

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

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This study develops a methodology to evaluate the quality of the legal aspect of bank regulation and supervision (RS). We use both the Basle guidelines and the letter of banking laws to form an extensive set of criteria to evaluate banking laws. As an application, we provide measures of RS for 23 transition economies. Our measurements indicate that legal banking reforms in Poland, Hungary, and Estonia have been more ambitious than the rest of the countries in transition. Controlling for various other relevant factors, empirical evidence reveals a significant positive relationship between RS and real GDP growth in transition economies. (JEL E44, G2, K29)

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 designed to achieve efficiency in resource allocation contribute to the soundness of the banking sector by 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 arrange-

ments. Achieving a sound banking system via good regulation and supervision is not an end in itself, however, as it may also contribute to macroeconomic growth via improving efficiency in resource allocation.¹

This article'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 and empirically investigate the linkage between bank regulation and supervision quality and growth in transition economies.

Banking laws lay out regulations with regard to bank ownership, management, asset structure, operations, reporting-recording requirements, and such. We argue that the more rule-based the legal regulatory framework, the more transparent, and thus easy to monitor, are the bank operations. This helps

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1. Levine (1997) provides an excellent review of the literature and discussion on the relationship between financial market development and growth. Also see Levine et al. (2000).

ABBREVIATIONS

BCP: Basle Core Principles
BCBS: Basle Committee on Banking Supervision
DI: Deposit Insurance
RS: Regulation and Supervision
GDP: Gross Domestic Product

reduce the adverse selection and moral hazard problems in the banking sector.² It is important to note, however, that the quality of regulation does not necessarily mean strictness of regulation. Rather, by *quality* we mean the extent of coverage of the regulatory framework, along with appropriate safeguards against the risks in the banking sector.³

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 improve the quality of both regulation and supervision by mitigating the likelihood of the moral hazard problem in the banking sector.

These are all pertinent issues, but measuring the quality of banking regulation and supervision is not a simple task. Like the measurement of the quality of any other institutional attribute, the approach can be mainly of two kinds: (1) evaluation of the letter of the law and (2) surveys. The main advantage of measurement based on various legal attributes is to minimize subjective evaluations regarding an institution, though it may have the disadvantage of not reflecting the practice, especially in case the law is not fully adhered to. On the other hand, although surveys focus on practice, they are also prone to possible subjective judgments of evaluators.⁴ Both approaches have their own advantages and disadvantages, but in

2. 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 [not employed by Caprio 1998], and liquidity)

3. Barth et al. (2002) demonstrate the positive linkage between banking sector performance and good, but not necessarily tight, regulatory practices based on accurate information disclosure and private sector incentives.

4. The survey approach to measuring bank regulation and supervision has been adopted in studies such as those by Claessens (1996) and Barth et al. (2001, 2002).

5. Measurement of an institutional quality based on the letter of the law has been employed by various studies. Alesina (1988), Grilli et al. (1991), Cukierman et al. (1992), and Eijffinger and Schaling (1993), for example, have all provided measurements of central bank independence (*CBI*) from the legal perspective. How well such measurements are a proxy for the actual attributes of an institution is, of course, open to debate. Eijffinger and De Haan (1996) and Berger et al. (2001), for example, argue that various measures of legal *CBI* are useful but insufficient proxies of actual *CBI*, as practice may seriously deviate from the law.

this article, we take the first approach.⁵ We nevertheless concede that additional information can be obtained by reconciling the approaches that can be complementary to each other.

To measure the legal bank regulation and supervision quality as objectively as possible, we use various sources to develop a comprehensive set of criteria. Among these sources, we primarily utilize the Basle core principles (BCPs),⁶ other Basle guidelines and documents (see BCBS 1998a,b, 1999a,b), and the banking laws of individual countries. In addition, we use the recent literature on financial sector stability, most notably Goodhart (1995), Folkerts-Landau and Lindgren (1998), Caprio (1998), and Demirguc-Kunt and Detragiache (1999) that provide insights into various issues of importance for prudent bank regulation, supervision, and deposit insurance.

The list of criteria we 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 category is composed of several subcategories 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 A).

Using this quantification procedure, we then obtain aggregate measurements of the quality of bank RS. 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 principal 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

6. BCPs have been outlined in 1997 by the Basle Committee for Banking Supervision (BCBs) as the guiding principles of banking regulation. The principles are initially composed of those pertaining to licensing, structural reforms, regulation and supervision, information criteria, and overseas banking.

7. Another study of a similar nature is that by Claessens (1996), who, on the basis of a questionnaire containing 16 questions, develops an index of bank RS for 25 transition

documentation of the legal quality of bank regulation and supervision across countries.⁷

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 degrees of liberalization (de Meb et al. 1996) and central bank independence, besides the factors that the literature suggests to affect growth, namely, governance,⁸ macroeconomic stability, openness, education, and initial level of per capita gross domestic product (GDP).⁹ The empirical analysis provides evidence for the significant positive relationship between the quality of bank RS and growth in transition economies.

The remainder of the article is organized as follows. Section II presents the method to measure the quality of banking RS. 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. Section IV provides a brief look at some banking sector performance indicators and our measures of RS. Concluding remarks are provided in section V.

II. MEASURING THE QUALITY OF BANK RS

As 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 RS is

therefore of great importance in achieving a stable banking system as part of the overall economic stability. Good RS 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.

The BCBS outlined BCPs in 1997 as a basic reference for authorities to implement bank supervision effectively.¹⁰ Among 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 article. Rather, it provides general guidelines for improving bank RS.

In addition to the BCP, we use 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 consider that a successfully designed DI complements the quality and effectiveness of bank RS.

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. As a result, we develop a comprehensive list of criteria consisting of a total of 98 criteria that appear relevant for measuring the quality of RS that we all coded from the letter of individual banking laws.¹¹ The following summarizes the eight main categories, as well as the rationale for coding them: (A) Capital requirements: minimum capital requirement at licensing; limitations on holding risky assets, and restrictions on capital acquisitions all intend to fulfill the purpose of limiting excessive risk taking by banks.¹² (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

countries. That index is based on the respondents' perception of the quality of bank RS. The author then uses that index to analyze its relation with various types of banking reform strategies, concluding that decentralized institution-building and penalizing weak banks are important for reform.

8. Measured by political stability and rule of law (due to Kaufmann et al. 2002) and the Corruption Perception Index provided by Transparency International.

9. See, for example, Easterly and Rebelo (1993), Fischer (1993), Frankel and Romer (1999), and Levine and Easterly (2000).

10. The BCBS is a committee of banking supervisors that works on strengthening financial stability throughout the world.

11. The banking laws were obtained mostly by mail request from individual countries' central banks, from the Web site www.gblid.org, or the Web sites of central banks.

12. BCBS (1999a) reports the positive real effects of a successful implementation of these principles.

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 in measuring RS. Detailed information on each of these items 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 organization, 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 establish prudent business practices and prevent fraud, banks' imprudent behavior, and excessive risk taking. (F) Corrective action: in cases of ineffective 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 license, 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 reports¹³ and with respect to rights and duties of the supervisor measures the effectiveness with which the implementation of regulatory standards are monitored. Measuring the quality of supervision alongside the quality of regulation

13. For this part, we particularly used the recent Basle report (1999c) 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.

is important because without supervision, effectiveness of regulation is not ensured.¹⁴ (H) DI: the list of "desirable features" of a DI scheme draws on the study by Demircuk-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, DI schemes may challenge the effectiveness of regulatory and supervisory practices.

In Appendix A, we report the list of criteria outlined, as well as their codification method to obtain an index measure of the quality of RS. The codification method ranks the information from 0 to 1, where 1 indicates the best quality.¹⁵

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 labeled as A to H. 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 principal component analysis in two different ways.¹⁶ (a) First, we obtain principal components derived from the entire set of 98 codes, regardless of the eight main categories into which each of those criteria are grouped. The resulting number of principal components

14. Who performs the function of the regulatory and supervisory agent has drawn 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 to minimize political involvement in bank activities and rescue operations. Because this debate is unresolved in the literature, we refrain from an attempt to form a criterion regarding this aspect of RS.

15. We arrive at these normalized codes by rescaling the codes in Appendix A between 0 and 1, such that code 1 under any criterion in Appendix A remains 1, and the highest number under each criterion is rescaled to 0, with other codes in between are rescaled accordingly.

16. Principal 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 98 (see, for example, Greene 1993, pp. 271–73). Various other papers similarly use the principal components methodology, such as de Haan et al. (2003).

is four; we label them *PCa1*, *PCa2*, *PCa3*, and *PCa4*. (b) Second, we obtain principal components initially for each of the 8 categories and then subject the resulting 17 components (as the number of components for each of the eight main categories varies)¹⁷ to a second round of analysis that produces 3 principal components, which we label *PCb1*, *PCb2*, and *PCb3*. Tables A1 and A2 report the principle components of both type *PCa* and *PCb*. The significance tests of the correlations between the factor loadings reveal that each principle component of both types is composed of a wide-ranging combination of the initial 98 codings.¹⁸ Hence it is not possible to label each principle component by the specific category of information it contains. This observation, however, indicates that the use of principal components is indeed quite appropriate for the current analysis.

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, whereas 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 inspected the most recent banking law of Germany, which is considered to closely reflect the BCPs. 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 third Polish banking law.

Interpreting the Principal Components and RSu

Appendix B details the composition of individual principal components devised for both type a and type b principal components. Because the number of codings that compose the principal components are very large, however, we next look at the relationship between our three types of RS measures and the main clusters of criteria involved in their measurement.

Appendix C reports the correlations among the clusters A to H with the principal components as well as with *RSu*. According

17. The number of principal components are selected on the basis of eigenvalues drawn from a procedure that maximizes the data variance.

18. Available from the authors on request.

TABLE 1
Ranking of Country-Banking Laws with Respect to *RSu*

Country	Year of Enactment of the Banking Law	<i>RSu</i>
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
Czech 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
Kyrgyzstan	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
Tajikistan	1991	0.07
Armenia	1992	0.06
Moldovia	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 there is more than one banking law since 1989.

to Table A4, the main determinants of the first, second, third, and fourth principal components of type *PCa* are as follows: provisions regarding corrective action and supervision (clusters F and G) have the greatest influence on the second; provisions regarding ownership, directors and managers, reporting/recording requirements, supervision (clusters C, D, E, and G, respectively) have the greatest influence on the third; and attributes of capital requirements and directors and managers (clusters A and D) have the greatest influence

on the fourth principal component of type *PCa*.¹⁹ It is interesting to note that DI (component H) is negatively correlated with the first principal component of type *PCa*, and it also has negligible contributions to *RSu* and principal components of type *Pcb*. This indicates that the elements of good design for deposit insurance proposed by Demircukunt and Detragiache (1999) do not appear to be closely related with the rest of the criteria we employ to measure the quality of RS.

As for the second type of principal components, *Pcb*, the first component is mainly composed of criteria related to ownership, directors and managers, reporting/recording requirements, and supervision (clusters C, D, E, and G, like the third principal component of the *PCa* type); the second one is composed of elements regarding corrective action and supervision (clusters F and G, like the second principal component of the *PCa* type), and the third one is mainly composed of the various attributes of capital requirements and directors and managers (clusters A and D, like the fourth principal component of the *PCa* type).

Our third overall measure, *RSu*, on the other hand, carries significant effects of all clusters, except for clusters B and H. Interestingly, like cluster H, cluster B, which is composed of provisions on lending, also appears mostly irrelevant in the composition of both the principal components and the unweighted measure, *RSu*. The robustness of these observations across different measures of RS indicates that simple averaging of the 98 coding is as good a measure of RS as the principal components method.

III. THE RELATIONSHIP BETWEEN RS AND GROWTH

The first part of this section describes the data, its coverage and sources, and the method of the empirical analysis. Then we report the main results of the estimation.

Data and the Estimation Method

The sample of the current study is made up of 23 transition economies that are the formerly centrally planned Central and East European countries and countries that broke off from the former Soviet Union.²⁰ As Table 1 shows,

eight of these countries have adopted two banking laws or amended their banking laws twice since 1989 (Armenia, Azerbaijan, Croatia, Georgia, Kazakhstan, Latvia, Slovakia and Uzbekistan), and one of them (Poland) has adopted three banking laws (or amended its banking law three times). Our data set on RS takes into account these changes in the banking laws.

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 the degree of economic liberalization, an index called *CLI*,²¹ developed by de Melo et al. (1996). Following de Melo et al. (1996) we hypothesize that *CLI* is positively related with growth. 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 postreform economic performance. In assessing the role of RS on growth, the current empirical analysis therefore also controls for levels of GDP per capita (in logs of U.S. dollars) in the year of the enactment of banking laws (*InitGDPpc*), as a measure of initial conditions.²²

In addition, we control for measures of governance, such as political stability (*PS*), rule of law,²³ and the Corruption Perception Index (*Corr*),²⁴ as we hypothesize that good governance also facilitates growth. Furthermore, following the recent growth literature, we also control for the degree of openness²⁵ and macroeconomic stability, measured by the rate of inflation²⁶ and deficits in percentage

20. The sample excludes Romania, Bosnia, contemporary Yugoslavia, and Turkmenistan due to data deficiencies.

21. CLI stands for cumulative liberalization index, which is composed of (1) internal and (2) external price liberalization and (3) other market reforms including privatization, which are all reported cumulatively over time.

22. The source for macroeconomic data is the Transition Report Update, European Bank for Reconstruction and Development.

23. Source for both indicators: Kaufmann et al. (2002). Higher values indicate better governance.

24. The index is published by Transparency International and is available on the Web site www.transparency.de/documents/cpi/index.html for 1999. The higher the values of *Corr*, the lower the corruption.

25. Measured as the ratio of the sum of exports and imports to GDP.

26. Measured as $\text{inflation rate} / (1 + \text{inflation rate})$, which is a one-to-one conversion made for eliminating possible scaling problems.

19. We only mention the clusters that are significant at 1% level.

of GDP. We also tried to control for the level of education.²⁷ Finally, we control for the degree of central bank independence (*CBI*)²⁸ because *CBI*'s negative association with inflation may have a constraining effect on growth in the short run.²⁹

The data are organized in the form of a panel, where the time coverage 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; the second period 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. In view of some multiple enactment of banking laws, construction of time periods in this way leads to a panel data of 32 observations.

Appendix Table A6 reports the panel data used in the empirical analysis, including the country list, the years of enactment of the banking laws, and the time coverage for each country-observation. Data on real growth rates, as well as the others excluding *CLI*, are used in averages over the periods identified for each country-observation. Because *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. In all the regressions reported, we estimate real GDP growth using ordinary least squares with heteroscedasticity-corrected error terms.³⁰

Empirical Evidence

In this part, in view of the foregoing arguments, we empirically investigate the relationship between RS and real GDP growth. We hypothesize 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.

27. Secondary school gross enrollment rate (source: Global Development Network, the World Bank).

28. *CBI* is constructed based on the letter of laws by Cukierman et al. (2002).

29. See, for example, Neyapti (2001) and Cukierman et al. (2002) for the negative relationship between *CBI* and inflation in transition economies.

30. The current data set is not suitable for using either random effects or fixed effects models because 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.

TABLE 2
Dependent Variable: Real Growth Rate of GDP

Explanatory Variables	I	II	III
<i>C</i>	-7.85*** (-4.11)	-1.10 (-1.22)	-0.72 (-0.87)
<i>RSu</i>	34.6*** (4.46)		
<i>PCa1</i>		-0.32 (-0.38)	
<i>PCa2</i>		2.28** (2.54)	
<i>PCa3</i>		2.36** (2.51)	
<i>PCa4</i>		2.06** (2.08)	
<i>PCb1</i>			2.26*** (2.56)
<i>PCb2</i>			2.53*** (2.76)
<i>PCb3</i>			2.54*** (3.30)
<i>R</i> -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 2 reports the regression of real growth on alternative measures of RS, namely *RSu*, *PCa* (four principal components) and *PCb* (three principal components) described in section II. According to the table, all types of aggregate measures of RS appear to have significant positive relationship with growth. Although *RSu* yields higher significance than any single principal component, all principal components, except for the first one of the first method (*PCa1*), are also significant. Also with regard to the goodness of fit, there is no major difference among the alternative measures of RS in explaining growth. Hence, to gain as many degrees of freedom as possible, we only report regressions that use *RSu* in the remainder of this section, though we also observe that the use of alternative measures (principal components) does not alter the nature of the results.

Table 3 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

TABLE 3
Dependent Variable: Real GDP Growth

Explanatory Variables	I	II	III	IV	V	VI	VII
Constant	-9.39*** (-3.85)	-8.16*** (-3.37)	-12.22*** (-1.56)	-13.48 (-1.48)	-13.43 (-1.52)	-13.12 (-1.43)	0.86 (0.09)
<i>RSu</i>	24.79*** (3.34)	21.94*** (2.68)	21.44** (2.55)	20.71*** (2.41)	14.46** (2.30)	14.84** (2.33)	14.55*** (2.60)
<i>CLI</i>	1.01* (1.74)	0.87 (1.64)	0.72 (1.20)	0.70 (1.21)	0.59 (1.04)	0.59 (1.03)	-0.08 (-0.16)
<i>PS</i>		1.74 (1.32)	1.58 (1.20)	1.49 (1.13)	1.84** (2.22)	1.77** (2.16)	2.48*** (3.13)
<i>InitGDPpc</i>			0.68 (0.56)	0.71 (0.59)	0.74 (0.62)	0.70 (0.57)	-0.11 (-0.10)
<i>CBI</i>				2.40 (0.39)	2.17 (0.42)	2.29 (0.43)	-1.93 (-0.37)
<i>MultRS</i>					22.41*** (3.03)	22.71*** (2.98)	14.28* (1.94)
<i>Openness</i>						-0.15 (-0.10)	0.21 (0.16)
<i>Inflation</i>							-12.99** (-2.46)
<i>R</i> -bar square	0.35	0.36	0.35	0.33	0.49	0.46	0.52
Degrees of freedom	29	28	25	24	23	22	21

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

consecutively into the regressions are *CLI*, political stability (*PS*),³¹ *InitGDPpc*, *CBI*, *MultRS*, *openness*, *inflation*, *deficits*, and *education*. *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. Although these laws were possibly modeled 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 hypothesize 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 have revised

banking laws in either 1995 or 1996.³² This may also be the result of the global recognition of the increasing importance of good regulatory and supervisory frameworks.

In column I of Table 3, 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 2, *CLI* itself is significant only at 10% level of confidence. Columns II and III show that neither *PS* nor initial level of GDP (*InitGDPpc*) is significant. In addition, the positive effect of *CLI* on real growth observed in column I disappears in regressions II and III, due possibly to multicollinearity problem.³³ Column IV indicates that *CBI* also does not significantly contribute to growth. In column V, however, we observe that the inclusion of *MultRS* improves the adjusted R^2 to 49%. In this regression, *PS* is also becomes significant at 5% level. Hence we conclude that keeping other things constant,

31. We also use alternative indices of governance (i.e., rule of law and *Corr*), but we do not report those results because the main findings do not change much.

32. See Table 1 for the complete list of the countries that have enacted more than one banking law since 1989.

33. The correlation between initial GDP and *CLI*, for example, is 63%.

higher quality of bank RS is associated with higher degrees of real growth, and revised banking laws reinforce these results.

In column VI, we observe that the inclusion of openness to explain growth neither improves the fit of the regression nor is itself significant. Finally, we observe that inflation negatively and significantly affects growth, leaving the rest of the findings robust. When we add budget deficits into the regression (not reported), either as alternative to inflation or in addition to specification in column VII, we observe that it does not improve the explanatory power of the regressions and is statistically insignificant itself. Likewise, the *education* variable is not significant, possibly because transition economies are generally characterized by high education levels, and because its addition reduces the goodness of fit of the estimation; those results are not reported here.³⁴

When we use rule of law and *Corr* instead of *PS*, the regression results slightly change. Though the high level of significance of *MultRS* remain throughout, *RSu* and inflation become insignificant with the use of *Corr*. With the use of rule of law, however, everything else remains virtually the same, although rule of law itself is no more statistically significant.

We next separately investigate the effects of each of the eight main components of *RSu* on growth. To do this, we run ordinary least squares regressions with robust errors as before (not reported). We consider that it is not appropriate to run a regression with all the eight components because many of the categories are highly correlated with each other (see Appendix C).³⁵ The results show that components A, C, D, E, F, and G are all positively correlated with growth at statistically significant levels, whereas B and H, which are lending and DI-related clusters, are not significantly correlated with growth. Interestingly, the correlation analysis in Appendix C reveals that those clusters also do not notably correlate with either the *RSu* or the indices formed by principal component analysis. In further

support of this point, we observe that replacing *RSu* alternatively with the two types of principal components in column VII of Table 3 (not reported) yield the following results: of type *PCa*, the second and the third principal components, and of type *PCb*, all three principal components are significant and positive. Together with Appendix F, these results also indicate that especially ownership structure, directors and managers, reporting-recording requirements, corrective action, and supervision-related provisions of banking laws matter for growth.

VI. *RSu* AND OTHER INDICATORS OF BANK PERFORMANCE

To address the question of how well our indices of bank RS quality indeed measure the intended attributes, we both compare *RSu* with other proposed measures of RS and also investigate its relationship with banking sector performance indicators. To our best knowledge, the existing literature offers two measures of RS: due to Claessens (1996) and Barth et al. (2001, 2002). First, because the measures of RS due to Barth et al., has not yet been provided in an index format that would enable a comparison with our index of *RSu*, we are only able to compare *RSu* with the survey-based index of Claessens (1996). Second, we inspect the correlations between *RSu* and bank performance or financial market development indicators.

Based on the responses to a questionnaire, Claessens (1996) provides a measure of legal environment that includes the quality of banking environment (call *RS_c*). We observe that the correlation of *RSu* and *RS_c* is very low and insignificant (−0.002). In view of the complementary aspects of the legal-based and survey-based indices, however, this observation does not lead us to an inference either in favor or against either one of these measurements.³⁶

We also replicated our regression analysis, using both Claessens's index (*RS_c*) and *RSu* in identical sample periods. The findings of these regressions confirm the significance of *MultRS* and *RSu*, whereas *RS_c* is not significant.³⁷

34. The results using both budget deficits and education are available on request.

35. Those components of RS that exhibit at least 50% correlation are, pairwise, 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, the highest correlations are between E (reporting and recording requirements) and both C (ownership structure) and D (directors and managers): 78% and 72%, respectively.

36. Cukierman et al. (1992) also show that the correlation between questionnaire-based index of *CBI* and legal *CBI* are significantly positively correlated in industrial countries only.

37. These results, which are based on 19 common observations, are available on request.

We next explore the correlations between our three measures of RS and both bank performance and financial market development indicators. For bank performance, we employ European Bank for Reconstruction and Development index of banking sector reform (*EBRD*),³⁸ and for financial market development we employ banking sector credit to the private sector in ratio to the GDP (*PRVRCR/GDP*) and financial deepening (*M2/GDP*). All the findings indicate positive and significant association of our indices (*RSu* and the two types of principal components) with bank performance and financial market development. Appendix Table A9 reports the regressions using *RSu* only.³⁹

Hence, notwithstanding its insignificant association with survey-based indicators, our proposed measures of RS appear to be significantly related with the actual performance indicators of the banking sector. This suggests that our indices contain valuable information regarding financial sector performance.⁴⁰

V. CONCLUDING REMARKS

This article develops a general framework to measure the quality of bank RS based on the evaluation of banking laws. Using a total of 98 criteria, we form aggregate measures of RS both by simply averaging the indices for the eight main aspects of RS and by principal components analysis.

Using panel data on 23 transition economies, we then perform ordinary least squares estimation of real GDP growth with heteroscedasticity-corrected error terms. The empirical analysis presents evidence that the higher the quality of RS, the higher the real growth rate. The effect of RS on growth remains after controlling for the commonly cited determinants of growth, as well as some additional measures of transition specific institutional reforms. 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 started in the early 1990s. In most transition economies, these revisions of banking law took place later than 1994. This indicates 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 other indicators of market reforms, degree of governance and macroeconomic stability in transition economies, an increase in the quality of bank 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 recent financial and economic crises. More specifically, quality of legal provisions regarding the ownership structure, directors and managers, reporting requirements, corrective action, and supervision of banks all seem to matter for the growth performance.

APPENDIX A: LIST OF CRITERIA FOR MEASURING THE QUALITY OF BANK REGULATION AND SUPERVISION

Note: Under each criterion, the ranking of (1) indicates the highest quality, and 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

38. Transition Updates, European Bank for Reconstruction and Development (1999, 2002).

39. The remainder of the regressions that involve principal components is available on request.

40. In a set of nontransition countries, Caprio et al. (2003) report that, bank valuation is not affected neither by the stringency of capital controls or official supervisory power, which is measured by Barth et al. (2002). Based on the same database, Beck et al. (2003) show that powerful supervision increase banks' financing obstacles.

- 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
- a. 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
- 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

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 credit-worthiness of borrowers?
 - (1) yes
 - (2) no
 - f. Does a bank investigate balance sheet of 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
 - 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
 - q. Rules for calculating guarantees for loans
 - (1) given
 - (2) not given
 - r. 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, up to how much capital reached 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?
 - (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 and d?
 - (1) yes
 - (2) no

E. Reporting/Recording

1. Operating plan systems of control and internal organization

- a. Are qualifications about independent auditors asked in law?
 - (1) yes
 - (2) no
- b. Is information about systems of control and internal organizations 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

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 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 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 deductibles 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 B: PRINCIPAL COMPONENTS

TABLE A1
Composition of $Pa1$, $Pa2$, $Pa3$, and $Pa4$

Criteria	Components			
	1	2	3	4
A1A	0.57	0.15	0.02	0.15
A2A	0.66	0.35	0.18	0.10
A2B	0.85	-0.02	0.08	0.01
A2C	0.27	-0.06	0.36	0.02
A3A	0.58	-0.23	-0.21	0.00
A3B	0.47	0.27	0.16	-0.08
A3C	0.06	0.16	0.63	0.24
A3D	-0.16	0.47	0.36	0.12
B1C	0.05	0.07	-0.05	0.24
B1E	0.57	-0.26	0.00	0.09
B1F	0.09	-0.01	0.11	0.19
B1G	0.65	0.45	0.03	0.26
B1H	0.05	0.07	-0.05	0.24
B1K	0.02	-0.20	0.40	0.11
B1L	0.86	0.18	-0.06	0.06
B1M	0.09	0.33	0.30	-0.16
B1N	0.37	0.30	0.59	0.05
B1O	0.73	-0.06	-0.19	0.23
B1P	0.86	-0.14	-0.01	0.07
B1R	0.16	0.25	0.58	-0.13
B2A	-0.14	-0.09	-0.08	-0.34
B2B	-0.09	-0.03	-0.02	-0.47
C1A	-0.09	0.20	0.51	0.24
C1B	-0.06	-0.04	0.57	0.26
C1C	0.10	-0.16	-0.01	-0.02
C1D	0.58	-0.26	-0.16	0.05
C1E	-0.31	-0.50	0.02	-0.21
C1F	-0.01	0.33	0.13	-0.09
C2A	0.15	0.34	0.44	-0.40
C2C	0.07	0.47	0.24	0.28
D1A	0.81	-0.19	0.20	-0.09
D1B	0.29	0.13	0.54	0.12
D1C	-0.03	0.11	0.57	0.20
D1D	-0.05	0.08	0.74	0.23
E1A	0.10	0.22	0.36	0.05
E1B	0.00	0.62	0.37	0.37
E1C	-0.02	0.37	0.56	0.08
E1D	-0.02	0.64	0.36	0.25
E2A	0.20	0.22	-0.14	0.55
E3A	0.26	-0.27	0.39	0.03
E4A	-0.05	0.34	0.44	0.39
E4B	-0.02	0.44	0.39	0.37

TABLE A1 continued

Criteria	Components			
	1	2	3	4
E4C	0.38	0.29	0.05	-0.04
E4D	0.06	0.34	0.28	0.01
E4E	0.56	0.57	0.06	0.20
E4F	0.15	0.19	0.48	-0.22
E4G	0.61	0.20	0.35	0.24
E5A	-0.40	0.42	0.25	0.38
E5B	0.27	-0.10	0.44	-0.10
E5C	-0.19	-0.06	0.46	-0.19
E5D	-0.09	0.17	0.68	-0.02
E5E	-0.09	0.17	0.68	-0.02
E5F	0.18	0.25	0.47	-0.11
E5G	-0.18	-0.13	0.44	0.20
F1A	-0.10	0.54	0.14	0.03
F1B	-0.14	0.69	0.07	0.23
F1D	-0.06	0.65	-0.33	-0.13
F1E	0.44	0.64	0.04	0.08
F1F	0.07	0.68	0.17	0.03
G1A	-0.15	0.11	0.09	0.14
G1B	0.25	0.12	0.34	0.57
G1E	0.27	0.74	0.08	-0.02
G1F	0.19	0.83	0.06	-0.01
G1G	0.13	0.75	0.24	0.15
G1H	0.32	0.20	0.50	-0.33
G1I	0.69	0.20	0.33	-0.03
G1J	0.69	0.20	0.33	-0.03
G1K	0.39	0.37	0.41	0.14
G1L	0.30	0.22	-0.06	0.25
G1M	0.41	0.38	0.50	0.01
G1O	-0.18	-0.18	0.40	0.08
G1R	0.18	0.16	0.09	0.34
H1A	0.04	0.48	-0.35	-0.13
H1C	0.04	0.48	-0.35	-0.13
H1E	-0.08	0.35	-0.31	-0.62
H1F	-0.05	0.46	-0.29	-0.63
H1G	-0.08	0.02	-0.25	-0.77
H1H	0.37	-0.03	-0.20	-0.70
H1I	0.39	-0.39	-0.12	0.06
H1J	0.06	0.06	0.15	-0.83
H1K	0.06	0.06	0.15	-0.83
H1L	-0.02	0.32	-0.12	-0.45
H1N	0.07	-0.05	-0.09	-0.37

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

TABLE A2
Composition of Pb1, Pb2, and Pb3:
First Step

Criteria	Component		
	1	2	3
A1A	0.81	-0.24	0.12
A2A	0.90	0.15	-1.30
A2B	0.64	-0.10	0.40
A2C	0.23	0.52	0.54
A3A	0.05	-0.12	0.86
A3B	0.68	0.34	-1.20
A3C	0.02	0.91	8.41
A3D	-0.04	0.69	-0.36
B1C	0.02	0.97	-0.09
B1E	0.57	0.03	0.27
B1F	0.05	0.72	0.35
B1G	0.65	0.33	0.39
B1H	0.02	0.97	-0.09
B1K	0.10	0.05	0.43
B1L	0.85	0.21	0.22
B1M	-0.10	-0.08	0.77
B1N	0.23	-0.08	0.84
B1O	0.80	-0.13	-0.13
B1P	0.90	-0.10	-0.01
B1R	-0.06	0.02	0.64
B2A	-0.18	-0.08	-0.27
B2B	-0.13	-0.06	-0.24
C1A	-0.30	0.85	0.01
C1B	0.01	0.90	-0.04
C1C	0.86	-0.04	0.27
C1D	0.26	-0.08	0.04
C1E	0.62	0.06	-0.45
C1F	-0.07	0.14	0.72
C2A	0.14	-0.21	0.74
C2C	-0.62	0.22	0.37
D1A	0.10		
D1B	0.42		
D1C	0.39		
D1D	0.39		
E1A	0.46	-0.16	
E1B	0.81	-0.09	
E1C	0.75	0.16	
E1D	0.75	-0.02	
E2A	0.23	-0.69	
E3A	0.08	0.00	
E4A	0.62	-0.28	
E4B	0.66	-0.31	
E4C	0.41	-0.10	
E4D	0.56	-0.10	

continued

TABLE A2 continued

Criteria	Component		3
	1	2	
E4E	0.54	-0.52	
E4F	0.59	0.25	
E4G	0.60	-0.29	
E5A	0.39	0.15	
E5B	0.30	0.41	
E5C	0.09	0.20	
E5D	0.62	0.64	
E5E	0.62	0.64	
E5F	0.57	-0.12	
E5G	0.17	0.38	
F1A	0.29		
F1B	0.29		
F1D	0.29		
F1E	0.27		
F1F	0.28		
G1A	-0.28	0.36	
G1B	0.39	0.18	
G1E	0.21	0.82	
G1F	0.29	0.76	
G1G	0.26	0.79	
G1H	0.22	0.49	
G1I	0.75	0.27	
G1J	0.75	0.27	
G1K	0.65	0.37	
G1L	0.73	0.00	
G1M	0.71	0.47	
G1O	0.00	-0.21	
G1R	0.76	-0.13	
H1A	0.06	0.96	
H1C	0.06	0.96	
H1E	0.67	0.57	
H1F	0.68	0.61	
H1G	0.89	0.10	
H1H	0.72	0.14	
H1I	0.08	-0.18	
H1J	0.89	-0.22	
H1K	0.89	-0.22	
H1L	0.57	0.03	
H1N	0.43	0.00	

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

TABLE A3
Composition of *Pb1*, *Pb2*, and *Pb3*

Principal Components of 8 Main Categories	Component		
	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 eigenvalues, three principal components for criteria A, B, and C; two principal components for criteria E, G, and H; and one principal component for criteria D and F are used.

APPENDIX C: CORRELATIONS AMONG THE VARIOUS MEASURES OF RS INDICES

TABLE A4
Correlations between *RSu*, Its Principal Components, and the Clusters of Indices

Clusters	Principal Components							<i>RSu</i>
	<i>PCa1</i>	<i>PCa2</i>	<i>PCa3</i>	<i>PCa4</i>	<i>PCb1</i>	<i>PCb2</i>	<i>PCb3</i>	
A	0.08	0.26	0.31	0.59*	0.32	0.34	0.64*	0.68*
B	-0.32	0.05	-0.01	0.10	-0.01	0.08	0.19	0.23
C	0.09	0.38	0.64*	0.05	0.62*	0.45	0.06	0.70*
D	0.24	0.13	0.72*	0.54*	0.74*	0.11	0.49*	0.69*
E	0.31	0.23	0.69*	0.20	0.66*	0.30	0.27	0.76*
F	-0.12	0.83*	0.14	-0.21	0.17	0.85*	-0.19	0.70*
G	0.07	0.53*	0.54*	0.26	0.55*	0.60*	0.28	0.84*
H	-0.87*	0.34	-0.39	-0.19	-0.35	0.33	-0.15	0.24

* Indicates significance at 1% level.

TABLE A5
Correlations among the Main Clusters of the RS Indices

	A	B	C	D	E	F	G	H
A	1.00							
B	0.14	1.00						
C	0.39	-0.08	1.00					
D	0.57	0.09	0.50	1.00				
E	0.43	0.07	0.78	0.72	1.00			
F	0.27	-0.04	0.41	0.12	0.36	1.00		
G	0.59	0.12	0.61	0.67	0.62	0.57	1.00	
H	0.05	0.30	-0.11	-0.19	-0.20	0.26	-0.04	1.00

APPENDIX D: TIME COVERAGE FOR COUNTRY-OBSERVATIONS

TABLE A6
Time Coverage for Country-Observations

Country	Observation	Sample Period	Enactment Year of Banking Law
Albania	1	97-98	96
Armenia	1	93-96	92
	2	97-98	96
Azerbaijan	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
Czech Republic	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
Kyrgyzstan	1	92-98	91
Latvia	1	93-95	92
	2	96-98	95

continued

TABLE A6 continued

Country	Observation	Sample Period	Enactment Year of Banking Law
Lithuania	1	93–98	92
Macedonia	1	95–98	94
Moldovia	1	92–98	91
Poland	1	90–93	89
	2	94–97	93
Russia	1	97–98	96
Slovak Republic	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

Notes: 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. The third observation on Poland is not in the current sample due to lack of data on other panel variables, such as *CLI*. Due to lack of data, the period used in the empirical analysis actually starts with 1991.

APPENDIX E: PANEL DATA

TABLE A7
Alternative Measures of RS

Country	Period	<i>Rsu</i>	<i>PCa1</i>	<i>PCa2</i>	<i>PCa3</i>	<i>PCa4</i>	<i>PCb1</i>	<i>PCb2</i>	<i>PCb3</i>
Albania	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
Azerbaijan	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
Czech 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
Kyrgyzstan	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

TABLE A7 continued

Country	Period	<i>Rsu</i>	<i>PCa1</i>	<i>PCa2</i>	<i>PCa3</i>	<i>PCa4</i>	<i>PCb1</i>	<i>PCb2</i>	<i>PCb3</i>
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	...	...	...	...	...	...	...	...
Slovak Republic	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: *Rsu* is unweighted averages of the eight main components of RS. *PCa* (1 to 4) and *PCb* (1 to 3) are two types of principal components. See Appendix B and text for details.

APPENDIX F

TABLE A8
Data Used in the Estimation

Country	Periods	Real GDP Growth	<i>CLI</i>	Init. GDP per Capita	<i>Inflation</i>	<i>Deficit</i>	<i>Openness</i>	<i>Corr</i>	Rule of Law	Political Stab (<i>PS</i>)
Albania	1	0.50	4.56	799	0.21	11.70	0.44	2.30	2.70	-0.60
	2	...	...	...	...	...	...	...	2.70	...
Armenia	1	0.83	1.69	125	0.59	10.27	0.96	2.50	4.90	-0.84
	2	5.15	3.37	426	0.09	5.55	0.75	2.50	4.90	-0.84
Azerbaijan	1	-13.33	1.25	364	0.64	6.60	0.86	1.70	3.20	-0.70
	2	7.95	2.64	423	0.03	2.90	0.80	1.70	3.20	-0.70
Belarus	1	-1.57	1.79	401	0.65	1.60	1.26	3.40	2.30	0.04
	2	...	...	...	...	...	...	...	2.30	...
Bulgaria	1	-2.15	3.81	1012	0.49	6.35	1.01	3.30	5.90	0.37
	2	...	...	...	...	...	...	...	5.90	...
Croatia	1	6.23	4.83	2342	0.18	-0.10	0.90	2.70	7.00	0.18
	2	4.50	6.53	4392	0.04	0.40	0.93	2.70	7.00	0.18
Czech Republic	1	2.07	5.04	2906	0.10	1.42	1.12	4.60	8.30	0.74
	2	...	...	...	...	...	...	...	8.30	...
Estonia	1	5.93	5.26	1530	0.15	0.30	1.59	5.70	8.50	0.73
	2	...	...	...	...	...	...	...	8.50	...
Georgia	1	-13.74	1.36	213.7	0.28	4.40	1.00	2.30	5.40	-1.00
	2	6.95	3.26	782.3	0.05	4.10	0.55	2.30	5.40	-1.00
Hungary	1	3.05	6.38	4052	0.17	4.70	0.87	5.20	4.00	0.75
	2	...	...	...	...	...	...	...	4.00	...
Kazakhstan	1	-10.40	1.62	916	0.79	5.10	0.83	2.30	8.70	0.29
	2	0.00	3.39	1008	0.17	6.50	0.70	2.30	8.70	0.29

continued

TABLE A8 continued

Country	Periods	Real GDP Growth	CLI	Init. GDP per Capita	Inflation	Deficit	Openness	Corr	Rule of Law	Political Stab (PS)
Kyrgyzstan	1	-5.87	2.63	...	0.32	11.30	0.81	2.20	4.50	-0.32
	2	...	...	...	...	...	...	...	4.50	...
Latvia	1	-5.03	2.45	578	0.33	2.23	1.05	3.40	4.40	0.50
	2	4.60	5.00	1780	0.09	0.00	1.12	3.40	4.40	0.50
Lithuania	1	-1.32	4.06	514	0.43	4.45	1.25	3.80	7.50	0.29
	2	...	5.39	2127	0.07	3.90	1.25	3.80	7.50	0.29
Macedonia	1	-3.99	5.93	1500	0.02	0.87	0.82	3.30	7.20	-1.45
	2	...	...	...	...	...	...	...	7.20	...
Moldovia	1	-11.40	2.30	231.7	0.50	7.20	1.29	2.60	4.70	-0.29
	2	-5.10	3.80	386.4	0.12	7.23	1.29	2.60	4.70	-0.29
Mongolia	1	...	2.94	...	0.59	...	1.54	4.30	8.70	0.72
	2	...	4.44	...	...	1.32	4.30	8.70	0.72	...
Poland	1	-0.20	2.46	2037	0.28	4.90	0.47	4.20	5.60	0.69
	2	6.30	3.36	2234	0.19	3.08	0.50	4.20	5.60	0.69
Russia	1	-1.85	6.05	2910	0.17	4.30	0.51	2.40	3.70	-0.41
	2	...	...	...	...	...	0.51	...	3.70	-0.41
Slovak Republic	1	3.68	3.90	2213	0.11	2.50	1.20	3.70	6.40	0.62
	2	5.45	6.05	3495	0.06	4.70	1.30	3.70	6.40	0.62
Slovenia	1	3.88	1.34	6280	0.13	0.67	1.15	6.00	8.40	0.87
	2	...	...	...	...	...	1.15	...	8.40	0.87
Tajikistan	1	-10.01	1.34	1116	0.53	4.10	1.36	...	1.40	-1.77
	2	...	...	...	...	...	...	...	1.40	...
Ukraine	1	-10.02	1.90	629	0.47	4.96	0.87	2.60	3.40	-0.59
	2	...	...	...	...	...	...	...	3.40	...
Uzbekistan	1	-1.79	1.69	...	0.75	4.10	0.59	1.80	2.70	-1.17
	2	...	2.83	251	0.34	4.47	...	1.80	2.70	...

Notes: Macroeconomic data is obtained from *Transition Updates* (European Bank for Reconstruction and Development). *CLI* is due to de Melo et al. (1996) and its update. *CBI* is from Cukierman et al. (2002). Rule of law and *PS* are from Kaufmann et al. *Corr* is obtained from Transparency International. The word *initial* refers to the year preceding the sample period.

TABLE A9
RS and Financial Sector Performance

	Dependent Variable		
	<i>EBRD</i>	<i>PRVTCRIGDP</i>	<i>M2/GDP</i>
Constant	1.70*** (8.06)	1.85*** (6.89)	2.53*** (12.97)
<i>Rsu</i>	3.17*** (3.66)	3.08*** (2.63)	2.21*** (2.61)
No. of obs.	33	30	31
<i>R</i> -bar square	0.24	0.13	0.09

*** Indicates significance at 1% level.

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