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# **MEASURING THE QUALITY OF BANK REGULATION AND SUPERVISION, WITH AN APPLICATION TO TRANSITION ECONOMIES**

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# **Measuring the Quality of Bank Regulation and Supervision, with an Application to Transition Economies**

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## **Abstract**

This study develops a method to evaluate the quality of a legal framework for bank regulation and supervision (RS) by developing an extensive set of criteria and a coding system. Using this method, we generate an original set of measurements for RS by evaluating the letter of banking laws of 23 transition economies. In doing so, we also utilize the Basle guidelines on banking supervision and the related literature. The indices of RS indicate that legal banking reforms in Poland, Hungary and Estonia have been more ambitious than the rest of the countries in transition. In general, however, banking laws in transition economies indicate a lower regulatory and supervisory quality than indicated by the German banking law, if one is willing to choose the latter as a benchmark.

This data set permits an empirical analysis of the relationship between legal RS and macroeconomic performance. The empirical evidence in the paper shows a significant positive relationship between RS and real GDP growth in transition economies.

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## I. Introduction

Financial sector development is closely associated with bank performance given that a major part of the financial sector is still accounted for by banks in a large part of the world. Banks play an essential role in resource allocation so long as depositors have confidence in the banking system's ability to pay the contracted return. Efficient transmission of resources by banks, however, can be threatened by adverse selection and moral hazard problems.

Legal and institutional arrangements that force efficiency in resource allocation contributes to the soundness of the banking sector via reducing both the likelihood and the cost of such problems. Appropriately designed legal regulatory and supervisory frameworks and deposit insurance schemes constitute an essential part of such arrangements for a sound banking sector.

Achieving a sound banking system via good regulation and supervision is not an end in itself for it also contributes to macroeconomic growth via improving efficiency in resource allocation.<sup>1</sup> This paper's contribution is twofold. First, it develops a general framework to evaluate the legal environment for regulation and supervision of the banking sector. In doing that, it proposes an extensive list of criteria (a total of 98 criteria) to measure the quality of bank regulation and supervision (RS) based on banking laws. Second, using these criteria we construct indices of RS to empirically investigate the linkage between the legal framework for bank regulation and supervision, we empirically investigate the linkage between bank regulation and supervision quality and growth in transition economies.

Banking laws lay out regulations with regards to bank ownership, management, asset structure, operations and reporting-recording requirements, besides other issues. We argue that the more rule-based the legal regulatory framework, the more transparent, and thus easy

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<sup>1</sup> Levine (1997) provides an excellent review of the literature and discussion on the relationship between financial market development and growth.

to monitor, are the bank operations. This helps to reduce the adverse selection and moral hazard problems in the banking sector.<sup>2</sup> It is important to note, however, that the quality of regulation does not necessarily mean strictness of regulation. Rather, the quality means the extent of coverage of the regulatory framework, along with appropriate safeguards against the risks in the banking sector.

Good supervision reduces the likelihood and the extent of excessive risk taking by banks. As a vehicle to ensure effective implementation of the regulatory practices, supervision of the banking system is therefore as important for the health of the banking sector as regulation. In addition, a -- carefully designed-- deposit insurance scheme helps to improve the quality of both regulation and supervision by mitigating the likelihood of the moral hazard problem in the banking sector.

While these are all pertinent issues, measuring the quality of banking regulation and supervision is not a simple task. To perform this task as objectively as possible, we thus use various sources to develop a comprehensive set of measurement criteria. Among these sources, we primarily utilise the Basle Core Principles (BCP, henceforth)<sup>3</sup>, other Basle guidelines and documents, and the banking laws of individual countries. In addition, we utilise the recent literature on financial sector stability, most notably, Goodhart (1995), Folkerts-Landau and Lindgren (1998), Caprio (1998), Demirguc-Kunt and Detragiache (1999), that provide insights into various issues of importance for prudent bank regulation, supervision and deposit insurance.

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<sup>2</sup> Based on Camelot rankings of bank regulation and regulatory environment, Caprio (1998) argues for the positive linkage between the laxity of regulatory framework for the financial sector and the extent of banking crises in 1997 for 12 Asian and Latin American countries. (Camelot rankings are based on capital, asset quality, management, earnings (which is not employed by Caprio [1988]) and liquidity)

<sup>3</sup> BCP have been outlined in 1997 by the Basle Committee for Banking Supervision as the guiding principles of banking regulation. The principles are initially composed of those pertaining to licencing, structural reforms, regulation and supervision, information criteria and overseas banking.

The list of criteria we thus propose covers eight main categories of information that appear in a standard fashion in banking laws: A) capital requirements; B) lending; C) ownership structure; D) directors and managers; E) reporting/recording requirements; F) corrective action; G) supervision and; H) deposit insurance. Each of these categories is composed of several subcategories so as to take into account as much information provided in banking laws as possible. For each such subcategory, we then develop a codification system that quantifies the information that are mostly of a qualitative nature (see Appendix 1).

Utilising this quantification procedure, we then obtain aggregate measurements of the quality of bank regulation and supervision. To do this, we follow two main procedures: 1. We first take simple (unweighted) averages of the set of criteria composing each of the eight categories and then take the simple averages of the resulting eight main numbers. 2. We employ a principle components analysis, which reduces the number of variables from 98 to only a few. The indexes of RS obtained through the first procedure also permit a systematic documentation of the legal quality of bank regulation and supervision across countries.<sup>4</sup>

Next, we empirically analyze the relationship between the legal quality of RS and growth. The current study focuses on transition economies that have all adopted new banking laws as part of their wide-ranging economic reforms since the end of the 1980s. These countries have, however, recently undergone many other institutional changes that may have also affected their growth performances. Hence, to single out the impact of the quality of RS on growth, we also control for the degree of liberalization, measured by de Melo et al (1996),

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<sup>4</sup> To our knowledge, the only other study of a similar nature is that by Cleassens (1997), who, on the basis of a questionnaire containing 16 questions, develops an index of bank regulation and supervision for 25 transition countries. That index is based on the respondents' perception of the quality of bank regulation and supervision. The author then uses that index to analyse its relation with various types of banking reform strategies, concluding that decentralized institution-building and penalising weak banks are important for reform.

the rule of law<sup>5</sup>, and initial level of per capita GDP. The empirical analysis provides suggestive evidence for the significant positive relationship between the quality of bank regulation and supervision and growth.

The remainder of the paper is organised as follows. Section II presents the method to measure the quality of banking regulation and supervision. An application of this framework to transition economies is reported in section III, where we report the results of the panel data analysis of the relationship between RS and the rate of growth. Concluding remarks are provided in Section IV.

## II. Measuring the Quality of Bank Regulation and Supervision

While banks act with the profit motive and may therefore be willing to take risks, their operations may not always be in the interest of the banking system or of the society as a whole. In addition, there are various sources of uncertainty in the financial system due not only to the domestic but also increasingly the global financial and economic factors. Bank regulation and supervision (RS) is therefore of great importance in achieving a stable banking system as part of the overall economic stability. Good regulation and supervision does not only ensure depositor safety, through various channels such as transparency in bank operations via reporting and recording requirements, but also banks' own safety, through prudent lending and capital controls. A healthy banking system also requires bank management and operations to be subject to prudent regulations and careful monitoring.

Basle Committee on Banking Supervision<sup>6</sup> has outlined Core Principles (BCP) in 1997 as a basic reference for authorities to implement bank supervision effectively. Among

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<sup>5</sup> Measured by the "Corruption Perception Index" provided by Transparency International.

these principles are those pertaining to licensing, methods of regulation and supervision, information requirements and cross-border banking. Nevertheless, BCP guidelines do not provide the detail and the extent of the coverage of most of the criteria we propose in this paper. Rather, it provides general guidelines for improving bank regulation and supervision.

In addition to the BCP, we utilize the main elements of a successful deposit insurance (DI) scheme reported by Demirguc-Kunt and Detragiache (1999) based on a cross-sectional study of banking system stability. We view that a successfully designed DI complements the quality and effectiveness of bank regulation and supervision.

Our method to evaluate the quality of RS is primarily based on the examination of the letter of banking laws, in view of both the BCP guidelines and the related literature. In doing this, we develop a comprehensive list of criteria by initially grouping the type of information that can be obtained from banking laws under eight main categories: A) capital requirements; B) lending; C) ownership structure; D) directors and managers; E) reporting/recording requirements; F) corrective action; G) supervision and; H) deposit insurance.

Who performs the function of the regulatory and supervisory agent has attracted a measure of attention in the literature (see, for example, Goodhart [1995]). It is argued, on the one hand, that the central bank should be involved in regulation as the lender of last resort. As an agent that should primarily care about price stability, however, the central bank is not the most appropriate agent to perform this function. The role of the government in bank regulation, on the other hand, should also be limited in order to minimize political involvement in bank activities and rescue operations. Since this debate is unresolved in the literature, we refrain from an attempt to form a criterion regarding this aspect of RS.

A detailed inspection of banking laws leads us to develop a total of 98 criteria that appear relevant for measuring the quality of RS that we all coded from the letter of individual

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<sup>6</sup> A committee of banking supervisors that works on strengthening financial stability throughout the



banking laws<sup>7</sup>. The following is an outline of the various criteria considered under each of the above eight categories, as well as the rationale for considering them: A) *Capital requirements*: minimum capital requirement at licensing; limitations on holding risky assets and; restrictions on capital acquisitions all intend to fulfil the purpose of limiting excessive risk taking by banks.<sup>8</sup> B) *Lending*: Establishing and fulfilling credit standards are of utmost importance for the health of the banking system. Hence, limitations on price, interest and exchange rate risk in lending; existence of background checks for the borrowers; limitations on the amount of lending either to a single borrower (related party, employee, manager or otherwise) or on the aggregate; decision taking for lending to big borrowers and managers and; limits on lending to the government all provide important information to measure RS. Detailed information on each of the above helps identify and monitor the credit risk in the banking system. C) *Ownership structure*: information on the financial standing of shareholders; limitations on shareholding and; transfer of shareholders are all geared to attain, and maintain, prudent financial standards in the banking system. D) *Directors and managers*: qualification restrictions on bank directors and managers intend to measure the competence, trustworthiness and accountability of bank administration, which are all important for prudence in bank activities. E) *Reporting-recording requirements*: information on operating plan; systems of control and internal organisation; time-coverage of financial projections; the extent of detail on on-site supervision and; the coverage and frequency of reporting requirements all allow for close monitoring of banks' performance. Besides, they all help to establish prudent business practices and to prevent fraud, banks' imprudent behaviour and excessive risk taking. F) *Corrective action*: in cases of ineffective

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world.

<sup>7</sup> The banking laws were obtained mostly by mail request from individual countries' central banks, from the internet site [www.GBLD.org](http://www.GBLD.org), or the web-sites of central banks.

regulation that results in the accumulation of bad loans, illiquidity or insolvency of a bank, supervisory agent may intervene in different ways, such as assigning a conservator or a liquidation trustee, providing credit, removal of the licence, imposing penalties or restricting bank activities. The detail of information that identifies the cases leading to such corrective action gives a measure of transparency and efficiency in the banking system. G) *Supervision*: the extent of information both provided in supervisory reports<sup>9</sup> and with respect to rights and duties of the supervisor help to measure the effectiveness with which the implementation of regulatory standards are monitored. H) *Deposit insurance (DI)*: the list of "desirable features" of a DI scheme draws upon the study by Demirguc-Kunt and Detragiache (1999). The rationale for including DI in the measurement of RS is that, when incorrectly designed, DI leads to the problem of moral hazard and that leads banks to become willing to undertake riskier projects than otherwise. Hence, unless appropriately designed, deposit insurance schemes may challenge the effectiveness of regulatory and supervisory practices.

In Appendix 1, we report the list of criteria outlined above, as well as their codification method to obtain an index measure of the quality of RS. The codification method ranks the information from 1 to 0, where 1 indicates the best quality.<sup>10</sup>

Using these codes, we then obtain aggregate measures of RS by means of two procedures. 1. We first take an unweighted average of the codes under each of the eight categories, leading to eight indices for each of the main categories labelled as A to H above.

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<sup>8</sup> BCBS reports in "Capital requirements and bank behaviour" (1999) the positive real effects of a successful implementation of these principles.

<sup>9</sup> For this part, we particularly utilised the recent Basle report (Core Principles Methodology, October 1999) in ascertaining the extent of detail that should be provided in banking laws for effective supervision. In the same report, information regarding corporate governance of banks are detailed, although we observe that current banking laws of transition economies have not handled this issue with the same emphasis.

We then take another unweighted average of the eight indices, resulting in an aggregate index of RS, which we call RSu. 2. As alternative to the unweighted averaging method, we apply a principle component analysis<sup>11</sup> in two different ways. a) Firstly, we obtain principle components derived from the entire set of ninety-eight codes, regardless of the eight main categories described above that each of those criteria are grouped into. The resulting number of principle components is four; we label them as PCa1 PCa2 PCa3 and PCa4. b) Secondly, we obtain principle components initially for each of the eight categories, and then subject the resulting 17 principle components (as the number of principle components for each of the eight main categories varies)<sup>12</sup> to a second round of analysis that produces three principle components, which we label: PCb1 PCb2 and PCb3. Tables A2.a and A2.b of the Appendix report the principle components of both type PCa and PCb.

Table 1 provides a ranking of countries with respect to RSu. According to this table, the current banking laws of Poland, Hungary and Estonia indicate the highest quality of RS in the list of transition economies, while the former banking law of Armenia and Latvia, and the current banking law of Moldova rank the lowest in the list. Due to lack of data for post 1997 period, however, current banking law of Poland is not included in the empirical analysis.

As a point of reference, we also looked at the most recent banking law of Germany, as a country that should closely reflect the Basle Core Principles. The coding of RSu for Germany is: 0.54, which is larger than all the countries' RSu in our list, with the exception of the 3<sup>rd</sup> Polish banking law.

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<sup>10</sup> We arrive at these normalized codes by rescaling the codes in Appendix I between zero and one, such that code 1 under any criterion in Appendix I remains to be 1, and the highest number under each criterion is rescaled to 0, with other codes in between are rescaled accordingly.

<sup>11</sup> Principle component analysis is used to represent information contained in 98 variables that measure RS by means of such few combinations of those 98 variables that are constructed to account for the highest variation among the ninety-eight (see, for example, Greene, pp. 271-73).

**Table 1:** Ranking of country - banking laws with respect to RSu.

Country	Year of Enactment of the Banking Law	RSu
Poland (3)	1997	0.68
Hungary	1994	0.48
Estonia	1994	0.42
Albania	1996	0.34
Kazakhstan (2)	1995	0.33
Macedonia	1994	0.30
Czheck Republic	1992	0.26
Slovak Republic	1992	0.26
Croatia (2)	1996	0.26
Armenia (2)	1996	0.26
Croatia	1993	0.25
Bulgaria	1992	0.25
Azerbaijan (2)	1996	0.24
Poland (2)	1993	0.23
Poland	1989	0.23
Latvia (2)	1995	0.23
Georgia (2)	1996	0.22
Slovak Republic (2)	1996	0.20
Kirgizstan	1991	0.20
Lithuania	1992	0.20
Kazakhstan	1993	0.16
Uzbekistan	1994	0.16
Slovenia	1992	0.14
Uzbekistan	1991	0.14
Belarus	1992	0.12
Georgia	1991	0.12
Ukraine	1993	0.11
Russia	1996	0.09
Azerbaijan	1992	0.07
Tajikstan	1991	0.07
Armenia	1992	0.06
Moldova	1991	0.04
Latvia	1992	0.03

Note: Numbers in parentheses next to the countries indicate the order of enactment of the banking laws, if not the first one since 1989.

### III. The relationship between RS and Growth

Part 1 of this section describes the data, its coverage and sources, and the method of the empirical analysis. Part 2 reports the main results of the estimation. Part 3 provides a close look into the individual components of RS.

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<sup>12</sup> The number of principle components are selected on the basis of eigen-values drawn from a procedure that maximizes the data variance.

### III.1. Data and the Estimation Method

The sample of the current study comprises 23 transition economies that are the formerly centrally planned central and east European countries and countries that broke off from the former Soviet Union (FSU).<sup>13</sup> Since the beginning of reforms at the end of the 1980s, eight of these countries have adopted two banking laws (or amended their banking laws twice) and one of them (Poland) has adopted three banking laws (or amended its banking laws three times).

In view of the wide ranging reforms that almost all transition economies have undergone since the beginning of the 1990s, this study also takes into account a measure of degree of liberalization, an index called CLI<sup>14</sup>, which is developed by De Melo et al (1996). It may be argued that countries that have better economic conditions at the start of the reforms also have the political capacity to reform and establish better institutions. Hence, such an initial effect may be the cause of both better institutions and better post-reform economic performance. In assessing the role of RS on growth, the current empirical analysis, therefore, also controls for levels of GDP per capita (in logarithms) at the year of the enactment of banking laws (InitGDPpc), as a measure of initial conditions.

The time coverage for the empirical analysis is chosen to be the period following the enactment year of the last banking law. In case a country has enacted two banking laws, the first period for that country begins with the year following the enactment year of the first banking law until, and including, the year of enactment of the next law; and the second period

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<sup>13</sup> The sample excludes Romania, Bosnia, contemporary Yugoslavia and Turkmenistan due to data deficiencies.

<sup>14</sup> CLI stands for "Cumulative Liberalization Index", which is a combined index of internal and external price liberalization and other market reforms including privatization that is reported cumulatively over time.

for that country covers the period after the year of enactment of the second banking law until 1998, which is the last year of the available data.

Since 1989, there have been more than one enactment of banking laws in nine (Armenia, Azerbaijan, Croatia, Georgia, Kazakhstan, Latvia, Poland, Slovakia and Uzbekistan) of the sample countries. By the construct of time periods described above, this leads to a panel data of 32 observations. Appendix table A3 reports the country list, the years of enactment of the banking laws and the time coverage for each country-observation. Data on real growth rates are used in averages over the periods identified for each country - observation. As CLI is measured cumulatively over the years, however, we take the value of CLI that corresponds to the median year of the period under consideration. Table 2 reports the sample correlations among the control variables used in the following empirical analysis.

**Table 2:** Correlations between the control variables:

	Rsu	CLI	Corr	InitGDP
Rsu	1			
CLI	0.59	1		
Corr	0.40	0.28	1	
InitGDP	0.51	0.63	0.63	1

In the regressions below, we estimate real growth using ordinary least squares with heteroskedasticity-corrected error terms.<sup>15</sup> Appendix Table A4.b reports the panel data used in the empirical analysis. The source for growth and GDP data is the Transition Report Update, European Bank for Reconstruction and Development, 1999.

<sup>15</sup> The current data set is not suitable for using either random effects or fixed effects models since many of the countries in the sample have only one observation over time. In case of either random or fixed effects formulations, this attribute of the data would therefore lead to biases in the estimated parameters.

### III.2. Empirical Evidence

In this part, we empirically investigate the relationship between RS and real GDP growth. We hypothesise that, not only as an institutional element but also as an indicator of the political will to reform the economy, RS has effects on the growth performance.

**Table 3:** Dependent Variable: Real growth rate of GDP

Explanatory variables:	I	II	III
C	-7.85*** (-4.11)	-1.10 (-1.22)	-0.72 (-0.87)
RSu	34.6*** (4.46)		
PCa1		-0.32 (-0.38)	
PCa2		2.28** (2.54)	
PCa3		2.36** (2.51)	
PCa4		2.06** (2.08)	
PCb1			2.26*** (2.56)
PCb2			2.53*** (2.76)
PCb3			2.54*** (3.30)
R-bar square:	0.32	0.27	0.34
Degrees of freedom:	30	27	28

Note: Numbers in parentheses are the t-ratios; \*\*\* indicates significance at 1% level, \*\* indicates significance at 5% level.

Table 3 reports the regression of real growth on alternative measures of RS, namely RSu, PCa (4 principle components) and PCb (3 principle components) described in section II. According to the table, all types of aggregate measures of RS appear to have significant positive relationship with growth. While RSu yields higher significance than any single principle component, all principle components, except for the first one of the first method (Pca1) are also significant. With regards to the goodness of fit, there is no major difference

among the alternative measures of RS in explaining growth. Hence, we use only RSu in the remainder of the empirical analysis in order to gain degrees of freedom.

Table 4 reports the results of robustness analysis, where we investigate the performance of RS after including other variables that may also affect growth. The variables we add consecutively into the regressions are CLI, Corr, InitGDPpc and MultRS. Corr stands for the *Corruption Perception Index*, higher values of which indicating greater rule of law.<sup>16</sup> The reason for including this variable is to isolate the effect of RS, which is merely based on banking laws, after controlling for the effect of rule of law on growth.<sup>17</sup> MultRS is an interactive term between RS and a dummy variable that takes the value of one for observations corresponding to the cases of more than one banking law enactment, and zero otherwise. The reason for including this interactive term is as follows. Many transition economies adopted banking laws early in the process of their wide-ranging reform attempts. While these laws were possibly modelled after developed country laws, they may, at least initially, not reflect the actual quality of RS that transition economies were politically capable of supporting. Hence, we hypothesise that the revised banking laws would better reflect the actual capacity, or will, of these countries to reform their legal frameworks than the earlier ones. It is worth noting that seven out of nine countries that have more than one banking law enactment<sup>18</sup> have revised banking laws in either 1995 or 1996. This may also be the result of

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<sup>16</sup> The index is published by Transparency International and available on the internet site "<http://www.transparency.de/documents/cpi/index.html>" for the year 1999.

<sup>17</sup> We try the same runs with the alternative index of the Rule of Law as in Pistor et al (2000). We do not report those results here since they are virtually the same as those obtained by the Corruption Perception Index.

<sup>18</sup> The complete list of the countries that have enacted more than one banking law since 1989 are Armenia (1996), Azerbaijan (1996), Croatia (1996) Georgia (1996), Kazakhstan (1995), Latvia (1995), Poland (1993), Slovakia (1996) and Uzbekistan (1994).



the global recognition of the increasing importance of good regulatory and supervisory frameworks.

**Table 4:** Dependent Variable: Real GDP growth

<u>Explanatory variables:</u>	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>
Constant	-9.39*** (-3.85)	-11.01*** (-3.16)	-17.07** (-2.30)	-15.17** (-2.24)
RSu	24.79*** (3.44)	20.35** (2.31)	20.25** (2.26)	9.4 (1.22)
CLI	1.01* (1.74)	0.89 (1.60)	0.52 (0.71)	0.71 (1.33)
Corr		0.98 (1.11)	0.43 (0.42)	2.07** (2.07)
InitGDPpc			1.33 (1.00)	0.23 (0.18)
MultRS				28.9 *** (3.73)
R-bar square:	0.35	0.31	0.30	0.51
Degrees of freedom:	29	27	24	23

(Note: numbers in parentheses are the t-ratios; \*\*\* indicates significance at 1% level, \*\* indicates significance at 5% level, \* indicates significance at 10% level.)

In column 1 of Table 4, we observe that although the addition of CLI into the regression slightly improves the goodness of fit as compared to the first column of Table 3, CLI itself is significant only at 10% level of confidence. Columns II and III show that neither rule of law (Corr) nor initial level of GDP (InitGDP) are significant; furthermore, they reduce the goodness of fit of the regression as compared to column 1 of Table 3 or Table 4. In addition, the positive effect of CLI on real growth observed in column 1 disappears in regressions II and III, due possibly to the multicollinearity problem that can be observed in Table 2. In column IV, however, we observe that the inclusion of MultRS improves the adjusted R-square of the regression to 51%. Though RSu loses its significance in this run,

MultRS term is significant at 1% level that supports the above argument justifying its inclusion. In this regression, Corr also appears significant at 5% level. In a separate regression (not reported) that employs only the constant term, RSu, CLI and MultRS as the right hand side variables, however, we observe that the coefficients of RSu and MultRS are both significantly positive, at 1% level. Hence, we conclude that, keeping other things constant, higher quality of bank regulation and supervision is associated with higher degrees of real growth and revised banking laws reinforce these results.

### **III.3. A Closer Look Into the Components of RS**

We next separately investigate the effects of each of the eight main components of RSu on growth. To do this, we run OLS regressions with robust errors as above(not reported). It is not appropriate to run a regression with all the eight components since many of the eight categories, marked A to H in Appendix 1, are highly correlated with each other. Those components of RS that exhibit at least 50% correlation are A and D, A and G, C and D, C and E, C and G, D and E, D and G, E and G, and F and G. Among these, E (reporting and recording requirements) is correlated with both C (ownership structure) and D (directors and managers) by more than 70%.

We next look at the composition of the principle components, both of type PCa and PCb. A close inspection of Appendix 2 reveals that the first principle component of type PCa attaches greater weights to some components of A, B, C, D, E and G that intend to measure the quality of RS with respect to, in that order, capital requirements, lending, ownership structure, directors and managers, reporting recording and supervision. More specifically, composition of the first principle component relies heavily on the explicit definition of liable capital, presence of a system to evaluate borrower creditworthiness, credit exposure, the nature of participating agents in the decision of lending to managers and big borrowers, presence of dual control, and the auditing and supervisory standards. Different emphases,

however, are observed in the second, third and the fourth components of type PCa, as well as in the components of type PCb. The first principle component of type PCb gives higher weights to capital adequacy (category A), lending (category B), directors and managers (category D) and reporting recording requirements (category E).

It is also interesting to note in both Table A2.a and A2.b that the various components of deposit insurance take either a negligible part or enter with a negative sign in the composition of the first principle components of both type PCa and type PCb. This may indicate that the existence of deposit insurance does not bode well with the rest of the criteria designed to measure the quality of RS.

#### IV. Concluding Remarks

This article develops a general framework to measure the quality of bank regulation and supervision (RS) based on the evaluation of banking laws. Using a total of ninety-eight criteria, we form aggregate measures of RS, both by simply averaging the indices for the eight main aspects of RS and by principle components analysis.

Using panel data on 23 transition economies, we then perform OLS estimation of real GDP growth with heteroskedasticity-corrected error terms. The empirical analysis presents evidence that the higher the quality of RS, the higher is the real growth rate. The effect of RS on growth remains after controlling for the degree of liberalization (CLI). Other things being constant, the effects of RSu on growth are much more pronounced in cases of more than one banking law enactments since the reforms have started in the early 1990s. In most transition economies, these revisions of banking law took place later than 1994. This may indicate that, keeping other factors constant, revised versions of banking laws better reflect the economic and political realities of transition economies than the early adopted versions of banking laws that were possibly of the nature "one size fits all".

The current study thus provides suggestive evidence that, given the level of market liberalization and the degree of central bank independence in transition economies, an increase in the quality of bank regulation and supervision (RS) is significantly associated with an increase in the growth rate. Hence, this study provides empirical support for strengthening bank regulation and supervision that emerged as the main policy proposal in the aftermath of the recent financial and economic crises.

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## **APPENDIX 1. LIST OF CRITERIA FOR MEASURING THE QUALITY OF BANK REGULATION AND SUPERVISION**

(Note: Under each criterion, the ranking of (1) indicates the highest quality, while higher numbers indicate lower quality)

### **A. Capital Requirements**

#### **1. Minimum capital at licensing**

- a. Minimum capital
  - (1) nominal amount
  - (2) determined by supervisor
  - (3) no comment

#### **2. Capital adequacy**

- a. Maximum liability ratio (risky assets / liable capital) of a bank should be
  - (1) 5 % of liable capital
  - (2) 10% of liable capital
  - (3) over 10 % of liable capital not mentioned
- b. Is liable capital explicitly defined?
  - (1) yes
  - (2) no
- c. Is there any extra capital required to cover losses?
  - (1) yes
  - (2) no

#### **3. Major acquisitions and investments**

- a. Maximum aggregate amount of investment
  - (1) 20 % of its own funds
  - (2) 40 % of its own funds
  - (3) 60 % of its own funds
  - (4) 80 % of its own funds
  - (5) no restriction
- b. Instead of repayment of a loan, a juridical person's capital may be owned for
  - (1) more than 3 years
  - (2) 2 years
  - (3) 1 year
  - (4) no comment
- c. Maximum amount of capital of any juridical person a bank may participate is
  - (1) 5 % of its own funds
  - (2) 10% of its own funds

- (3) 20% of its own funds
- (4) no comment

d. Maximum aggregate amount of investment on juridical persons

- (1) 20 % of liable capital
- (2) 40 % of liable capital
- (3) 60 % of liable capital
- (4) 80 % of liable capital
- (5) no comment or higher

## **B. Lending**

### **1. Lending to Private Sector**

a. May supervisors prohibit emergency loans?

- (1) yes
- (2) no

b. Maximum total amount of certain positions of a bank involving price risks at close of business any day

- (1) 10 % of liable capital
- (2) 20 % of liable capital
- (3) 30 % of liable capital
- (4) 50 % of liable capital
- (5) more than 50 % of liable capital or not mentioned

c. Maximum total amount of certain positions of a bank involving exchange rate risks at close of business any day

- (1) 10 % of liable capital
- (2) 20 % of liable capital
- (3) 30 % of liable capital
- (4) 50 % of liable capital
- (5) more than 50 % of liable capital or not mentioned

d. Maximum total amount of certain positions of a bank involving interest risks at close of business any day

- (1) 10 % of liable capital
- (2) 20 % of liable capital
- (3) 30 % of liable capital
- (4) 50 % of liable capital
- (5) more than 50 % of liable capital or not mentioned

e. Is there a defined system to evaluate the creditworthiness of borrowers?

- (1) yes
- (2) no

f. Does a bank investigate balance sheet of the borrower to evaluate the financial standing?

- (1) yes
- (2) no or not mentioned



g. Maximum aggregate credit for one borrower

- (1) 25 % of liable capital
- (2) 50 % of liable capital
- (3) 75 % of liable capital
- (4) over 75 % or not mentioned

h. Maximum aggregate credit for one related party

- (1) 25 % of liable capital
- (2) 50 % of liable capital
- (3) 75 % of liable capital
- (4) over 75 % or not mentioned

i. Maximum aggregate credit for one single sector

- (1) 25 % of liable capital
- (2) 50 % of liable capital
- (3) 75 % of liable capital
- (4) over 75 % or not mentioned

j. Maximum aggregate credit that may be given to borrowers

- (1) 10 times capital
- (2) 20 times capital
- (3) 30 times capital
- (4) over 30 times of capital or not mentioned

k. Maximum aggregate credit that may be given to related parties

- (1) 1 times capital
- (2) 2 times capital
- (3) 3 times capital
- (4) over 3 times capital or not mentioned

l. Maximum aggregate credit that may be given to 10 big borrowers (large exposures)

- (1) 5 times capital
- (2) 10 times capital
- (3) 15 times capital
- (4) over 15 times of capital or not mentioned

m. Maximum aggregate credit to a single employee

- (1) 100 % of employee's salary
- (2) 200 % of employee's salary
- (3) up to 5 % of liable capital
- (4) up to 10 % of liable capital
- (5) more or unlimited

n. Maximum aggregate credit to managers

- (1) not allowed
- (2) 10 % of liable capital
- (3) 20 % of liable capital

- (4) 30 % of liable capital
- (5) over 30 % of liable capital or not mentioned

o. Who participates in the decision of lending to 10 big borrowers (large exposures)?

- (1) unanimous votes and supervisor's consent
- (2) majority votes
- (3) unanimous votes
- (4) none of the above

p. Who participates in the decision of lending to managers?

- (1) unanimous votes and supervisor's consent
- (2) majority votes
- (3) unanimous votes
- (4) none of the above

r. Rules for calculating guarantees for loans

- (1) given
- (2) not given

s. Is credit to shareholders allowed?

- (1) no
- (2) yes

## **2. Lending to the Government**

a. May banks carry out operations with budget funds on the basis of concluded contracts, carry out money transfers with the organs of executive power and municipal organs, provide for aimful use of budget funds allocated for the purpose of carrying out state and regional programs?

- (1) no
- (2) yes

b. Extending credit to government and local government to finance budget deficits allowed or not?

- (1) no
- (2) yes

## **C. Ownership structure**

### **1. Restrictions on shareholders**

a. Financial standing for shareholders wanted for

- (1) over 5 years
- (2) greater or equal to 3 years less than 5 years
- (3) greater or equal to 1 year less than 3 years
- (4) no comment

b. Financial standing of shareholders asked owning

- (1) over 1% of total shares

- (2) over 5% of total shares
- (3) over 10% of total shares
- (4) no comment

c. Maximum share one may own

- (1) 10 % of total shares
- (2) 25 % of total shares
- (3) 50 % of total shares
- (4) 75 % of total shares
- (5) more than 75 % of total shares or not mentioned

d. Source of the capital

- (1) should be proved
- (2) no comment

e. Who are restricted from being shareholders?

- (1) political parties, social funds, media
- (2) one or two of (1)
- (3) not restricted

f. Does the law prohibit selection of shareholders that are associated bank failures as a director or manager or a shareholder in the past?

- (1) yes
- (2) no

## 2. Transfer of shareholders

a. When how much shares transferred supervisor should be notified?

- (1) less than 5 %
- (2) greater or equal to 5 % less than 10 %
- (3) greater or equal to 10 % less than 25 %
- (4) greater or equal to 25 % less than 50 %
- (5) over 50 % or No comment

b. When a shareholder dies, may supervisor prohibit business?

- (1) yes
- (2) no

c. While increasing or decreasing shares when how much capital reached it should be reported?

- (1) less than 10 %
- (2) greater or equal to 10 % less than 25 %
- (3) greater or equal to 25 % less than 50 %
- (4) greater or equal to 50 % less than 75 %
- (5) no comment

## **D. Directors and Managers**

- a. Is there a rule of *dual control*<sup>(19)</sup>?
- (1) Yes
  - (2) No
- b. How much experience needed for top managers?
- (1) More than 5 years
  - (2) greater or equal to 3 years less than 5 years
  - (3) greater or equal to 1 year less than 3 years
  - (4) no clause
- c. How much experience needed for other managers (other than top managers)?
- (1) more than 5 years
  - (2) greater or equal to 3 years less than 5 years
  - (3) greater or equal to 1 year less than 3 years
  - (4) no clause
- d. Does the law prohibit selection of directors or managers who are associated bank failures as a director or manager in the past?
- (1) yes
  - (2) no
- e. Are the overseas managers also subject to c and d?
- (1) yes
  - (2) no

## **E. Reporting / Recording**

### **1. Operating Plan Systems of Control and Internal Organisation**

- a. Are qualifications about independent auditors asked in law?
- (1) yes
  - (2) no
- b. Is information about systems of control and internal organisations spelled out in the law?
- (1) yes
  - (2) no
- c. Does the law require information about qualifications of managers of the board?
- (1) yes
  - (2) no
- d. Are the duties of the managers of the board defined explicitly in the law?
- (1) yes
  - (2) no

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<sup>19</sup> Decisions should be taken by at least two managers.

## 2. Financial Projection

- a. Projected balance sheet for
  - (1) over 3 years
  - (2) 2 years
  - (3) 1 year
  - (4) no comment

## 3. Cross Border Banking

- a. Is approval from home country required when the proposed owner is a foreign bank?
  - (1) yes
  - (2) no

## 4. On-site supervision

- a. Do on-site checks exist?
  - (1) yes
  - (2) no
- b. Who does on-site checks?
  - (1) supervisor's employees
  - (2) auditors
  - (3) other or not mentioned
- c. Frequency of audits
  - (1) monthly or more often
  - (2) quarterly
  - (3) yearly
  - (4) not mentioned
- d. Is there a detailed scope for auditing report?
  - (1) yes
  - (2) no
- e. Do auditors inform supervisors about irregularities and deficiencies?
  - (1) yes
  - (2) no
- f. Does the law require background check for auditors?
  - (1) yes
  - (2) no
- g. Do the auditing reports obey the accounting standards set by the reports?
  - (1) yes
  - (2) no

## **5. Coverage of Reporting and Recording**

- a. Is there a requirement for reporting annual balance sheets?
  - (1) yes
  - (2) no
  
- b. Frequency of bank reports
  - (1) monthly
  - (2) quarterly
  - (3) semiannually
  - (4) annually
  - (5) not mentioned
  
- c. Is there any report on liquidity creditworthiness and profitability of the bank?
  - (1) yes
  - (2) no
  
- d. Does the bank notify the supervisor when there is a change in the charter?
  - (1) yes
  - (2) no
  
- e. Is there a detailed scope for supervision reports?
  - (1) yes
  - (2) no
  
- f. Are bank reports required to have a statement on risk management policies and procedures?
  - (1) yes
  - (2) no
  
- g. Does the bank report to supervisors its deposit sources?
  - (1) yes
  - (2) no

## **F. Corrective Action**

- a. Are the cases causing conservatorship defined clearly?
  - (1) yes
  - (2) no or not mentioned
  
- b. Are the cases causing liquidation trustee defined clearly?
  - (1) yes
  - (2) no
  
- c. Central Bank provides credit

- (1) under very restrictive conditions
- (2) under looser conditions
- (3) no restrictions

d. Limit of loss causing loss of license

- (1) less than 1/3 of liable capital
- (2) greater or equal to 1/3 of liable capital less than 2/3 of liable capital
- (3) greater or equal to 2/3 of liable capital

e. May the supervisor impose penalties on individual managers of the bank?

- (1) yes
- (2) no

f. May the supervisor constrain the business activities of the bank?

- (1) yes
- (2) no

## **G. Supervision**

a. Are supervisor reports published?

- (1) yes
- (2) no or not mentioned

b. Are the roles of the supervisor clearly defined?

- (1) yes
- (2) no or not mentioned

c. Does the supervisor have a say over the licensing? (if supervisor and the regulatory agent are the same then the answer will be kept as NA)

- (1) yes
- (2) no or not mentioned

d. When supervisory and regulatory agents are different, is there a close coordination between them? (if supervisor and the regulatory agent are the same then the answer will be kept as NA)

- (1) yes
- (2) no or not mentioned

e. Is the amount of investment and acquisitions that needs supervisor's approval is clearly defined?

- (1) yes
- (2) no or not mentioned

f. Does the supervisory agent have a full access to lending and investment information ?

- (1) yes
- (2) no or not mentioned

- g. Does the supervisor have a legal authority to require changes in bank management and the board?  
(1) yes  
(2) no or not mentioned
- h. Does the supervisor hold regular meetings of the bank's senior and middle management?  
(1) yes  
(2) no or not mentioned
- i. Does the supervisor have the authority to monitor the quality of work done by external auditors  
(1) yes  
(2) no or not mentioned
- j. Does the supervisor have a say on the appointment (and dismissal) of external auditors based on the expertise and independence (or the lack of it)  
(1) yes  
(2) no or not mentioned
- k. Authority to supervise the overseas activities of local banks?  
(1) yes  
(2) no or not mentioned
- l. Does the supervisor visit offshore locations-periodically?  
(1) yes  
(2) no or not mentioned
- m. Does the supervisor have the authority to close the overseas offices or to impose limitations on their activities?  
(1) yes  
(2) no or not mentioned
- n. Does the supervisor set fixed percentages for exposures to each country?  
(1) yes  
(2) no or not mentioned
- o. In case of corporate ownership of banks, does the supervisor have the authority to review the activities of parent companies and of companies affiliated with the parent companies  
(1) yes  
(2) no or not mentioned
- p. In case of corporate ownership of banks, does the supervisor have the authority to take remedial actions regarding parent companies and non-bank affiliates?  
(1) yes  
(2) no or not mentioned
- q. In case of corporate ownership of banks, does the supervisor have the authority to establish and enforce fit and proper standards for owners and senior management of parent companies?  
(1) yes



(2) no or not mentioned

r. Is there a system of cooperation and information sharing with foreign agencies that have supervisory responsibilities for banking operations of material interest to the domestic supervisor?

(1) yes

(2) no or not mentioned

## **H. Deposit Insurance**

a. Is deposit insurance (DI) coverage explicitly determined?

(1) yes

(2) no or not mentioned

b. Is there a coinsurance (by depositors, in the form of deductables on earnings)?

(1) yes

(2) no or not mentioned

c. Are foreign currency deposits covered?

(1) yes

(2) no or not mentioned

d. Are interbank deposits covered?

(1) yes

(2) no or not mentioned

e. Is DI funded (by the covered banks via premiums) ?

(1) yes

(2) no or not mentioned

f. Funded schemes are based on:

(1) Paid-up resources

(2) Callable

g. Sources of funds:

(1) Banks only

(2) Banks and Government

(3) Government

h. Is membership compulsory?

(1) yes

(2) no (-on a voluntary basis)

i. DI is managed:

(1) Privately

(2) Jointly by banks and government

(3) by the government

j. Is there a close cooperation between the management of DI and the Central Bank?

- (1) yes
- (2) no or not mentioned

k. Is there a close cooperation with the bank supervisor ?

- (1) yes
- (2) no or not mentioned

l. Are the payments (to depositors) prompt (within 30 days) ?

- (1) yes
- (2) no or not mentioned

m. Is there full coverage during crises?

- (1) yes
- (2) no or not mentioned

**APPENDIX 2: Principle Components****Table A2.a:** Composition of Pa1, Pa2, Pa3 and Pa4:

Criteria :	Components:				Criteria :	Components:			
	1	2	3	4		1	2	3	4
A1A	0.57	0.15	0.02	0.15	E4C	0.38	0.29	0.05	-0.04
A2A	0.66	0.35	0.18	0.10	E4D	0.06	0.34	0.28	0.01
A2B	0.85	-0.02	0.08	0.01	E4E	0.56	0.57	0.06	0.20
A2C	0.27	-0.06	0.36	0.02	E4F	0.15	0.19	0.48	-0.22
A3A	0.58	-0.23	-0.21	0.00	E4G	0.61	0.20	0.35	0.24
A3B	0.47	0.27	0.16	-0.08	E5A	-0.40	0.42	0.25	0.38
A3C	0.06	0.16	0.63	0.24	E5B	0.27	-0.10	0.44	-0.10
A3D	-0.16	0.47	0.36	0.12	E5C	-0.19	-0.06	0.46	-0.19
B1C	0.05	0.07	-0.05	0.24	E5D	-0.09	0.17	0.68	-0.02
B1E	0.57	-0.26	0.00	0.09	E5E	-0.09	0.17	0.68	-0.02
B1F	0.09	-0.01	0.11	0.19	E5F	0.18	0.25	0.47	-0.11
B1G	0.65	0.45	0.03	0.26	E5G	-0.18	-0.13	0.44	0.20
B1H	0.05	0.07	-0.05	0.24	F1A	-0.10	0.54	0.14	0.03
B1K	0.02	-0.20	0.40	0.11	F1B	-0.14	0.69	0.07	0.23
B1L	0.86	0.18	-0.06	0.06	F1D	-0.06	0.65	-0.33	-0.13
B1M	0.09	0.33	0.30	-0.16	F1E	0.44	0.64	0.04	0.08
B1N	0.37	0.30	0.59	0.05	F1F	0.07	0.68	0.17	0.03
B1O	0.73	-0.06	-0.19	0.23	G1A	-0.15	0.11	0.09	0.14
B1P	0.86	-0.14	-0.01	0.07	G1B	0.25	0.12	0.34	0.57
B1R	0.16	0.25	0.58	-0.13	G1E	0.27	0.74	0.08	-0.02
B2A	-0.14	-0.09	-0.08	-0.34	G1F	0.19	0.83	0.06	-0.01
B2B	-0.09	-0.03	-0.02	-0.47	G1G	0.13	0.75	0.24	0.15
C1A	-0.09	0.20	0.51	0.24	G1H	0.32	0.20	0.50	-0.33
C1B	-0.06	-0.04	0.57	0.26	G1I	0.69	0.20	0.33	-0.03
C1C	0.10	-0.16	-0.01	-0.02	G1J	0.69	0.20	0.33	-0.03
C1D	0.58	-0.26	-0.16	0.05	G1K	0.39	0.37	0.41	0.14
C1E	-0.31	-0.50	0.02	-0.21	G1L	0.30	0.22	-0.06	0.25
C1F	-0.01	0.33	0.13	-0.09	G1M	0.41	0.38	0.50	0.01
C2A	0.15	0.34	0.44	-0.40	G1O	-0.18	-0.18	0.40	0.08
C2C	0.07	0.47	0.24	0.28	G1R	0.18	0.16	0.09	0.34
D1A	0.81	-0.19	0.20	-0.09	H1A	0.04	0.48	-0.35	-0.13
D1B	0.29	0.13	0.54	0.12	H1C	0.04	0.48	-0.35	-0.13
D1C	-0.03	0.11	0.57	0.20	H1E	-0.08	0.35	-0.31	-0.62
D1D	-0.05	0.08	0.74	0.23	H1F	-0.05	0.46	-0.29	-0.63
E1A	0.10	0.22	0.36	0.05	H1G	-0.08	0.02	-0.25	-0.77
E1B	0.00	0.62	0.37	0.37	H1H	0.37	-0.03	-0.20	-0.70
E1C	-0.02	0.37	0.56	0.08	H1I	0.39	-0.39	-0.12	0.06
E1D	-0.02	0.64	0.36	0.25	H1J	0.06	0.06	0.15	-0.83
E2A	0.20	0.22	-0.14	0.55	H1K	0.06	0.06	0.15	-0.83
E3A	0.26	-0.27	0.39	0.03	H1L	-0.02	0.32	-0.12	-0.45
E4A	-0.05	0.34	0.44	0.39	H1N	0.07	-0.05	-0.09	-0.37
E4B	-0.02	0.44	0.39	0.37					

- Notes: 1. Principle components are obtained with Varimax method.  
2. Codification of criteria follow Appendix 1. Those criteria that have no variation across observations have been eliminated, resulting in 83 variables reported above.

**Table A2.b:** Composition of Pb1, Pb2 and Pb3 -- first step<sup>3</sup>

Criteria:	Component			Criteria:	Component	
	1	2	3		1	2
A1A	0.81	-0.24	0.12	E4C	0.41	-0.10
A2A	0.90	0.15	-1.30	E4D	0.56	-0.10
A2B	0.64	-0.10	0.40	E4E	0.54	-0.52
A2C	0.23	0.52	0.54	E4F	0.59	0.25
A3A	0.05	-0.12	0.86	E4G	0.60	-0.29
A3B	0.68	0.34	-1.20	E5A	0.39	0.15
A3C	0.02	0.91	8.41	E5B	0.30	0.41
A3D	-0.04	0.69	-0.36	E5C	0.09	0.20
B1C	0.02	0.97	-0.09	E5D	0.62	0.64
B1E	0.57	0.03	0.27	E5E	0.62	0.64
B1F	0.05	0.72	0.35	E5F	0.57	-0.12
B1G	0.65	0.33	0.39	E5G	0.17	0.38
B1H	0.02	0.97	-0.09	F1A	0.29	
B1K	0.10	0.05	0.43	F1B	0.29	
B1L	0.85	0.21	0.22	F1D	0.29	
B1M	-0.10	-0.08	0.77	F1E	0.27	
B1N	0.23	-0.08	0.84	F1F	0.28	
B1O	0.80	-0.13	-0.13	G1A	-0.28	0.36
B1P	0.90	-0.10	-0.01	G1B	0.39	0.18
B1R	-0.06	0.02	0.64	G1E	0.21	0.82
B2A	-0.18	-0.08	-0.27	G1F	0.29	0.76
B2B	-0.13	-0.06	-0.24	G1G	0.26	0.79
C1A	-0.30	0.85	0.01	G1H	0.22	0.49
C1B	0.01	0.90	-0.04	G1I	0.75	0.27
C1C	0.86	-0.04	0.27	G1J	0.75	0.27
C1D	0.26	-0.08	0.04	G1K	0.65	0.37
C1E	0.62	0.06	-0.45	G1L	0.73	0.00
C1F	-0.07	0.14	0.72	G1M	0.71	0.47
C2A	0.14	-0.21	0.74	G1O	0.00	-0.21
C2C	-0.62	0.22	0.37	G1R	0.76	-0.13
D1A	0.10			H1A	0.06	0.96
D1B	0.42			H1C	0.06	0.96
D1C	0.39			H1E	0.67	0.57
D1D	0.39			H1F	0.68	0.61
E1A	0.46	-0.16		H1G	0.89	0.10
E1B	0.81	-0.09		H1H	0.72	0.14
E1C	0.75	0.16		H1I	0.08	-0.18
E1D	0.75	-0.02		H1J	0.89	-0.22
E2A	0.23	-0.69		H1K	0.89	-0.22
E3A	0.08	0.00		H1L	0.57	0.03
E4A	0.62	-0.28		H1N	0.43	0.00
E4B	0.66	-0.31				

- Notes: 1. Principle components are obtained with Varimax method.  
2. Codification for criteria follow Appendix 1.  
3. Separate principle component analysis is performed for each of the eight main components. This leads to 17 principle components (number of components added up for each category from A to H) that are then subjected to a second round of analysis reported below.

**Table A2.b:** Composition of Pb1, Pb2 and Pb3 -- Continued:

Principle Components of 8 Main Categories:	Components:		
	1	2	3
A1	0.11	0.51	0.55
A2	0.67	0.16	0.04
A3	-0.06	-0.34	0.65
B1	-0.13	0.13	0.91
B2	-0.12	0.22	0.10
B3	0.69	0.33	-0.01
C1	0.04	-0.39	-0.12
C2	0.76	-0.06	-0.03
C3	0.23	0.65	-0.03
D	0.84	0.06	0.22
E1	0.40	0.62	0.38
E2	0.65	-0.03	-0.39
F	0.16	0.84	-0.07
G1	0.33	0.13	0.65
G2	0.21	0.83	-0.09
H1	-0.28	0.12	-0.19
H2	-0.22	0.48	-0.14

Note: Based on Eigen values, 3 principle components for criteria A, B and C, 2 principle components for criteria E, G, and H and 1 principle component for criteria D and F are used, as reported above.

**APPENDIX 3: Time Coverage for country-observation:**

Country	Observation	Sample Period	Enactment year of The Banking-Law
Albenia	1	97-98	96
Armenia	1	93-96	92
	2	97-98	96
Azarbaijan	1	93-96	92
	2	97-98	96
Belarus	1	93-98	92
Bulgaria	1	93-98	92
Croatia	1	94-96	93
	2	97-98	96
Czeck	1	93-98	92
Estonia	1	95-98	94
Georgia	1	92-96	91
	2	97-98	96
Hungary	1	95-98	94
Kazakhstan	1	94-95	93
	2	96-98	95
Krgyzistan	1	92-98	91
Latvia	1	93-95	92
	2	96-98	95
Lithuania	1	93-98	92
Macedonia	1	95-98	94
Moldovia	1	92-98	91
Poland	1	90 <sup>3</sup> -93	89
	2	94-97	93
Russia	1	97-98	96
Slovakia	1	93-96	92
	2	97-98	96
Slovenia	1	93-98	92
Tajikistan	1	92-98	91
Ukraine	1	94-98	93
Uzbekistan	1	92-98	91

Note: 1. The starting year of the sample periods are selected as the year following the latest of the enactment years of banking laws until the enactment of the next law or 1998, which is taken as the end of the period.

2. The third observation on Poland is not in the current sample due to lack of data on other panel variables, such as CLI.

3. Due to lack of data, the period used in the empirical analysis actually starts with 1991.

## APPENDIX 4: Panel Data

Table A4.a: Alternative measures of RS.

Country	Period	RSu	PCa1	PCa2	PCa3	PCa4	PCb1	PCb2	PCb3
Albenia	1	0.34	-0.34	0.81	0.83	0.93	0.91	0.56	0.38
	2	--	--	--	--	--	--	--	--
Armenia	1	0.06	-0.50	-0.89	-0.34	0.08	-0.28	-1.10	-0.30
	2	0.26	-0.83	0.60	0.50	0.79	0.35	0.84	-0.95
Azarbaijan	1	0.07	-0.59	-0.94	-0.41	0.15	-0.44	-0.98	-0.56
	2	0.24	-1.02	-0.98	2.22	0.45	2.35	-1.37	-0.54
Belarus	1	0.12	-0.57	-0.52	-0.55	-0.03	-0.75	-0.56	-0.22
	2	--	--	--	--	--	--	--	--
Bulgaria	1	0.25	1.20	-0.58	0.86	0.40	1.11	0.09	0.83
	2	--	--	--	--	--	--	--	--
Croatia	1	0.25	2.41	-1.09	-0.72	0.21	-0.60	-0.64	2.33
	2	0.26	3.21	-1	-0.87	0.29	-0.75	-0.44	2.52
Czcheck Republic	1	0.26	-0.13	1.76	-0.64	-2.48	-0.78	1.51	-1.21
	2	--	--	--	--	--	--	--	--
Estonia	1	0.42	0.43	1.19	2.19	0.51	2.90	0.83	0.19
	2	--	--	--	--	--	--	--	--
Georgia	1	0.12	-0.48	-0.60	-0.61	-0.74	-0.68	-0.60	-0.77
	2	0.22	-0.57	0.34	0.91	0.09	0.62	0.18	-0.49
Hungary	1	0.48	2	1.10	2.81	-1.81	1.37	1.98	0.50
	2	--	--	--	--	--	--	--	--
Kazakhstan	1	0.16	-0.56	-0.54	-0.34	0.69	-0.40	-0.18	-0.28
	2	0.33	-0.28	-0.01	1.02	1.25	1.80	-0.64	0.55
Krgyzystan	1	0.20	-0.51	-0.15	-0.08	-2.61	-0.86	-0.35	-0.69
	2	--	--	--	--	--	--	--	--
Latvia	1	0.03	-0.61	-0.44	-0.57	0.27	-0.59	-0.68	-0.10
	2	0.23	0.30	0.41	-0.29	1.35	-0.81	1.05	0.83
Lithuania	1	0.20	-0.70	0.03	0.45	0.07	0.68	0.03	-0.72
	2	--	--	--	--	--	--	--	--
Macedonia	1	0.30	0.21	2.67	-1.96	-0.75	-1.20	2.71	-0.53
	2	--	--	--	--	--	--	--	--
Moldovia	1	0.04	-0.70	-0.97	-0.26	-0.01	-0.34	-1.03	-0.76
	2	--	--	--	--	--	--	--	--
Poland	1	0.23	-0.46	1.43	-1.02	1.05	-0.69	1.31	-0.51
	2	0.23	-0.45	1.42	-1.02	1.05	-0.63	1.28	-0.54
Russia	1	0.09	-0.52	-0.72	-0.03	0.18	0.10	-0.91	-0.31
	2	--	--	--	--	--	--	--	--
Slovakia	1	0.26	-0.13	1.76	-0.64	-2.48	-0.78	1.51	-1.21
	2	0.20	-0.25	0.69	0.42	-0.21	0.85	0.44	-0.73
Slovenia	1	0.14	1.05	-0.24	-0.61	-0.27	-0.49	-0.64	1.59
	2	--	--	--	--	--	--	--	--
Tajikistan	1	0.07	-0.45	-0.70	-0.73	0.09	-0.74	-0.51	-0.55
	2	--	--	--	--	--	--	--	--
Ukraine	1	0.11	-0.67	-0.64	-0.04	-0.06	0.13	-0.92	-0.77
	2	--	--	--	--	--	--	--	--
Uzbekistan	1	0.14	-0.26	-0.99	-0.15	-1.41	-0.52	-0.95	-0.46
	2	--	--	--	--	--	--	--	--

- Notes: 1. RSu is unweighted averages of the eight main components of RS.  
2. PCa (1 to 4) and PCb (1 to 3) are two types of principle components. See Appendix 2 and see p.9 for detail.

**Table A4.b:** Data Used in the Estimation

Country	Periods	Real GDP Growth	CLI	Initial GDP per capita	Corr
Albenia	1	--	4,56	799	2,30
	2	0,83	--	--	--
Armenia	1	5,15	1,69	125	2,50
	2	-13,33	3,37	426	2,50
Azarbaijan	1	7,95	1,25	364	1,70
	2	-1,57	2,64	423	1,70
Belarus	1	--	1,79	401	3,40
	2	-2,15	--	--	--
Bulgaria	1	--	3,81	1012	3,30
	2	6,23	--	--	--
Croatia	1	4,50	4,83	2342	2,70
	2	2,07	6,53	4392	2,70
Czheck Republic	1	--	5,04	2906	4,60
	2	5,93	--	--	--
Estonia	1	--	5,26	1530	5,70
	2	-13,74	--	--	--
Georgia	1	6,95	1,36	213,7	2,30
	2	3,05	3,26	782,3	2,30
Hungary	1	--	6,38	4052	5,20
	2	-10,40	--	--	--
Kazakhstan	1	0,00	1,62	916	2,30
	2	-5,87	3,39	1008	2,30
Krgyzystan	1	--	2,63	--	2,20
	2	-5,03	--	--	--
Latvia	1	4,60	2,45	578	3,40
	2	-1,32	5,00	1780	3,40
Lithuania	1	--	4,06	514	3,80
	2	-3,99	5,39	2127	3,80
Macedonia	1	--	5,93	1500	3,30
	2	-11,40	--	--	--
Moldovia	1	-5,10	2,30	231,7	2,60
	2	--	3,80	386,4	2,60
Poland	1	6,30	2,46	2037	4,20
	2	-1,85	3,36	2234	4,20
Russia	1	--	6,05	2910	2,40
	2	3,68	--	--	--
Slovakia	1	5,45	3,90	2213	3,70
	2	3,88	6,05	3495	3,70
Slovenia	1	--	1,34	6280	6,00
	2	-10,01	--	--	--
Tajikistan	1	--	1,34	1116	--
	2	-10,02	--	--	--
Ukraine	1	--	1,90	629	2,60
	2	-1,79	--	--	--
Uzbekistan	1	--	1,69	--	1,80
	2	2,00	2,83	251	1,80

Notes: 1. Macroeconomic data is obtained from: Transition Update, 1999 of European Bank for Reconstruction and Development. CLI is due to de Melo et al (1996) and its update. CBI is due to CMN (2000). Rule is obtained from Transparency International.

2. The word "initial" refers to the year preceding the sample period.