International Financial Statistics
Standard deviation of inflation	Standard deviation of inflation over the previous 5 years	IMF, International Financial Statistics
Real GDP per capita growth	Average annual real GDP per capita growth over the previous 5 years	IMF, International Financial Statistics
Standard deviation of growth	Standard deviation of growth over the previous 5 years	IMF, International Financial Statistics
Index of discipline (BCL)	Index of discipline	Barth et al. (2001)
Index of disclosure (BCL)	Index of information disclosure	Barth et al. (2001)
Index auditing requirements (BCL)	Index of auditing requirements	Barth et al. (2001)
Stock market turnover	Total shares traded on the stock market exchange to GDP, average 1999–2003	World Bank, Financial Structure Database
Index frequency SDDS	Index of frequency of data release—IMF Special Data Dissemination Standards	Allum abd Acça (2001)
Index timeliness SDDS	Index of timeliness of data release—IMF Special Data Dissemination Standards	Allum abd Acça (2001)
Foreign owned	Dummy variable for foreign-owned banks	Bankscope
State owned	Dummy variable for state-owned banks	Bankscope
English legal origin	Dummy for English legal origin	La Porta et al. (2002)
French legal origin	Dummy for French legal origin	La Porta et al. (2002)
German legal origin	Dummy for German legal origin	La Porta et al. (2002)
Scandinavian legal origin	Dummy for Scandinavian legal origin	La Porta et al. (2002)
Socialist legal origin	Dummy for Socialist legal origin	La Porta et al. (2002)

Table B.2
Country list—Baseline sample and broader sample

Countries in baseline sample	Additional countries in broader sample
Bahrain	Albania
Brazil	Algeria
Bulgaria	Armenia
Canada	Bangladesh
Colombia	Cameroon
Croatia	Costa Rica
Czech Republic	Cote d'Ivoire
Egypt	Dominican Republic
France	El Salvador
Hong Kong	Georgia
Hungary	Ghana
India	Guatemala
Indonesia	Guyana
Ireland	Iran
Israel	Jamaica
Japan	Kenya
Kazakhstan	Kyrgyz Republic
Korea	Lithuania
Kuwait	Madagascar
Latvia	Mozambique
Mauritius	Nigeria
Mexico	Sri Lanka
Morocco	Switzerland
Peru	Tanzania
Philippines	Uganda
Poland	Yemen
Russia	Zambia
Slovak Republic	Total = 27
Slovenia	
South Africa	
Sweden	
Thailand	
Tunisia	
Turkey	
UAE	
United Kingdom	
Ukraine	
Total = 37	

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