The Impact of Regulation on Soundness of Banking: A panel Data Approach

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Abstract

The recent financial crisis has shown that the reforming in regulation and supervision is essential. This paper studies whether banking regulation improves bank soundness or more regulation lead to decrease soundness of banking. Specifically, countries which require banks to report regularly and accurately their financial data to regulators and market participants have sounder banks. In this paper, we test the quadratic relationship between regulation and sound banking with a panel data model during (2000-2009) for selected countries. The dependent variable in the study is the bank's financial soundness as measured by its Z-score. These findings emphasize the importance of regulation on banking system. The results show that regulation and financial soundness have significantly quadratic form because the sign of regulation-squared coefficient is gative and sign of coefficient of

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regulation is positive and significant, it could be said that quadratic hypothesis of above relationship can't be rejected.

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1. Introduction

There are five main theoretical reasons for restricting bank activities and banking commercial links. First, conflicts of interest may arise when banks engage in such diverse activities as securities underwriting, insurance underwriting, and real estate investment. Such banks, for example, may attempt to "dump" securities on ill-informed investors to aid firms with outstanding loans (John et al., 1994, and Saunders, 1985). Second, to the extent that moral hazard encourages riskier behavior, banks will have more opportunities to increase risk if allowed to engage in a broader range of activities (Boyd et al., 1998). Third, complex banks are difficult to monitor. Fourth, such banks may become "too big to discipline." Finally, large financial companies may reduce competition and efficiency. Then, governments can improve banking by restricting bank activities.

However, there are alternative theoretical reasons for allowing banks to engage in a broad range of activities. First, fewer regulatory restrictions permit the exploitation of economies of scale and scope (Claessens, Klingebiel, 2000). Second, fewer regulatory restrictions may increase the franchise value of banks and thereby augment incentives for more prudent behavior. Lastly, broader activities may enable banks to diversify income streams and thereby create more stable banks.

The empirical evidence generally indicates that restricting bank activities has negative repercussions. The greater regulatory restrictions on bank activities are associated with (1) a higher probability of suffering a major banking crisis, and (2) lower banking-sector efficiency (Barth et al., 2001a). Restricting bank activities were not associated with less concentration, more competition, or greater securities-market development (Barth et al., 2004).

Boyd et al., (1998) argue that in a country with generous deposit insurance that intensifies 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, capital requirements are the mainstay of current approaches to bank regulation and supervision (Barth, et al., 2004).

This study is organized as follows: The second section will examine the concept of financial stability and the need for regulation. The third section reviews the literature on the regulation and supervision in banking. In the fourth section the paper discusses the regulatory instruments and structure. In the fifth section it introduces the variables and data and discusses the methodology. Finally we draw conclusions in the sixth section.

2. Financial Stability and the Need for Regulation

Stability is 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 also cause stock market crashes, bank failures and other financial disasters which may endanger the health of the whole economy. Financial operations are characterized by risk and uncertainty. In particular, information problems arise. As a result, financial decision making depends on expectations. Market suddenly and collectively adjusts its expectations leading to high volatility in financial markets. Moreover, compared to other sectors of the economy, financial markets are much more interdependent. Events in one financial market or institution may then have important effects on the financial system (Heremans, 2000).

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

may withdraw their funds on short notice. Banks cannot detect the true liquidity needs of depositors. A true liquidity risk arises when depositors decide to remove more funds than what the bank has immediately available. This will force the bank to liquidate relatively illiquid assets probably at a loss. A liquidity crisis may then endanger also the solvency of the bank and eventually lead to bankruptcy (Heremans, 2000).

The providers of funds are not able to assess the value of the bank s underlying assets. 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 a large number of savers lose confidence in the soundness of a bank. 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, thereof, depositors may also lose confidence and remove their funds.

Financial market failures and instability eventually leading to a systematic crisis not only affect individual savers and depositors, but the health of the economy as a whole. Then, public policy intervention is not only a microeconomic question of protecting individual savers and investors, but also 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 damage the ability of the financial markets and intermediaries to provide the services of risk sharing, liquidity and information when faced with economic instability.

Because of the banks importance in the economy, it is of particular importance to maintain the health of the banking industry. The severity of the Great Depression of the 1930s is linked to the breakdown of the banking system s ability to provide financial services. Banks are very important in reducing information costs in the economy. Insolvency of banks is costly because information on borrowers is then lost. 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. 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.

Liquidity crisis can be overcame by monetary authorities acting as a lender of the last resort and providing additional liquidity. However, this may lead in turn to a moral hazard problem. Financial institutions anticipating the possibility of bail-out by monetary authorities may behave in a riskier way. Hence, the lender of the last resort certainly does not have to intervene for financial problems that do not contain the danger of leading to a systematic crisis. For an international financial crisis the question arises as to the need of an international lender of the last resort.

Finally, ensuring a stable payments system has been a principal concern of public policy. Financial regulation 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 the last resort function.

3. Literature Review

In their empirical studies of bank crisis determinants, Demirgüç-Kunt and Detragiache (1998, 2002) find that countries with better institutions are less likely to experience banking crises and are less affected by moral hazard due to deposit insurance. They apply variables such as rule of law and quality of bureaucracy as proxies for supervision and regulation, but

do not include direct measures of this dimension, which were not available at the time.

Barth, Caprio, and Levine (2001) (BCL) 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, BCL (2004) found 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.

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 different rules for marking loans as non-performing (Barth et al., 2006). On the other hand, an advantage of the BCL survey data is that it does not rely on the subjective views of compliance assessors.

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 rate spreads. They found BCP[1]compliance was not a significant determinant of soundness. Das et al., (2004) broaden the measure of bank soundness to include also compliance with standards for monetary and financial policies, and show that better regulatory governance is associated with sounder banks, particularly in countries

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1- Basel Core Principle.

with better institutions. Mitton (2002) argues that transparency helps better performance in financial crises, as East Asian companies with auditors from major international accounting firms were found to have better stock performance after the crisis of 1997-98. Perotti and Von Thadden (2005) survey how the presence of a dominant investor affects a firm decision of how much to disclose.

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

Kunt and Detragiache (2010) study whether compliance with the Basel Core Principles for effective banking supervision (BCPs) is associated with bank soundness. They found that neither the overall index of BCP compliance nor its individual components are robustly associated with bank risk measured by Z-scores.

Uhde and Heimeshoff (2009) show that national banking market concentration has a negative impact on the stability of European banking systems. Berger et al., (2009) use a variety of risk and competition measures from banks in selected countries. They provide limited support to both the competition-fragility and competition-stability views in that market power increases credit risk, but banks with greater market power face lower risks.

4. Regulatory Instruments and Structure

To maintain the health of the financial system, governments have developed a variety of regulatory instruments. They have placed different degrees of emphasis on the objectives at different times and have used different regulatory tools to achieve them. 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 can control the levels of risk assumed, 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. Third, regulatory measures may emphasis on the macroeconomic concerns of systematic risk, or directly aim at microeconomic consumer protection. However, both are organized as the avoidance of consumer risks also limits systematic risks and vice-versa.

Structural and prudential regulation involves a set of different public regulatory measures which differ from country to country. Protective interventions in the form of the lender of the last resort and deposit insurance provisions do not involve such extensive regulation. Central banks can significantly limit the occurrence of systematic crises by their role as the lender of the last resort . Central banks have been set up to control liquidity provision in the economy. By providing liquidity as a bankers bank, they can stop the transmission of financial problems among financial intermediaries.

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 systematic 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 (Herring and Litan, 1995).

The need for government intervention in the form of regulatory instruments depends on the danger of the occurrence of systematic crises and on the need for individual investors protection. The occurrence of these risks may differ among financial institutions. Hence the need for regulating different types of financial institutions depends on the specific activities they engage in. In particular, the danger of systematic risk is seen as justifying a larger role for government. In this respect, the activities of the different financial institutions may be compared according to three criteria: first the risks involved that may lead to their failure; second the interconnections among intermediaries determining the contagion effect; and finally their importance for the whole financial system and the real economy.

According to Mayer and Neven (1991), deposit taking, which is the core of banking, has been found to be especially helpless to systematic risk. First, the maturity transformation sets the banks apart from other financial intermediaries. The mismatch between the maturities of their assets makes them weak to decisions by depositors to withdraw their funds. As the liquidation value of their investments is often smaller, this may increase withdrawals to a bank run. Second, important interconnections in bank relations means that even healthy banks are exposed to failures elsewhere in the banking system. The externalities involved may lead to a contagious collapse of the whole banking system. Third, the bank failures costs to the economy may be huge. Banks play a crucial role in the payments system and in refinancing other financial intermediaries. Failures have wider ramifications on the rest of the financial system and on the real sector of the economy. One may point also to the danger that a banking crisis causes large and uncontrollable fluctuations in the quantity of money and credit. Hence, the case for banking regulation not only arises from the need of depositors protection, but more urgently from the systematic risk of the collapse of the whole financial system (Heremans, 2000).

In this paper, we focus on the relationship between soundness and banking regulation. We also include a regulation square that examines the quadratic relationship between regulation and bank stability.

5. Methodology and Data

In this section we discuss the empirical model used to investigate the impact of regulation on bank stability.

Bank Soundness is measured with Z-Scores. Moody s ratings are measures 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 may be argued that analysts may be better disposed towards banks that provide more accurate and timely information even though these banks are not necessarily sounder. To address this concern, in this section we measure bank soundness using an alternative, objective, and commonly used indicator, named the Z-score. We compute Z-scores for countries in our sample[1].

To measure a bank s financial soundness, the Z-score is used. The Z-score combines the banks profitability ( ), capital/total asset ratio (k) and return volatility ( ) in one single indicator. This ratio has become a measure of bank soundness in related empirical work on financial stability (Boyd and Runkle, 1993; De Nicolo et al.,2004;Uhde and Heimeshoff,2009) and is denoted as:

$$= (\ +\ )/$$

Obviously, the Z-score will increase with the banks profitability and capital/total asset ratio and decreases with increasing return volatility.

1- Australia, Austria, Belgium, Canada, China, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, India, Indonesia, Iran, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, South Africa, Spain, Sweden, Switzerland, Turkey, United Kingdom, United State, Venezuela

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.

The Z-score has become rather popular in the literature (Mercieca et al., 2007). The Z-score combines banks buffers (capital and profits) with the risks they face (measured by the standard deviation of returns). It can be shown that the Z-score measures the number of standard deviations a return realization has to fall in order to reduce equity. A higher Z-score implies a lower probability of insolvency, providing a direct measure of soundness. Z-score is used as an explanatory variable in banking system in this analysis. A higher Z score indicates that the bank is more stable. According to Kunt and Detragiache (2010), the dependent variable is the bank s financial soundness as measured by its Z-score, and the explanatory variable is the country s banking regulation. The latter is available only at one point in time, so the sample is cross-sectional.

The regression equation has been specified as follows:

$$Z_{i,j} = {}_0 + {}_1 X_{1i,j} + {}_2 X_{2i,j} + {}_3 X_{3i,j} + \varepsilon_{i,j}$$

where the subscript j denotes the country and the subscript i denote the bank. Z is the Z-score in country j, X_1 is banking regulation in country j, X_2 is a vector of bank characteristics including capital/total asset ratio and liquidity reserve and bank return on asset, X_3 is a vector of country characteristics including GDP per capita and GDP growth, and ε_{ij} is a random disturbance. Equation is estimated by panel data and fixed effect is selected.

The data variable of regulation is derived from economic freedom index of Fraser Institute from 2000 to 2009. Regulation in economic freedom Index concludes regulation in credit market, regulation in labor market and regulation in business. We use regulations in credit market. Subcomponents of credit market regulation provide evidence on the

extent to which the banking industry is dominated by private firms and whether foreign banks are permitted to compete in the market and indicate the extent that credit is supplied to the private sector and whether interest rate controls interfere with credit market operations. Countries with an open banking system where privately owned banks extend a larger share of the outstanding credit to private borrowers at interest rates determined by market forces receive higher ratings for the credit market component in the regulatory area.

Macroeconomic control variables are retrieved from the World Development Indicator (WDI) database provided by the World Bank. We use growth of GDP per capita as macroeconomic control variable. The quadratic form relationship between regulation of banking and financial soundness is the main idea of the paper.

Descriptive Statistics for the variables are displayed in table 1. The average countries in the sample have a capital/total asset ratio of 7.5 percent and the average return on asset was 1.2 during the sample period. The average growth rate in the sample period was 2 percent, and the average of Z-score is around 35 percent.

Table (1) Summary Statistics

Variable	Std. Deviation	Mean
Z-score	3.29	35.1
Capital/total asset ratio	0.857	7.46
Regulation	0.8	7.7
Liquidity reserve	3.145	2.076
Bank return on asset	1.61	6.22
GDP per capita	2617.1	16695.5
GDP per capita growth	0.377	1.186

Capital/total asset ratio and bank return on asset have positive relationship. Increasing bank return on asset, increased stability and improved capital market. Improving in capital/total asset ratio leads to more stability in banking system. Reserve liquidity of bank has negative relationship, and then increasing Reserve liquidity decreases the stability of financial market.

Higherreal per capita GDP is associated with higher country development. In this model, growth of per capita GDP and GDP at constant prices of 2000 is used during (2000-2009). Higher GDP growth rate indicates economic boom which should lead to higher banking profitability and stability.

Table (2) Cross section random effect-Hausman test

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

Table 2 shows that Hausman-test and selection between fixed effect and random effect, Chi-squared statistic is 22.6 and then, fixed effect selection is significant.

Table (3) Fixed-Effect Estimation (dependent variable Z-score in selected countries)

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

Adjusted R-Squared: 0.89

We analyze regulations that theoretical and empirical research highlight as affecting bank behavior. Thus, we examine regulatory restrictions on bank activities, which some theories suggest will improve bank stability by preventing banks from engaging in very risky activities and other theories, suggest that will reduce bank stability by preventing banks from diversifying income flows.

In our model, regulation and regulation-squared are considered expository variables. Regulation and regulation-squared with financial soundness have significantly quadratic form because the sign of regulation^2 coefficient is negative and sign of regulation coefficient is positive and significant, it could be said that   shape hypothesis of above relationship can't be rejected.

6. Conclusion

This paper provides an analysis of how existing regulations are associated with bank soundness. Specifically, the results show that regulation of banking is associated with lower bank risk, as measured by Z-scores. GDP per capita growth rate indicates economic boom which should lead to higher banking profitability and stability. Capital/total asset ratio and bank return on asset have positive relationship. Increasing bank return on asset increases stability and improves capital market. Improving in capital/total asset ratio leads to more stability in banking system. Liquidity reserve of bank has negative relationship, and then increase of reserve liquidity decreases stability of financial market. We found a robust statistical relationship linking regulation of banking and improved bank soundness. If anything, we found that regulation and financial soundness have significantly quadratic form because the sign of coefficient regulation-squared is negative and sign of regulation coefficient is positive and significant, it could be said that quadratic (shape) hypothesis of above relationship can't be rejected.

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