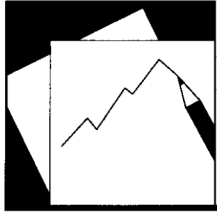


# Working Paper

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# IMF Working Paper

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## Basel Core Principles and Bank Risk: Does Compliance Matter?

*Asli Demirgüç-Kunt  
and Enrica Detragiache*

## IMF Working Paper

IMF Institute

### Basel Core Principles and Bank Risk: Does Compliance Matter?

Prepared by Asli Demirgüç-Kunt and Enrica Detragiache<sup>1</sup>

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#### Abstract

**This Working Paper should not be reported as representing the views of the IMF.**

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This paper studies whether compliance with the Basel Core Principles for effective banking supervision (BCPs) is associated with bank soundness. Using data for over 3,000 banks in 86 countries, we find that neither the overall index of BCP compliance nor its individual components are robustly associated with bank risk measured by Z-scores. We also fail to find a relationship between BCP compliance and systemic risk measured by a system-wide Z score.

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## I. INTRODUCTION

The recent financial crisis has sparked widespread calls for reforms of regulation and supervision. The initial reaction to the crisis was one of disbelief: how could such extensive financial distress emerge in countries where the supervision of financial risk had been thought to be the best in the world? Indeed, the regulatory standards and protocols of the advanced countries at the center of the financial storm were being emulated worldwide through the progressive adoption of the international Basel capital standards and the Basel Core Principles for Effective Bank Supervision (BCPs).

The crisis exposed significant weaknesses in the financial system regulatory and supervisory framework worldwide, and has spawned a growing debate about the role these weaknesses may have played in causing and propagating the crisis. As a result, reform of regulation and supervision is a top priority for policymakers, and many countries are working to upgrade their frameworks. But what should the reforms focus on? What constitutes good regulation and supervision? Which elements are most important for ensuring bank soundness? What should be the scope of regulation?

To date, the best practices in supervision and regulation have been embodied by the BCPs (Table 1). These principles were issued in 1997 by the Basel Committee on Bank Supervision, comprising representatives from bank supervisory agencies from advanced countries.<sup>2</sup> Since then, most countries in the world have stated their intent to adopt and comply with the BCPs, making them a global standard for bank regulators. Importantly, since 1999, the IMF and the World Bank have conducted evaluations of countries' compliance with these principles, mainly within their joint Financial Sector Assessment program (FSAP).<sup>3</sup> The assessments are conducted according to a standardized methodology developed by the Basel Committee and therefore provide a unique source of information about the quality of supervision and regulation around the world. Hence the international community has made significant investments in developing these principles, encouraging their wide-spread adoption, and assessing progress with their compliance.

In light of the recent crisis and the resulting skepticism about the effectiveness of existing approaches to regulation and supervision, it is natural to ask if compliance with the global standard of good regulation is associated with bank soundness. This is the subject of this paper. Specifically, we test whether better compliance with BCPs is associated with safer banks. We also look at whether compliance with different elements of the BCP framework is more closely

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<sup>2</sup> The Basel committee, initially made up of Belgium, Canada, France, Germany, Italy, Japan, Luxemburg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States, now also includes Argentina, Australia, Brazil, China, Hong Kong SAR, India, Indonesia, Korea, Mexico, Russia, Saudi Arabia, Singapore, South Africa and Turkey. The committee consults with supervisors from non-member countries.

<sup>3</sup> FSAPs are a comprehensive evaluation of the stability and development of a country's financial sector and include assessments of compliance with various standards and codes. Many FSAPs are publicly available on the IMF and World Bank websites.

associated with bank soundness to identify if there are specific areas which would help prioritize reform efforts to improve supervision.

The paper extends our previous work (Demirgüç-Kunt, Detragiache and Tressel, 2008: henceforth DDT), in which we showed that banks receive more favorable financial strength ratings from Moody's in countries with better compliance with BCPs related to information provision, while compliance with other principles does not affect ratings significantly. The policy message from this study was that countries should give priority to strengthening regulation and regulation in the area of information provision (both to the market and to supervisors) relative to other areas covered by the core principles.

Using rating information to proxy bank risk significantly limited the sample size in that study, making it necessary to exclude many smaller banks and many banks from lower income countries. Furthermore, after the recent crisis, the credibility of credit ratings as indicators of bank risk has also diminished, questioning the merit of using these ratings in the analysis.<sup>4</sup>

In this paper, we explore whether BCP compliance affects bank soundness, but instead of using ratings we capture bank soundness using the Z-score, which is the number of standard deviations by which bank returns have to fall to wipe out bank equity (Boyd and Runkle, 1993). Because we can construct Z-scores using just accounting information, and because assessment data for additional countries have also become available, we can extend the sample size considerably relative to our earlier study, to over 3,000 banks from 86 countries (compared to 200 banks from 37 countries analyzed in DDT). This is not just a simple increase in sample size: the sample of rated banks was not a representative sample, because rated banks tend to be larger, more internationally active, and more likely to adhere to international accounting standards. From a policy point of view, we would like to investigate the effect of BCP compliance on all types of banks operating in different country circumstances, rather than a select subgroup. In this study, the richer sample allows us to explore whether the relationship between BCPs and bank soundness varies across different types of banks.

All in all, we do not find support for the hypothesis that better compliance with BCPs results in sounder banks as measured by Z-scores. This result holds after controlling for the macroeconomic environment, institutional quality, and bank characteristics. We also fail to find a significant relationship when we consider different samples, such a sample of rated banks only, a sample including only commercial banks, and samples including only the largest financial institutions. In an additional test, we calculate aggregate Z-scores at the country level to try to capture the stability of the system as a whole rather than that of individual banks, but also this measure of soundness is not significantly related to overall BCP compliance.

When we explore the relationship between soundness and compliance with specific groups of principles, which refer to separate areas of prudential supervision and regulation, we continue to find no evidence that good compliance is related to improved soundness. If anything, we find

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<sup>4</sup> Most of the criticism of rating agencies has focused on ratings of structured products. Nonetheless, bank ratings certainly did not foresee the impending financial meltdown.

that stronger compliance with principles related to the power of supervisors to license banks and regulate market structure are associated with riskier banks.

While these results cast doubts on whether international efforts to improve financial regulation and supervision should continue to place a strong emphasis on BCPs, a number of *caveats* are in order. First, insignificant results may simply indicate that accounting-based measures, such as Z-scores, do not adequately capture bank soundness, especially for small banks and in low income countries, where accounting standards tend to be poor.<sup>5</sup> They may also reflect low quality in the assessment of BCP compliance, especially in countries where laws and regulations on the books may carry little weight. It might be also argued that assessments are not comparable across countries, despite the best efforts of expert supervisors and internal reviewing teams at the IMF and the World Bank to ensure a uniform methodology and uniform standards. If our negative results arise because compliance assessments do not reflect reality or are not comparable across countries, then – at a minimum – they should lead us to question the value of these assessments in ensuring that supervision measures up to global standards.

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

## II. LITERATURE REVIEW

Defining good regulatory and supervisory practices is a difficult and complicated task. Barth, Caprio, and Levine (2001, 2004, and 2006) were the first to compile and analyze an extensive database on banking sector laws and regulations using various surveys of regulators around the world, and to study the relationship between alternative regulatory strategies and outcomes. This research finds that regulatory approaches that facilitate private sector monitoring of banks (such as disclosure of reliable, comprehensive and timely information) and strengthen incentives for greater market monitoring (for example by limiting deposit insurance) improve bank performance and stability. In contrast, boosting official supervisory oversight and disciplinary powers and tightening capital standards does not lead to banking sector development, nor does it improve bank efficiency, reduce corruption in lending, or lower banking system fragility.<sup>7</sup> They interpret their findings as a challenge to the Basel Committee's influential approach to bank regulation which heavily emphasizes capital and official supervision.

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<sup>5</sup> Measurement error in the dependent variable, if random, increases standard errors, thereby resulting in insignificant coefficients.

<sup>6</sup> Difference in accounting standards across countries may affect the international comparability of Z-scores. In the Bankscope database, which we use to construct our sample, accounting data are standardized as much as possible, since the purpose of the database is to allow analysts to compare bank performance across countries. Nonetheless, differences in standards cannot be entirely corrected for.

<sup>7</sup> Laeven and Levine (2008) extend this analysis to show that the impact of regulations on bank risk taking also varies with the comparative power of shareholders within the corporate governance structure of each bank.

An important limitation of this type of survey is that it mainly captures rules and regulations that are on the books rather than actual implementation. IMF and the World Bank financial sector assessments have often found implementation to be lacking, particularly in low income countries, so that cross-country comparisons of what is on the books may hide substantial variation in the quality of supervision and regulation. BCP assessments have the advantage of taking into account implementation. Of course, assessing how rules and regulations are implemented and enforced in practice is not an exact science, and individual assessments may be influenced by factors such as the assessors' experience and the regulatory culture they are most familiar with. Nevertheless, although it is difficult to eliminate subjectivity completely, assessments are based on a standardized methodology and are carried out by experienced international assessors with broad country experience.

Cihak and Tieman (2008) analyze the quality of financial sector regulation and supervision using both Barth, Caprio and Levine's survey data and BCP assessments. They find that regulation and supervision in high-income countries is generally of higher quality than in lower income countries. They also note that the correlation between survey data and BCP data tend to be low, always less than 50 percent and in many cases in the 20-30 percent range, suggesting that taking into account implementation may indeed make an important difference.

A number of papers also use BCP assessments to study bank regulation and performance. Sundararajan, Marston, and Basu (2001) use a sample of 25 countries to examine the relationship between an overall index of BCP compliance and two indicators of bank soundness: non-performing loans (NPLs) and loan spreads. They find BCP compliance not to be a significant determinant of these measures 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 compliance with the BCPs as well as compliance 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.

In this paper, as already discussed we rely on the Z-score to measure bank soundness. While the Z-score has its limitations, we believe it is an improvement over measures used 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. 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, cross-country comparability is a serious issue. In contrast with ratings, Z-scores do not rely on the subjective judgment of rating agencies' analysts.

### **III. METHODOLOGY AND DATA**

The dependent variable is the bank's financial soundness as measured by its Z-score, 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 sample is a cross-sectional one. The regression equations we estimate are of the form:



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

where the subscript  $j$  denotes the country and the subscript  $i$  denotes the bank.  $Z_{ij}$  is the Z-score for bank  $i$  in country  $j$ ,  $X_j^1$  is the BCP compliance score in country  $j$ ,  $X_{ij}^2$  is a vector of bank characteristics,  $X_j^3$  is a vector of country characteristics, and  $\varepsilon_{ij}$  is a random disturbance. The right-hand side variables are five-year averages over the period  $[t, t-4]$ , where  $t$  is the year of the BCP compliance evaluation, which varies within the time period 1999-2006 depending on the country.<sup>8</sup>

The Z-score is defined as (average return on assets + equity/assets)/(standard deviation of the return on assets) over  $[t, t-4]$ . It can be interpreted as the number of standard deviations by which returns would have to fall from the mean to wipe out all equity in the bank (Boyd and Runkle, 1993). In the regressions, we actually use as the dependent variable  $\ln(1 + \text{Z-score})$  to smooth out higher values of the Z-score and avoid truncating the dependent variable at zero. In an alternative specification we also calculate Z-scores at the country level as opposed to individual bank level to capture systemic as opposed to individual bank risk (see section IV below for more details). Equation (1) is estimated by OLS with standard errors clustered by country to allow for correlated residuals within each country.

The variable of interest is  $X_j^1$ , the BCP compliance score. The data come from IMF and the World Bank BCP assessments conducted from 1999 to 2006.<sup>9</sup> Assessors rate compliance with each of the 25 Basel Core 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). Also in this case, we sum the numerical ratings for each principle in the Chapter and average the value. Compliance for each chapter is used as an alternative variable of interest.

The first set of control variables includes various bank characteristics that might affect financial strength: size, measured by the logarithm of bank assets; cost efficiency, measured as overhead costs as a ratio of total assets; and illiquidity proxied by the ratio of bank loans to total assets. We also control for whether the bank is a commercial bank or not (see below for sample composition). Bank data come from Fitch's Bankscope database.<sup>10</sup>

<sup>8</sup> For some banks the variables are averaged over a shorter time period because of missing data.

<sup>9</sup> 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.

<sup>10</sup> Summary statistics and cross-correlations for the variables used in the analysis are in the Appendix. A small number of observations with negative equity, negative overheads, overhead to assets ratios greater than one and negative net loans/assets were excluded.

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, Kraay, and Mastruzzi (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 and volatile inflation, rapid exchange rate depreciation, 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 combinations 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.

The sample covers 86 countries and over 3,000 banks, including commercial banks, cooperative banks, real estate and mortgage banks, and savings banks (Table A1). Some large countries, such as the U.S. or Germany, are missing because the BCP assessment had not been carried out or completed when this research began. In other cases, countries are missing because they lack the necessary data in Bankscope. We also work with different subsamples of banks; from smallest to largest, these are: rated banks (those with a Moody's rating), commercial banks, and all financial institutions, including investment banks/security houses, medium and long-term credit banks, nonbank credit institutions, specialized government credit institutions.

Since countries in the sample have economies and banking systems of vastly different size, the sample is very unbalanced, with some countries represented by only a handful of banks, and others with hundreds. In particular, Japanese banks account for 23.4 percent of this sample (721 banks). To ensure that regression results are not overly influenced by Japan, we examine results both with and without Japanese banks. Finally, we also estimate specifications including only the top 10 banks in each country and the top 20 percent of banks in the sample, to explore whether the relationship between bank soundness and compliance may differ for the largest banks.<sup>11</sup>

#### IV. THE RESULTS

Results from the baseline regression, relating bank soundness measured by the Z-score to the degree of compliance with the BCPs are in Table 2. In the sample including all countries, the Z-score is higher, indicating a sounder bank, for banks with lower operating costs in countries with higher GDP per capita. Also, non-commercial banks tend to have higher Z-scores, while the other control variables are not significant. The coefficient of the BCP compliance index is positive but not significant.

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<sup>11</sup> For more details on the various subsamples, see Table A6.

If we exclude Japanese banks, which account for over 20 percent of the sample, the fit of the model improves markedly (the R-squared increases from 10 percent to 19 percent) and the coefficients of many regressors change substantially.<sup>12</sup> This suggests that the variables explaining the Z-score of Japanese banks may be somewhat different than for the rest of the sample, perhaps because of the lingering effects of Japan's prolonged banking crisis on bank balance sheets. For example, in the sample excluding Japan inflation and the rule of law index are significant (with the expected coefficients), while GDP per capita is not (though the coefficient remains positive). Also, banks with a higher ratio of net loans to assets have higher Z-scores, perhaps because Basel regulation mandating minimum levels of risk-adjustment capital forces these banks to hold more equity. Also, in the sample excluding Japan larger banks have lower Z-scores, likely because they tend to hold less capital than smaller banks. Despite these differences, the coefficient of the BCP compliance index remains insignificantly different from zero also in the sample without Japanese banks. The same is true when we add to the regression additional macro controls, such as exchange rate appreciation, private credit, or the sovereign rating.

In the regressions reported in Table 3, we explore how the relationship between BCP compliance and bank soundness changes if we alter the sample composition to include various categories of financial institutions to explore whether BCP compliance may affect soundness for alternative types of banks. All these results refer to the sample excluding Japan, so that the overrepresentation of Japanese banks does not distort the results.

The first exercise is to examine the widest sample possible, i.e. one that includes investment banks/securities houses, medium and long-term credit banks, nonbank credit institutions, and specialized government credit institutions. These are institutions that in most countries are unlikely to fall under the perimeter of bank regulation and supervision, so we have excluded them from the baseline sample. When we include them, the sample size grows by 25 percent, but the main regression results are unchanged. In particular, bank soundness is not significantly affected by compliance with the BCPs.

If we restrict the sample to commercial banks only, thereby losing about 300 banks compared to the baseline sample, once again we find that regression results remain very close to the baseline. When we focus only on banks rated by Moody's, as in our earlier work, the sample shrinks considerably (to just over 300 banks), and the coefficient of the BCP compliance index becomes positive and significant, albeit only at the 10 percent confidence level. Thus, BCP compliance seems to have some positive effect on the soundness of this specific group of banks. To explore this issue further, we ask whether this result is driven by the fact that rated banks are larger banks. To do so, we consider two alternative samples: the first includes the largest 10 percent of banks within each country and the second includes the largest 20 percent of banks in the entire sample. In both cases, the BCP compliance index has an insignificant coefficient, as in the baseline sample.

The BCP compliance index is the weighted sum of compliance scores for several individual chapters of the Core Principles. Could it be that, even though overall compliance does not seem

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<sup>12</sup> Excluding other countries does not result in large changes in regression results.

to matter for bank soundness, some aspects of the Core Principles might be relevant? In fact, it may be possible that the overall index is not significant because of offsetting effects of its different components. In fact, in our previous study of Moody's ratings, we found that, although overall compliance did not seem to matter, higher financial strength ratings were associated with better compliance with principles related to information provision to supervisors.

We address this question by re-running the baseline regressions breaking down the compliance index into seven components, based on the standard grouping of principles used by the Basel Committee (Table 1). An important *caveat* is that compliance scores are fairly strongly correlated (see Appendix Table A5), which may make it difficult to disentangle the effect of one set of principles from the others. We replicate the regression for different samples of banks to investigate the robustness of the results. The results are in Table 4. There is only one component of the compliance index that has a fairly robust relationship with bank Z-scores, and that is compliance with Chapter 2 of the BCP, i.e. principles having to do with supervisors' powers to regulate bank licensing and structure. Interestingly, this component of the index is *negatively* correlated with bank soundness, so that banks in countries where regulators have better defined powers to give out licenses and regulate bank activities tend to be riskier. This result holds in all the samples except those including only the largest banks.<sup>13</sup> This finding supports the contention that supervisory systems that tend to empower supervisors do not work well (Barth, Caprio, and Levine, 2001, 2004, 2006).<sup>14</sup>

So far, we have considered individual bank risk. In principle, bank supervision and regulation should be primarily concerned with systemic risk, rather than individual bank risk, although in practice it is not always easy to make this distinction. Could it be that BCP compliance, while not relevant to individual bank soundness, is important to ensure the stability of system as a whole? To address this question, it would be ideal to test whether BCP compliance reduces the probability of a financial crisis. However, since crises are rare events, this type of test requires a panel of data; since we have BCP compliance assessments only at a point in time, we are restricted to cross-sectional data. Nonetheless, to explore this question we compute a rough measure of systemic soundness as the aggregate equivalent of the individual bank Z-score. More specifically, we aggregate profits and equity of all the banks in the country (for which we have data), we compute the standard deviation of aggregate profits, and then we compute an aggregate Z-score. This measure tells us by how many standard deviations banking system profits must fall to exhaust all the capital in the banking system. We then regress this measure on the BCP compliance score and a number of macroeconomic control variables.

The results are in Table 5. Our measure of systemic soundness is correlated with the macro variables as one might expect: higher growth, low inflation, low inflation volatility, appreciation of the currency, favorable sovereign ratings are all significantly associated with higher values of

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<sup>13</sup> Results are robust to introducing compliance to each subcomponent separately in the regression.

<sup>14</sup> We also find that compliance with Chapter 5, information disclosure, has a positive and significant coefficient, but only in the sample including Japan. In contrast, in DDT we found that compliance with information disclosure was a significant determinant of Moody's financial strength rating, and that this result was robust to dropping any individual country from the sample.

the aggregate Z-score. Once again, though, the BCP compliance index does not seem to be a significant determinant of banking system soundness. Though it is positive, the coefficient of the BCP index is small and not statistically significant in any specification.

## V. CONCLUSIONS

While the causes and consequences of the recent financial crisis will continue to be debated for years to come, there is emerging consensus that the crisis has revealed significant weaknesses in the regulatory and supervisory system. Resulting calls for reform have led to numerous proposals and policymakers in many countries are hard at work to upgrade their regulatory frameworks.<sup>15</sup> This paper seeks to inform the on-going reform process by providing an analysis of how existing regulations and their application are associated with bank soundness. Specifically, we study whether compliance with Basel Core Principles for effective banking supervision (BCPs) is associated with lower bank risk, as measured Z-scores.

We find no evidence of a robust statistical relationship linking better compliance with BCPs and improved bank soundness. The analysis of aggregate Z-scores to capture systemic stability issues yields similarly insignificant results. If anything, we find that compliance with a specific group of principles, those giving supervisors powers to regulate bank licensing and structure is associated with riskier banks, potentially suggesting that such powers may be misused in practice.

While our results may reflect the difficulty of capturing bank risk using accounting measures, or the inability of assessors to carry out evaluations that are comparable across countries, nevertheless they raise questions about the relevance of the Basel Core Principles, the current emphasis on these principles as key to effective supervision, and the wisdom of carrying out costly periodic compliance reviews of BCP implementation in the IMF/World Bank Financial Sector Assessment Programs.

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<sup>15</sup> See for example Acharya and Richardson (2009), Brunnermeier et al. (2009), Caprio et al. (2009), Financial Services Authority (2009), Demirgüç-Kunt and Serven (2009), Financial Stability Forum (2008), G-20 (2009), Goodhart, (2008a,b), Goodhart and Persaud (2008), Kashyap et al. (2008), U.S. Treasury (2009) and proposals by the Shadow Financial Regulatory Committee, which can be found on the American Enterprise Institute (AEI) website.

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## **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.

#### **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: *Core Principles for Effective Banking Supervision*, Basel Committee on Banking Supervision, Basel, September 1997.

**Table 2. BCP Compliance and Bank Z-Scores: Baseline Results**

	All countries (1)	Excluding Japan (2)	Excluding Japan (3)	Excluding Japan (4)	Excluding Japan (5)
BCP overall compliance	0.310	-0.188	-0.155	-0.217	-0.389
(	0.490)	(0.332)	(0.333)	(0.342)	(0.387)
Non-commercial bank	0.287***	0.529***	0.529***	0.532***	0.457***
(	0.088)	(0.122)	(0.120)	(0.122)	(0.163)
Rated banks	0.071	0.148	0.171	0.154	0.175
(	0.127)	(0.111)	(0.112)	(0.110)	(0.108)
Net loans/total assets	0.003	0.005***	0.005***	0.005***	0.005***
(	0.003)	(0.001)	(0.001)	(0.001)	(0.001)
Total assets	-0.043	-0.060** -	0.067*** -	0.063**	-0.066**
(	0.034)	(0.026)	(0.025)	(0.026)	(0.027)
Overheads/total assets	-2.978***	-3.625*** -	3.631***	-3.590***	-2.648***
(	0.753)	(0.740)	(0.763)	(0.738)	(0.873)
Index of rule of law	0.107	0.201***	0.179**	0.106	-0.149
(	0.092)	(0.066)	(0.072)	(0.102)	(0.181)
GDP growth	7.512**	1.595	1.315	2.418	4.475
(	3.673)	(3.041)	(2.983)	(3.303)	(2.809)
Inflation -	0.520	-1.000***	-0.519 -	0.773***	-0.662**
(	0.525)	(0.245)	(0.467)	(0.263)	(0.320)
Standard deviation of inflation -	0.622	0.074	-0.263	-0.160	-0.416
(	0.799)	(0.969)	(1.111)	(0.946)	(0.773)
Exchange rate appreciation			0.695		
			(0.656)		
Private credit				0.003	
				(0.002)	
Sovereign rating					0.076**
					(0.030)
Constant 2	.941***	3.825***	3.957***	3.712***	3.125***
(	0.907)	(0.610)	(0.560)	(0.651)	(0.712)
Number of observations	3072	2351	2313	2351	1867
R-squared 0.	103	0.191	0.194	0.194	0.196

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
Standard errors are clustered by country

**Table 3. BCP Compliance and Bank Z-scores: Alternative Samples**

	Excluding Japan include unregulated (1) logZscore	Excluding Japan only commercial (2) logZscore	Excluding Japan only rated (3) logZscore	Excluding Japan only top 10 banks in each country (4) logZscore	Excluding Japan only top 20% largest banks in sample (5) logZscore
BCP overall compliance	-0.185 (0.325) (	-0.289 (0.288) (	1.295* (0.746) (	-0.096 (0.396) (	0.932 (0.654)
Non-commercial bank	0.111 (0.075) (	0.000 (0.000) (	0.565** (0.228) (	0.164 (0.193) (	0.701*** (0.146)
Rated banks	0.166 0 (0.106) (	.157 0 (0.123) (	.000 0 (0.000) (	.170 (0.112) (	0.340*** (0.122)
Net loans/total assets	0.006*** (0.001) (	0.004*** (0.001) (	0.004 (0.004) (	0.004* (0.002) (	0.006*** (0.002)
Total assets	-0.061** (0.028) (	-0.070** (0.028) (	-0.077 - (0.057) (	0.053 - (0.036) (	0.070 (0.081)
Overheads/total assets	-2.879*** (0.578) (	-3.451*** - (0.842) (	7.219** (3.329) (	-5.887*** (1.734) (	-6.420*** (1.699)
Index of rule of law	0.190*** (0.057) (	0.201*** (0.065) (	0.079 (0.169) (	0.118 (0.094) (	-0.014 (0.130)
GDP growth	1.821 3 (2.845) (	.059 3 (3.025) (	.737 0 (5.811) (	.343 (3.332) (	-2.031 (5.300)
Inflation -	0.946*** (0.248) (	-1.006*** (0.222) (	0.021 (0.412) (	-0.170 (0.555) (	-0.190 (0.464)
Standard deviation of inflation	0.104 (0.985) (	0.111 (0.884) (	-1.549 (1.094) (	-2.615** (1.216) (	-4.238* (2.323)
Constant	3.709*** (0.636) (	4.032*** 3 (0.632) (	.341** (1.406) (	3.874*** 3 (0.801) (	.376** (1.662)
Number of observations	2962	2019	318 6	63 5	32
R-squared	0.127 0.	103 0.	205 0.	127 0.	318

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Standard errors are clustered by country

**Table 4. BCP Compliance--Individual Chapters**

	Baseline (1)	include Japan	include unregula ted	only commerci al	only rated	only top 10 banks in each country	only top 20% banks in sample
	(1)	(2)	(7)	(8)	(9)	(10)	(11)
Non-commercial bank	0.548***	0.430***	0.119		0.401*	0.037	0.668***
(	0.124)	(0.098)	(0.079)	(	0.213)	(0.210)	(0.164)
Rated banks	0.193*	0.069	0.184*	0.172		0.183	0.307***
(	0.112)	(0.137)	(0.106)	(0.125)		(0.130)	(0.098)
Net loans/total assets	0.005***	0.003	0.006***	0.004***	0.004	0.006**	0.007***
(	0.001)	(0.003)	(0.001)	(0.001)	(	0.003)	(0.002)
Total assets	-0.062**	-0.022	-0.053**	0.061**	-0.077	-0.031	-0.032
(	0.025)	(0.040)	(0.026)	(0.028)	(	0.053)	(0.059)
Overheads/total assets	-2.909**	2.011*	-2.426***	-2.750**	5.551**	6.473***	4.973**
(	1.255)	(1.150)	(0.854)	(1.279)	(	2.671)	(2.099)
Index of rule of law	0.235***	0.133*	0.199***	0.211***	0.116	0.114	0.018
(	0.057)	(0.076)	(0.055)	(0.059)	(	0.260)	(0.110)
GDP growth	2.894	6.868**	3.091	4.228	3.612	0.215	-0.254
(	3.034)	(3.336)	(2.709)	(3.079)	(	5.704)	(4.723)
Inflation -	0.850**	-0.652	-1.027***	0.939***	0.521	-0.444	-0.300
(	0.370)	(0.438)	(0.321)	(0.337)	(	0.735)	(0.587)
Standard deviation of inflation	-0.222	-0.163	0.178	-0.133	-1.910	3.471	5.030*
(	1.295)	(1.412)	(1.284)	(1.181)	(	2.239)	(2.223)
Index chapter 1	0.147	0.192	0.224	0.114	0.221	0.181	0.323
(	0.166)	(0.188)	(0.147)	(0.152)	(	0.278)	(0.296)
Index chapter 2	0.512***	0.366**	-0.549***	-0.428***	-0.017	0.482***	0.034
(	0.134)	(0.151)	(0.123)	(0.120)	(	0.376)	(0.289)
Index chapter 3	0.137	0.433***	0.069	0.083	0.285	-0.066	-0.229
(	0.152)	(0.145)	(0.149)	(0.138)	(	0.407)	(0.174)
Index chapter 4	0.030	-0.365**	0.181	0.083	-0.286	0.280	0.368*
(	0.179)	(0.144)	(0.147)	(0.157)	(	0.403)	(0.172)
Index chapter 5	0.041	0.252**	0.011	0.027	0.362	-0.096	0.038
(	0.129)	(0.111)	(0.128)	(0.124)	(	0.262)	(0.121)
Index chapter 6	0.110**	-0.044	0.053	0.104	0.073	0.083	0.149
(	0.049)	(0.053)	(0.048)	(0.075)	(	0.157)	(0.071)
Index chapter 7	-0.129	-0.143	-0.156*	0.154*	-0.092	-0.072	-0.263
(	0.098)	(0.113)	(0.087)	(0.089)	(	0.240)	(0.108)
Constant 4	.116***	2.935***	3.803***	4.046***	3.044*	3.787***	2.516*
(	0.527)	(0.757)	(0.521)	(0.588)	(	1.634)	(0.872)
Number of observations	2049	2770	2611	1722	294	480	503
R-squared 0.	235	0.152	0.164	0.137	0.261	0.170	0.365

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
Standard errors are clustered by country

**Table 5. BCP Compliance and System-Wide Risk**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BCP overall compliance	0.075	0.141	0.276 0	.069	0.439 0	.558 -	0.256
(	0.167)	(0.315)	(0.617)	(0.159)	(0.970) (	1.403) (	-0.463)
Index of rule of law	0.017	0.019	-0.008	0.024			
	(0.165)	(0.183)	(-0.076)	(0.237)			
GDP growth	1.909***				2.023*** 2	.185*** 1	.573**
	(3.651)				(3.647) (	3.772) (	2.508)
Inflation		-1.582***					
		(-3.549)					
Standard deviation of inflation			-2.408**				
			(-2.012)				
Exchange rate appreciation			2	.289***			
			(	3.665)			
GDP per capita					-0.013		
					(-0.965)		
Private credit					-0.005**		
					(-	2.205)	
Index of sovereign rating							0.055*
							(1.890)
Constant	1.509***	1.501***	1.386*** 1	.586***	1.344*** 1	.395*** 1	.113***
(	4.690)	(4.664)	(4.473)	(5.049)	(4.623) (	5.348) (	2.899)
Number of observations	83	83	83	85	83 83	54	
R-squared	0.088 0.	065	0.055	0.073	0.098	0.123	0.212

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Appendix

### Table A1. Baseline Sample

Country	Number of banks
ALBANIA	11
ALGERIA	12
ARMENIA	8
AUSTRALIA	68
AZERBAIJAN	19
BANGLADESH	34
BARBADOS	4
BELARUS	2
BOLIVIA	12
BOSNIA-HERZEGOVINA	30
BRAZIL	160
BULGARIA	31
CAMEROON	10
CANADA	18
CHILE	34
COLOMBIA	37
COSTA RICA	46
CROATIA	44
CZECH REPUBLIC	35
DOMINICAN REPUBLIC	30
ECUADOR	41
EGYPT	31
EL SALVADOR	15
ESTONIA	1
FRANCE	322
GEORGIA REP. OF	11
GHANA	15
GUATEMALA	40
HONDURAS	34
HONG KONG	22
HUNGARY	26
INDIA	76
INDONESIA	67
IRAN	5
IRELAND	2
ISRAEL	17
IVORY COAST	9
JAMAICA	18
JORDAN	5
KAZAKHSTAN	18
KENYA	36
KOREA REP. OF	26
KUWAIT	5
KYRGYZSTAN	8

LATVIA	2	7
LITHUANIA	12	
MACEDONIA (FYROM)		18
MADAGASCAR	5	
MALTA	1	1
MAURITIUS	16	
MEXICO	4	5
MOLDOVA REP. OF		23
MONTENEGRO	9	
MOROCCO	10	
MOZAMBIQUE	1	2
NAMIBIA	1	3
NICARAGUA	12	
NIGERIA	73	
OMAN	9	
PAKISTAN	25	
PARAGUAY	38	
PERU	36	
PHILIPPINES	51	
POLAND	56	
ROMANIA	31	
RUSSIAN FEDERATION		226
RWANDA	5	
SAUDI ARABIA		5
SERBIA	52	
SINGAPORE	30	
SLOVAKIA	20	
SLOVENIA	26	
SOUTH AFRICA		30
SRI LANKA		11
SWEDEN	106	
TANZANIA	19	
TRINIDAD AND TOBAGO		8
TUNISIA	17	
TURKEY	4	8
UGANDA	13	
UKRAINE	48	
UNITED ARAB EMIRATES		7
UNITED KINGDOM		149
URUGUAY	70	
YEMEN	7	
ZAMBIA		8
<b>Total (excluding Japan)</b>		<b>2,981</b>
JAPAN		721
<b>Total</b>		<b>3,702</b>

**Table A. 2. Summary Statistics--Baseline Sample (excluding Japan)**

	Mean	Median	s.d.	Maximum	Minimum	No. of observations
<u>Bank-level variables</u>						
z-score	2.672	2.721	1.039	6.253	-1.936	2400
Non-commercial bank dummy	0.130	0	0.336	1	0	2981
Rated banks dummy	0.130	0	0.337	1	0	2981
Net loans/total assets	49.481	50.301	2.288	100	0	2950
Total assets (logs)	19.487	19.306	2.059	27.388	13.315	2981
Overheads/total assets	0.054	0.040	0.057	0.907	0	2981
<u>Country-level variables</u>						
BCP compliance: Overall index	0.646	0.644	0.182	1	0.233	86
Chapter 1	2.074	2.167	0.578	3	0.667	86
Chapter 2	2.230	2.250	0.559	3	0.750	86
Chapter 3	1.776	1.800	0.680	3	0.400	76
Chapter 4	2.018	2.100	0.645	3	0.600	80
Chapter 5	2.012	2	0.759	3	1	86
Chapter 6	1.733	2	0.832	3	0	86
Chapter 7	1.928	2	0.809	3	0.333	65
Index of rule of law	-0.068	-0.287	0.859	1.813	-1.340	86
GDP growth	0.044	0.043	0.019	0.106	0.002	86
Inflation 0	.084	0.060	0.100	0.741	-0.030	83
Standard deviation of inflation	0.044	0.026	0.060	0.364	0.002	83
Exchange rate appreciation	-0.054	-0.052	0.074	0.081	-0.405	85
Private credit	39.325	26.218	3.104	151.209	4.238	86
Sovereign rating	10.791	10.333	4.133	20	4.200	55



**Table A3. Cross-Correlations: Country-Level Variables**

	<b>BCP overall compliance index</b>	<b>Inflation</b>	<b>Exchange rate appreciation</b>	<b>Rule of law</b>	<b>Standard deviation of inflation</b>	<b>S&amp;P sovereign rating</b>	<b>Private credit</b>	<b>GDP growth</b>
BCP overall compliance index	1							
Inflation - 0.	0.255 020	1						
Exchange rate appreciation 0.	0.273 012	-0.725 0.000	1					
Index of rule of law 0.	0.654 000	-0.275 0.012	0.265 0.014	1				
Standard deviation of inflation 0.	-0.214 052	0.664 0.000	-0.361 0.001	-0.347 0.001	1			
S&P sovereign rating 0.	0.598 000	-0.447 0.001	0.458 0.001	0.865 0.000	-0.463 0.000	1		
Private credit 0.	0.549 000	-0.355 0.001	0.342 0.001	0.770 0.000	-0.331 0.002	0.669 0.000	1	
GDP growth	-0.045 0.681	0.041 0.711	0.046 0.674	-0.099 0.364	0.124 0.264	0.036 0.794	-0.195 0.072	1

**Table A4. Cross-Correlations--Bank-Level Variables**

	Z-score	Non-commercial bank dummy	Rated banks dummy	Net loans/total assets	Total assets	Overheads/total assets
Z-score	1					
Non-commercial bank dummy 0.0.	120 000	1				
Rated banks dummy 0.	-0.003 832	-0.194 0.000	1			
Net loans/total assets 0.	0.142 000	0.082 0.000	0.006 0.704	1		
Total assets 0.	0.007 680	0.097 0.000	0.268 0.000	0.088 0.000	1	
Overheads/total assets	-0.069 0 0.000	.018 0.206	-0.006 0.697	-0.026 0.077	-0.027 0.063	1

**Tables A5. Cross-Correlations: Individual BCP Chapters**


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	<b>Chapter 1</b>	<b>Chapter 2</b>	<b>Chapter 3</b>	<b>Chapter 4</b>	<b>Chapter 5</b>	<b>Chapter 6</b>	<b>Chapter 7</b>
Chapter 1	1						
Chapter 2	0.594 0.000	1					
Chapter 3	0.622 0.000	0.679 0.000	1				
Chapter 4	0.609 0 0.000 0.	.688 0 000 0.	.828 000	1			
Chapter 5	0.579 0 0.000 0.	.597 0 000 0.	.621 000	0.680 0.000	1		
Chapter 6	0.596 0 0.000 0.	.393 0 000 0.	.504 000	0.434 0.000	0.489 0.000	1	
Chapter 7	0.646 0 0.000 0.	.653 0 000 0.	.627 000	0.669 0.000	0.572 0.000	0.497 0.000	1

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**Table A6. Sample Size and Composition**

<b>Sample</b>	<b>Characteristics</b>	<b>Number of Banks (excluding Japan)</b>	<b>Number of Banks (including Japan)</b>
Rated banks	Includes all banks with Moody's rating	423	461
Commercial banks	Includes all commercial banks	2,594	2,760
Regulated banks	Includes commercial banks, cooperative banks, real estate and mortgage banks, and savings banks 2,	981	3,823
All banks	Includes regulated banks and investment banks/securities houses, medium and long-term credit banks, nonbank credit institutions, specialized government credit institutions	3,974	4,906

Source: Bankscope Database.

**Table A7. Variable Definitions and Sources**

<b>Variable</b>	<b>Definition</b>	<b>Source</b>
Z-score	Log of ((Return on equity-equity/assets)/s.d. return on equity )	Bankscope
Net loans/total assets	Net loans, in percent of total assets	Bankscope
LogTA	Log of total bank assets	Bankscope
Overheads Ove	head costs/assets	Bankscope
Index of Rule of Law	Average 1996-2002 of Index of Rule of Law	Kaufman, Kraay and Mastruzzi (2003)
Inflation	Average annual inflation rate over the previous 5 years	World Bank, World Development Indicators (WDI)
Standard deviation of inflation	Standard deviation of inflation over the previous 5 years	World Bank, World Development Indicators (WDI)
Real GDP growth	Average annual real GDP growth over the previous 5 years	World Bank, World Development Indicators (WDI)
Appreciation	Average annual appreciation of the nominal exchange over the previous 5 years	World Bank, World Development Indicators (WDI)
Private credit	Ratio of bank credit to the private sector to GDP	World Bank, World Development Indicators (WDI)
Index of sovereign rating	Moody's country sovereign rating	S&P's RatingDirect