

## The Impact of Regulation on Soundness Banking

(Selected Countries)

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**Abstract**—the recent financial crisis has sparked widespread calls for reforms of regulation and supervision. This paper studies whether regulation banking improves bank soundness. We find a significant and positive relationship between bank soundness and regulation banking. Specifically, countries which require banks to report regularly and accurately their financial data to regulators and market participants have sounder banks. The dependent variable is the bank's financial soundness as measured by its Z-score. These findings emphasize the importance of transparency in making supervisory processes effective and strengthening market discipline. Countries aiming to upgrade banking regulation and supervision should consider giving priority to information provision over other elements of the Core Principles.

**Keywords:** Bank Soundness, Regulation, Supervision, panel data.

### I. INTRODUCTION

Economic theory provides convicting predictions about the effects of each of these bank regulations and supervisory practices on bank development, performance, and stability. Some argue, for example, in favor of restricting banks from participating in securities, insurance, and real estate activities or from owning non financial firm. They stress that

- Neither private nor official entities can effectively monitor such complex banks due to informational asymmetries, and
- Both the market and political power enjoyed by such banks can impede competition and adversely influence policies.

Others argue the opposite, stressing that

- Informational asymmetries are not that great,
- Potential adverse spillovers to the entire economy are not sufficient to warrant such restrictions, and
- Fewer restrictions allow banks to exploit economies of scale and scope and thereby provide services more efficiently.

An examination of countries with different regulations for bank activities can help resolve this debate. More generally, we discuss the theoretical predictions surrounding each of the regulations and supervisory practices noted above in subsequent sections and then empirically examine its relationship to bank development, performance and stability. Theory also provides more subtle predictions about

the precise conditions under which regulations and supervisory practices enhance bank development, performance and stability. Some models, for instance, predict that the correct answer to the question as to whether countries should restrict bank activities is “it depends on other policies and institutions”.

Boyd, Kwak and Smith (2000) argue that in a country with generous deposit insurance that intensives moral hazard problems, broad banking powers provide excessive opportunities for risk-taking. Thus, they conclude that restrictions on bank activities enhance social welfare in countries with generous deposit insurance. Similarly, while capital requirements are the mainstay of current approaches to bank regulation and supervision, theory predicts that such requirements are particularly beneficial when

- Generous deposit insurance distorts incentives,
- Official supervision is weak, and
- Complex banks are difficult to monitor.

For these reasons, analyses of individual regulations and supervisory practices should incorporate interaction terms to assess the efficacy of each one in the presence of others. [1]

The paper is organized as follows. Section 2 discusses the theoretical and policy debates surrounding each of the issues noted earlier. Section 3 discusses our data set and presents regression results, while Section 6 contains conclusions.

### II. BANK REGULATION

#### A. Literature Review

In their empirical studies of bank crisis determinants, Demirgüç-Kunt and Detragiache (2008) find that countries with better institutions are less likely to experience banking crises and are less affected by moral hazard due to deposit insurance. They interpret institutional variables such as rule of law and quality of bureaucracy as proxies for supervision and regulation, but do not include direct measures of this dimension, which were not available at the time. [2]

Barth, Caprio and Levine (2001) assembled the first extensive cross-country database on the characteristics of the supervisory and regulatory framework. The data come from a survey of bank supervisors, and measure the presence or absence of a series of regulatory features. In the first comprehensive theoretical and empirical study of alternative approaches to bank supervision Barth, Caprio, and Levine find that regulatory and supervisory practices that force

accurate information disclosure, empower private sector monitoring of banks, and foster incentives for private agents to exert corporate control work best to promote bank performance and stability. Specifically, in a cross-country setting they show that regulatory and supervisory regimes with these features have suffered fewer crises in the past two decades, have lower non-performing loans, and have deeper credit markets.[3]

To the extent that bank regulation and supervision may have evolved over the sample, the relationships identified may not be accurate. Non-performing loans do not suffer from this problem, but are not usually comparable across countries, since countries have difference rules for marking loans as non-performing. On the other hand, an advantage of the BCL survey data is that it does not rely on the subjective views of compliance assessors.[4]

Three papers have used information on BCP compliance to study bank performance:

An early paper by Sundararajan, Marston, and Basu (2001) uses a sample of 25 countries to examine the relationship between an overall index of compliance and bank soundness measured by the size of non-performing loans (NPLs) and loan spreads.[5] They found BCP compliance not be a significant determinant of soundness. Das et al. (2004) broadens the measure of bank soundness to include also compliance with standards for monetary and financial policies, and shows that better regulatory governance is associated with sounder banks, particularly in countries with better institutions.[6]

### *B. Financial Stability and the Need for Regulation*

Stability is traditionally an important concern in the financial sector. The characteristics of the financial sector are such that individual problems may easily spill over and endanger the whole financial system. Hence, failures in the operation of the financial sector not only have consequences for individual investors and savers but stock market crashes, bank failures and other financial disasters may endanger the health of the whole economy. Financial operations are characterized by risk and uncertainty. In particular information problems arise as explained before. As a result financial decision making depends heavily upon expectations. It is also characterized by herd behavior. Market parties adjust suddenly and collectively their expectations leading to high volatility in financial markets. Moreover, compared to other sectors of the economy, financial markets are much more interdependent. This is witnessed by very tight interconnections in the interbank market. Events in one financial market or institution may then have important effects on the rest of the financial system. Failure in one market or institution may create a financial panic and end up in a systemic crisis. Due to ever increasing international capital mobility it may become a worldwide financial crisis.

Banks specifically are faced with a two-sided asymmetric information problem. On the asset side borrowers may fail on their repayment obligations. Depositors, however, cannot observe these credit risks. The quality of the loan portfolio is private information acquired while evaluating and monitoring borrowers. On the liabilities side savers and

depositors may withdraw their funds on short notice. Banks, however, cannot observe the true liquidity needs of depositors. This is private information. A true liquidity risk arises when depositors collectively decide to withdraw more funds than the bank has immediately available. It will force the bank to liquidate relatively illiquid assets probably at a loss. A liquidity crisis may then endanger also the solvability of the bank and eventually lead to bankruptcy.

The providers of funds are not able to assess the value of the bank's underlying assets. As a result bad news, whether true or false, may provoke a withdrawal of funds. Moreover, as deposits are repaid in full on a first-come-first-served basis until the liquid assets are exhausted, depositors have an incentive to act quickly. A 'bank run' may occur when enough savers lose confidence in the soundness of a bank.

Moreover, bad news about one bank can snowball and have a contagion effect on other banks. A bank failure could eventually trigger a signal on the solvency of other banks. Even if these banks are financially healthy the information about the quality of the loan portfolio underlying the deposits is private, so that depositors may also lose confidence and withdraw their funds. As is documented by Paroush (1988) domino effects lead to a widespread loss of confidence in the banking system and create a 'financial panic'. Financial market failures and instability eventually leading to a systemic crisis not only affect individual savers and depositors, but the health of the whole economy. Public policy intervention then is not only a microeconomic question of protecting individual savers and investors, but becomes a macroeconomic issue.

Government concern about the health of the financial system is mainly motivated by the negative macroeconomic externalities from bank failures and financial panics. These impair the ability of the financial markets and intermediaries to provide the key services of risk sharing, liquidity and information when faced with economic disturbances. Financial crises undermine the efficiency with which resources in the economy are allocated as, for example, companies have difficulty raising capital for investment and job creation. The collapse of financial institutions in general may have important costs of debt deflation on effective aggregate demand in the economy, as is extensively documented by Hubbard (1991).

Because of the banks' importance it is in particular important to maintain the health of the banking industry. The severity of the Great Depression of the 1930s is often linked to the breakdown of the banking system's ability to provide financial services. As explained before, banks are very important in reducing information costs in the economy. Insolvency of banks is costly because information on borrowers is then lost. It hurts in particular the ability of less well known borrowers to obtain loans. Moreover, banks play an essential role in the payments system and in the creation of money. As argued by Mishkin (1997) bank failures could cause large and uncontrollable fluctuations in the quantity of money in circulation. The negative impact of banking problems on economic growth, the government budgets, the balance of payments and foreign exchange rates are further documented in an IMF study by Lindgren, Garcia and Saal

(1996). Systemic risks are more difficult to deal with than the previous individual risks for depositors and savers. Of course government intervention aiming at the protection of depositors and investors by reducing information costs will also stabilize their behavior and reduce the danger of major financial instability. Also at the international level the timely dissemination of accurate financial information may be in order. The question arises whether additional government intervention may be necessary. This applies especially to ex post interventions when a financial crisis has occurred.[7]

Finally, ensuring a stable payments system has been a principal concern of public policy. Therefore financial regulation in a wider perspective contains also a whole framework for controlling the volume of money in circulation, that is a whole set of monetary policy instruments. Normally a stable and sound financial system is a condition for an efficient monetary policy. Therefore in financial law specific regulations determine for instance which institutions can offer deposit accounts.

However, in the short run conflicts may also arise between money supply control and the provision of additional liquidity under the lender of last resort function.

### C. Regulatory Instruments

To maintain the health of the financial system governments have developed a whole range of regulatory instruments. They have placed different degrees of emphasis upon the various objectives at different times and have used different regulatory tools to achieve them. The different regulatory and policy measures are classified in third section. First, following Baltensperger (1990) public authorities may limit themselves to ex post interventions, offering protection to customers and financial intermediaries in the case of impending insolvency.

They may also act in a preventive way by controlling the levels of risk assumed and reducing the probability of insolvency and illiquidity. Second, the safety and stability of the financial system may be enhanced by structural limitations of competition and market forces. Instead of these structural measures more weight is given to market efficiency by resorting to a whole set of prudential measures. Third, regulatory measures may focus on the macroeconomic concerns of systemic risk, or directly aim at microeconomic consumer protection. However, both are interrelated as the avoidance of consumer risks also limits systemic risks and vice-versa.

Historically, the overriding reason for government intervention has been the desire to avoid systemic risk, mainly by ex post rescue operations of financial intermediaries. Preventive measures were mostly of a structural nature by limiting competition. The focus on market efficiency and individual consumer protection by deposit insurance and prudential measures is of a more recent date.

Structural and prudential regulation often involve a whole set of different public regulatory measures which differ from country to country. Protective interventions in the form of the lender of last resort and deposit insurance provisions do not involve such extensive regulation. Central

banks can significantly limit the occurrence of systemic crises by their role as a 'lender of last resort'. Central banks have been set up to control liquidity provision in the economy. They are the ultimate source of credit to which financial institutions can turn during a panic. By providing liquidity as a bankers' bank they can stop the contagious transmission of financial problems among financial intermediaries.

As pointed out in Herring and Litan (1995), in some countries central banks under certain conditions also guarantee the settlements risk involved in the funds transfer system. By bearing the risk of non-payments by participants they take the systemic risk out of the payments system. The same role may also be taken up by private clearing houses, which have developed to handle larger value payments transactions. These clearing houses additionally use forms of private regulation such as capital standards, limits on the amount of debt and so on, to reduce default risk. The problem, however, is that these private intermediaries do not have sufficient means to cope with economy-wide shocks, for example serious disturbances that affect the members as a whole. [8]

There are several difficulties with the lender of last resort function. First, interventions must be carried out swiftly in a credible way. Credit should only be advanced to solvent financial intermediaries using the good, but illiquid, assets as collateral. They should not be used to bail out insolvent institutions, often at a high cost for taxpayers. However, it may not be easy in practice to distinguish between problems of liquidity and insolvency. Second, lender of last resort interventions may conflict with monetary policy objectives. In order to avoid a systemic crisis central banks may extend liquidity and fuel inflationary pressures. Inflation may structurally weaken the financial sector and its capacity to absorb shocks, thereby increasing the probability of a systemic crisis.

In addition public authorities also intervene by guaranteeing some financial liabilities and by directly protecting investors through 'deposit insurance'. Insurance arrangements contain the promise that if a financial institution fails, the investors will be reimbursed for the funds lost. They directly aim at individual investors' protection, in particular the small depositors who are unable to determine the quality of the bank's assets. Indirectly they also reduce the threat of a systemic crisis. This is achieved not by bailing out individual financial institutions, but by reducing incentives for bank runs by depositors and by containing the risk of contagion among financial institutions.

### III. METHODOLOGY AND DATA

Bank Soundness with Z-Scores measured. Moody's ratings are a nice measure of bank financial strength, as they are prepared by specialists with access to variety of sources of information and whose business is to make accurate assessments. On the other hand, ratings are subjective, and it may be argued that analysts may be better disposed towards bank that provide more accurate and timely information even though these banks are not necessarily more sound. To

address this concern, in this section we measure bank soundness using an alternative, objective, and commonly used indicator, namely the Z-score. We compute Z-scores for countries in our sample<sup>1</sup>.

We build this indicator per country and time by aggregating the banks' consolidated balance sheet data and define  $\mu$  as the return on average assets before taxes (ROA),  $k$  as the equity capital in percent of total assets and  $\sigma$  as the standard deviation (volatility) of the ROA. Hence, the Z-score combines in one single indicator the banks' profitability ( $\mu$ ), capital ratio ( $k$ ) and return volatility ( $\sigma$ ). Obviously, the Z-score will increase with the banks' profitability and capital ratio and decrease with increasing return volatility. From an economic viewpoint the Z-score initially measures the probability of a bank going insolvent when the value of assets becomes lower than the value of debt. Hence, a higher (lower) Z-score implies a lower (higher) probability of insolvency risk.

$$Z=(\mu+k)/\sigma \quad (1)$$

The dependent variable is the bank's financial soundness as measured by its Z-score, and the explanatory variable is the country's regulation banking. The latter is available only at one point in time, so the sample is a cross-sectional one. The regression equations we estimate are of the form:

$$Z_{ij}=\alpha+\beta_1X_{1j}+\beta_2X_{2j}+\beta_3X_{3j}+\epsilon_{ij} \quad (2)$$

Where the subscript  $j$  denotes the country and the subscript  $i$  denote the bank.  $Z$  is the Z-score in country  $j$ ,  $X_{j1}$  is regulation banking in country  $j$ ,  $X_{j2}$  is a vector of bank characteristics included capital ratio and liquidity reserve and Bank return on asset,  $X_{j3}$  is a vector of country characteristics included real GDP per capita and GDP growth, and  $\epsilon_{ij}$  is a random disturbance.  $t$  is the year of the regulation evaluation, which varies within the time period 2000-2009 depending on the country. Equation is estimated by dynamic panel data and fixed effect selected.

The data variable of regulation is come from economic freedom index of Fraser institute from 2000 to 2009. We lagged some of the variables to avoid simultaneity. Macroeconomic control variables are retrieved from the World Development Indicator (WDI) database provided by the World Bank. We used GDP per capita, the rate of real GDP growth means of macroeconomic control variables.

Regulation of banking used to  $\cap$  shape. The  $\cap$  shape relationship between regulation of banking and financial soundness is the main idea of paper. Following econometrics quadratic form models were used for showing the  $\cap$  shape relationship.

1-Australia,Austria,Belgium,Canada,China,Denmark,Egypt,Finland, France,Germany,Greece,Hungary,Iceland,Ireland,India,Indonesia,Iran, Italy,Japan,Malaysia,Mexico,Netherlands,Newzealand,Norway,Poland ,Portugal,Southafrica,Spain,Sweden,Switzerland,Turkey, United kingdom, United states, Venezuela

TABLE I. TEST CROSS SECTION RANDOM EFFECT-HAUSMAN TEST

Variable	Fixed-Effect Coefficient	Random-effect Coefficient
<i>Gdp capita</i>	0.0032	0.0057
<i>Gdp growth</i>	0.1386	0.1425
<i>Capital ratio</i>	3.37	3.33
<i>Liquidity reserve</i>	-0.182	-0.195
<i>Bank return on asset</i>	1.79	1.89
<i>Regulation^2</i>	-0.038	-0.0358
<i>Chi-Squared: 22.18</i>		<i>R-Squared:0.88</i>

In table I, in Hausman-test and selection between fixed effect and random effect, Chi-squared statistic is 22.18 and is significant then fixed effect selected.

According to the table II, regulation and financial soundness have significantly quadratic form because the sign of regulation<sup>2</sup> is negative and significant, it could be said that  $\cap$  shape hypothesis of above relationship is proved.

Capital ratio and bank return on asset have positive relationship. Increasing bank on asset increased in stability and improving capital market. Liquidity reserve of bank has negative relationship then increasing Liquidity reserve decreasing stability of financial market.

Higher Real Gdp per capita is associated with higher country development. Higher Gdp growth rate indicate economic booms which should lead to higher asset quality.

TABLE II. FIXED-EFFECT ESTIMATION (DEPENDENT VARIABLE Z-SCORE IN SELECTED COUNTRIES)

Variable	Coefficient	t-statistic
<i>c</i>	16.27	13.36
<i>GDP capita</i>	0.0032	3.27
<i>GDP growth</i>	0.1386	2.26
<i>Capital ratio</i>	3.37	26.69
<i>Liquidity reserve</i>	-0.1826	-3.74
<i>Bank return on asset</i>	1.79	5.79
<i>Regulation^2</i>	-0.03812	-3.31

Adjusted R-Squared: 0.88

TABLE III. TEST CROSS SECTION RANDOM EFFECT-HAUSMAN TEST

Variable	Fixed-Effect Coefficient	Random-effect Coefficient
<i>GDP capita</i>	0.0025	0.0015
<i>GDP growth</i>	0.172	0.145
<i>Capital ratio</i>	3.33	3.315
<i>Liquidity reserve</i>	-0.15	-0.168
<i>Bank return on asset</i>	1.74	1.84
<i>Regulation</i>	1.59	1.32
<i>Regulation^2</i>	-0.151	-0.129
<i>Chi-Squared: 22.6</i>		<i>R-Squared:0.89</i>

Table III show that Hausman-test and selection between fixed effect and random effect, Chi-squared statistic is 22.6 and is significant then fixed effect selected.

In table IV, Regulation and regulation<sup>2</sup> considers expository variable. Regulation and regulation<sup>2</sup> with financial soundness have significantly quadratic form because the sign of coefficient regulation<sup>2</sup> is negative and sign of coefficient regulation is positive and significant, it could be said that  $\cap$  shape hypothesis of above relationship is proved.

TABLE IV. FIXED-EFFECT ESTIMATION (DEPENDENT VARIABLE Z-SCORE IN SELECTED COUNTRIES)

Variable	Coefficient	t-statistic
<i>C</i>	11.0066	2.98
<i>GDP capita</i>	0.0025	2.12
<i>GDP growth</i>	0.172	3.22
<i>Capital ratio</i>	3.33	25.88
<i>Liquidity reserve</i>	-0.15	-2.82
<i>Bank return on asset</i>	1.74	5.6
<i>Regulation</i>	1.59	1.51
<i>Regulation<sup>2</sup></i>	-0.151	-1.998

Adjusted R-Squared: 0.89

#### IV. CONCLUSION

While the causes and consequences of the recent financial crisis will continue to be debated for years to come, there is emerging consensus that the crisis has revealed significant weaknesses in the regulatory and supervisory system. Resulting calls for reform have led to numerous proposals and policymakers in many countries are hard at work to upgrade their regulatory frameworks.

This paper seeks to inform the on-going reform process by providing an analysis of how existing regulations and their application are associated with bank soundness. Specifically, we study whether regulation of banking is associated with lower bank risk, as measured Z-scores. We

find a robust statistical relationship linking better regulation of banking and improved bank soundness. The analysis of aggregate Z-scores to capture systemic stability issues yields similarly significant results. If anything, we find that Regulation and regulation<sup>2</sup> with financial soundness have significantly quadratic form because the sign of coefficient regulation<sup>2</sup> is negative and sign of coefficient regulation is positive and significant, it could be said that  $\cap$  shape hypothesis of above relationship is proved.

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