CAPITAL REGULATIONS AND FINANCIAL INSTITUTIONS: REFLECTIONS FROM THEORY AND EVIDENCE

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Abstract: In recognition of the important role banks play in any economy, numerous researches have been undertaken on how these institutions should be regulated. For example, researches on capital requirements have indicated that the capital base of a bank is vital for the protection of its creditors (its depositors) and hence for the maintenance of general confidence in its operations and the underpinning of its long-term stability and growth. Other researches have addressed the deposit insurance schemes as well as reserve requirements and their effects on the risk taking behaviour of banks. The principle objective of this paper is to review the current literature on capital regulations with the intent of exploring the implications of banking theory for optimal regulation. Results suggest that there are mixed arguments about capital regulations and its effects to banks' risk taking behaviour. It is inconclusive as to whether or not risk based capital requirement increases incentives for banks to take risks.

INTRODUCTION

Any business that starts by taking the customers' money up front instead of after delivering the service is potentially prone to fraud. Such problems may range from direct fraud (insider lending) to excessive risk taking by managers, especially if the downside risk is covered by de facto deposit insurance fund (i.e. the moral hazard problem). In the most elementary terms, the banking industry borrows funds from one part of the market to lend them to the other. However, its sources and uses of funds are much more complicated than this simple summary. By virtual of uncertainties surrounding the whole issue of assets choices, it is apparent that the banking business becomes inherently risky and as such calls for some sort of regulators who should be able and ready to intervene in case the need be.

Banks are crucial to a country's economy for they serve as a centre point of money throughout the economy. They gather savings from small and large depositors, make loans, run the payment system, and co-ordinate financial transactions. These key roles the banking industry play in any economy, whether developed or otherwise, have led to extensive regulations by most governments.

Banks may appear more solid than they really are. A bank that has loaned money to a borrower who is unable to repay may keep the bad loan on its balance sheet as long as possible, though the loan might never be paid back. Moreover, bank deposits are also somewhat precarious. A bank normally cannot refuse to accept deposits, but if, for whatever reason, its depositors lose confidence in the bank's soundness, they may withdraw their funds not only from that bank but also from other, perfectly sound banks. This problem might be due to failure to properly and efficiently regulate the banking system and leads, in most cases, to bank crises. Recent researches suggest that there are several initial steps that could be taken to reduce significantly the likelihood of such banking crises. Country could, among other things, develop and improve legal systems and information disclosure (Demirguc-Kunt and Detragiache (1997)); impose rate ceilings on bank deposits (Hellmann et al. (1998)). They could establish limits either on the rate at which banks can expand credit or on the rate of increase in their exposure to certain sectors, such as real estate (Barth et al. (1998)). They could undoubtedly require greater diversification of bank portfolios as well as to reduce the restrictions on the range of activities in which banks can engage (Caprio and Wilson (1997)). Generally put, the financial system must be regulated.

The literature on the whole issue of regulating the banking sector is apparently voluminous. Most of the researchers, however, have taken up the issue in two different, though related perspectives. There are those dealing with the concept of regulations, such as capital adequacy, from static perspective (Kahane, 1977; Koehn and Santomero, 1980; and Furlong and Keeley, 1989 and there are those looking at the concept in a dynamic perspective (Blum, 1999). Without using any empirical data this paper reviews the current literature in order to establish, based on the findings of different researchers, some answers for the raised questions in what follows.

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Specifically, the paper sets out to address the arguments that: (1) imposing regulations on banks lead them to reducing total volume of their risky portfolio, (2) when banks are regulated, tend to be less efficient in allocating their resources, (3) failure probability of some banks increases when they are subjected to capital regulations, and (4) More restrictive regulatory systems lead to lower probability of banking crises.

The remainder of this paper is organised as follows: in section two the paper briefly reviews the evidences and discusses in a detailed manner the literature on the subject matter. Section three discusses the risk-based capital requirement. Section four briefly analyses the impact of capital regulations on the macroeconomic performance. Finally, section five gives some concluding remarks.

REVIEW OF THE EVIDENCE

Although regulation can be established for several purposes, in the banking industry the major emphasis has increasingly been on their safety as well as their capital structure. These two purposes lead bank regulators to consider two goals, namely, limiting the risk that banks incur, and promoting competition (Santomero and Babbel, 1997). The real fear of a regulator, however, is a crisis of confidence in the system that results in a full bank run. By definition, bank runs are caused by depositors trying to get out to avoid a loss of capital. To reduce the likelihood of this problem, bank regulators have been given tools to ensure the stability of the banking system.

Regulation of bank capital and bank portfolio restrictions has been introduced to reduce the incentives for banks to undertake highly risky positions. When measured appropriately capital provides an important protection for depositors (for the deposit insurer). More capital generally means more protection. The measurement of capital in any case is not a trivial issue. In deed, the proper measure of capital is at the heart of the issue of capital adequacy for banks. However, it has to be made clear that if capital measurement framework is faulty there is far less assurance that any claimed amount of capital will be sufficient to provide the needed protection to depositors.

According to Gennotte and Pyle (1991), capital controls limit the banks' ability to lever their investment portfolio. Therefore, a central issue in bank capital regulation is whether the enforcement of higher capital ratio requirements gives banks greater incentive to increase asset risk, thereby partially or even fully offsetting the effect of a higher capital ratio on default risk. Numerous researches such as Kahane (1977), Santomero and Babbel (1997), Furlong and Keeley (1989), and Keeley and Furlong (1990) on the relationship between bank risk and capital have focused on excessive risk-taking, particularly among undercapitalised banks. This body of research, primarily theoretical in nature, has incorporated options pricing, state-preference, agency-theory, and mean-variance models. It has generated contradictory conclusions about how bank risk-taking and capital are related, and about whether risk-taking is effectively constrained by either private incentives or regulatory policies.

The fact that their findings were based on theoretical analyses, it would be worthy to suggest a new look that would review the empirical evidence on the impact of the 1988 Basle Accord.[1] Cooper et al. (1991), and Peek and Rosengren (1995) have focused on whether the adoption of fixed minimum capital requirements led some banks to maintain higher capital ratios than would otherwise have been the case and whether any increase in ratios was achieved by increasing capital or reducing lending. Moreover, they address whether fixed capital requirements have been successful in limiting risk-taking relative to capital as intended, or whether banks have been able to take actions to reduce their effectiveness, either by shifting to riskier assets within the same weighting band or through capital arbitrage. Gjerde and Semmen (1995) look at two possible side effects. Firstly, whether in some periods capital requirements may have had the effect of constraining bank lending thereby causing a credit crunch.[2] Secondly, whether the introduction of fixed minimum requirements for banks affected their competitiveness relative to other forms of intermediation. They both find

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1 The agreement is principally referred to as the International Convergence of capital Measurement and Capital Standards, Basle Committee on Banking Supervision (July 1998).

2 See, Peek and Rosengren (1995).

that banks with formal actions shrink at a significantly faster rate than those without, even after controlling for capital-to-asset ratios. As they deviate from the optimal risk weights, they find that a combination of a leverage restriction and a risk-based equity ratio seems to be the more appropriate approach to controlling bank portfolio risk.

While some researchers contend that capital regulation of the bank induces it to undertake more risky investment decisions, others reject the assertions. Kahane (1977) and Koehn and Santomero (1980), for example, by applying a mean-variance model to utility maximising banks demonstrate that higher capital requirements may induce a bank to increase its asset portfolio risk, thereby partially defeating the purpose of capital control. Kim and Santomero (1988) also find potential impact of capital regulation on bank risk taking and industry structure. They find that in a utility maximising mean-variance framework, banks with relatively low risk aversion will choose relatively high leverage (low capital) and relatively high asset risk. Econometric models suggests that, this being the case, we could therefore observe a negative cross-sectional correlation between the level of asset risk and bank's capital ratios due simply to cross-sectional variation in risk preferences. Notwithstanding this negative cross-section correlation, which was in deed observed by Kim and Santomero in their data, the theories discussed in their work have different implications for how individual banks adjust either capital to changes in risk or adjust risk to changes in capital. Thus, in order to test these theories, Shrieves and Dahl (1992) suggest that it is necessary to analyse the relationship between changes in risk and changes in capital, rather than the relationship between capital and risk levels. Based on this approach Shrieves and Dahl find a positive association between changes in risk and capital. They argue that the fact that this finding holds in banks with capital ratios in excess of regulatory minimum levels supports the conclusion that for most banks incentives works to limit total risk exposure.

Regarding the industry structure Dahl and Shrieves (1990), inter alia, examine the extent to which regulatory capital standards influence infusions of external equity into commercial banks. On the basis of various statistical tests, they conclude that regulatory minimum capital constraints are instrumental in influencing the external financing decisions of some undercapitalised banks. They find that while such infusions occur infrequently, they result in large adjustments to overall bank capital and provide important signal to regulators of managerial intent. In a more recent study by Blum (1999) it is shown that in a dynamic setting a new intertemporal effect can arise which leads to an increase in risk. The key insight of this study is that under binding capital requirements an additional unit of equity tomorrow is more valuable to a bank. According to Blum if raising equity is excessively costly, the only possibility to increase equity tomorrow is to increase risk today. How much increase should be expected, of course, depends on how able and ready the management is to stomach risks of the underlying assets. It will also depend on the unobservable ad hoc utility functions of these managers.

In this research, Blum (1999) analyses a single bank, both when it is regulated and when it is not regulated. The resulting optimal choices are compared with the first-best solution of the model. Due to limited liability an unregulated bank has a tendency to take "excessive risks", i.e. risks higher than first best. According to this study, if the bank only faces a binding capital rule in the first period, tightening the requirement decreases these risks. If capital requirements are implemented in the second period, however, banks may increase asset risk in period one. This is true because tightening the regulation has two effects. First, a tighter restriction lowers the expected profits of the bank. If profits are lower, the bank has less to lose in the event of bankruptcy. Therefore, increasing risk, and hence the probability of default, is less costly for the bank the stronger the restrictions (see Rochet, 1992 and Blum, 1999).

Second, changes in the regulation affect the marginal return on risk. In his model Blum (1999) this marginal return on risk may be raised and therefore may reinforce the first effect, which leads to an overall increase in risk. The reason is the fact that under binding regulation equity tomorrow is more valuable to the bank. In the regime of binding capital requirements the amount that can be invested in the risk but profitable assets is restricted to a multiple of the value of equity.

Furlong and Keeley (1989) and Keeley and Furlong (1990) challenged the validity of these

results, especially the earlier ones. They make a very important point that the mean-variance framework employed in these studies is inappropriate because the distribution of returns actually earned by the banks ceases to be normal in the case of insolvency. The main finding of their study is that a higher bank capital ratio (lower leverage) does not lead value-maximising banks to increase asset risk. Contrary to the earlier studies, they find that more stringent capital requirements reduce the gains to a bank from increasing the risk of its asset portfolio. The analysis also indicates that a value-maximising bank will meet higher capital ratio requirements in part by raising capital, rather than merely by retiring debt. After taking into account the truncation of the returns distribution, Furlong and Keeley (1989) show that imposing stricter leverage limits unambiguously results in a decrease in total bank risk and no increase in asset risk.

However, their findings are still based on theoretical examination of the effects of more stringent capital regulation on bank asset portfolio risk; and above all they consider a bank from static point of view.[3] And one more important thing to note here is that these conflicting results are explained by the different underlying assumptions regarding the curvature of bank managers' risk-return preferences. Using a curvature in preferences in including positive NPV investment opportunities for the bank, Gennotte and Pyle (1991) show that banks will increase their asset risk and reduce their scale when the capital requirement is increased. Several other studies, such as Kareken and Wallace (1978), Dothan and Williams (1980), and Pyle (1986) support the view that regulations are required to control both the leverage and the asset risk of a value-maximising bank. In this context, it should be pointed out that a large number of non-performing loans in bank's portfolio are a result of earlier poor loan decisions and, sometimes, deteriorating economic conditions. Minimum levels of capital will therefore serve as a cushion to absorb economic shocks, but if the value of a bank's assets declines relative to that of the liabilities it does not own, its capital can soon be exhausted.

RISK-BASED CAPITAL REQUIREMENTS

In July 1988, central bank governors from twelve leading Western industrialised nations announced their agreement to apply common risk-based capital requirements to international banks in their countries. The agreement culminated many months of study and negotiations by the Basle Committee on Banking Regulations and Supervisory Practices, which includes representatives from these twelve nations and the Bank for International Settlements (BIS).[4] The major outcome of the Basle Accord was to raise the capital bases of banks actively operating across national borders while levelling a significant dimension of competitive arena by requiring uniformity in the new risk-adjusted capital requirements (Kidwell et al., 1997). The intent of the agreement is to control bank risk taking and thereby helping preserve and protect the safety and soundness of the international financial system. This is accomplished by assigning assets to risk categories, based upon the type of collateral, guarantees, and the identity of the obligator. Off-balance sheet item such as loan commitments, letters of credits, and guarantees and indemnities are first converted into equivalent amounts, then assigned to risk categories on the same basis as bank assets.

Capital requirements are set against the value of risk-weighted assets, which are computed as the sum of risk-weighted balance-sheet assets and off-balance sheet commitments. Assets and credit-equivalents that are considered to posses little risks or no credit risks are given risk-weights of zero per cent and therefore require no capital backing. Riskier assets and off-balance sheet commitments are assigned higher risk-weights, as high as 100 per cent (Rochet, 1992). Risk-based capital requirements are also related to the issue of pricing deposit insurance. For example, Buser et al. (1981) have argued that, based on Modiglian and Miller's (1958, 1963) tax model of how financial leverage (i.e., debt/value ratio) affects firm valuation, risk-based capital requirements serve as an implicit deposit insurance premium.

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[3] See Blum (199).

[4] The Basle Committee on Banking Supervision, established by Central Bank Governors of the Group of Ten countries in 1975, consists of senior representatives of bank supervisory authorities and central banks from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, The Netherlands, Sweden, Switzerland, the United Kingdom and the United States. It usually meets at the Bank for International Settlement in Basle, where its permanent secretariat is located

In combination with the fixed-rate, explicit deposit insurance premium, capital requirements enable regulators to variably price deposit insurance and thereby curtail bank exploitation of the insurance fund through excessive risk taking. If deposit insurance rates are fixed, regulators must try to vary the net cost of insurance so that it covers the risk taken by an insured institution. In such cases, the risk-based capital standards address credits risks in a limited fashion and makes crude adjustments for country-transfer risk. Total risk-weighted assets determine a bank's capital requirements. For example, in the US after a phase in period which ended at year-end 1992, banks must have at least 4 per cent Tier 1 capital and 8 per cent total risk-based capital, where both capital ratios are measured as a per cent of risk-weighted assets.[5]

Due to the fact that the world financial system has witnessed considerable economic turbulence over the last two years, the Basle Committee on Banking Supervision has decided to introduce a new capital adequacy framework to replace the 1988 Accord. Nevertheless, this does not actually suggest changes in the discussed measurements above, which were calculated, based on the old accord. The review of the Accord is designed to improve the way regulatory capital requirements reflect underlying risks. It is also designed to better address the financial innovation that has occurred in recent years, as shown, for example, by asset securitisation structures. As suggested by Bank for International Settlements (BIS) and as a result of this innovation, the current Accord has been less effective in ensuring that capital requirements match a bank's true risk profile. The review is also aimed at recognising the improvements in risk measurement and control that have occurred in recent days.

It is suggested that the new capital framework should consist of three pillars. These are minimum capital requirements, a supervisory review process, and effective use of market discipline. With regard to minimum capital requirements, the Committee recognises that a modified version of the existing Accord should remain the "standardised" approach. For some sophisticated banks, however, the use of internal credit ratings and, at a later stage, portfolio models could contribute to a more accurate assessment of a bank's capital requirement in relation to its particular risk profile. The result will be to reduce risk weights for high quality corporate credits, and to introduce higher-than-100% risk weight for certain low quality exposures. A new risk-weighting scheme to address asset securitisation and the application of a 20% credit conversion factor for certain types of short-term commitments is also proposed.[6]

The need to maintain adequate capital has an impact on the general operations of the bank and its profitability in the long term. The implementation of the Basle Accord means that banks requires more capital to support their assets than perhaps would have chosen if the matter were left to the banks themselves. Moreover, once a bank is not able to meet the capital adequacy criteria, it must strive to achieve appropriate capital ratios. This can be done either by accumulating more capital of the right type or by reducing the size of the asset base so that the given amount of assets (fixed) on a risk-weighted basis match the capital currently in place. Consequently, this latter approach brings some adverse effects to the bank's performance in terms of liquidity and profitability. This is so because under conditions of falling stock market values, rising interest rates and worries concerning bank safety it may be difficult for some banks to raise the extra capital. Squeezed profitability will also make some difficulties to banks to increase reserves from retained profits, especially, if a proportion of the bank's assets is non-performing. In such cases the alternative for a bank will be to reduce the size of its assets bases (Pawley et al., (1991)).

In another development, Cooper *et al.* (1991) carried out the empirical evidence on the relative competitive effects of the adoption of the risk-based capital requirements on large international banks in the U.S., Canada, U.K., and Japan. Using a two-index regression model they calculated prediction errors in periods with numerous announcements concerning the new capital rules, including the Basle Conference. They found significant declines in equity returns for the U.S., Canadian, and U.K. banks in response to news announcements, with U.S. banks exhibiting the largest negative reaction.

[5] See, Santomero and Babbel (1997)

[6] As with the former primary and secondary capital constraints, bank supervisors are given the authority to set higher minimum risk-based capital requirements that are judged to be badly run or managed

For Japanese banks, the equity return results were mixed, probably due to uncertainty among investors regarding the handling of their sizeable hidden reserves under the new risk-adjusted capital rules.

The crux of capital adequacy, however, is that capital should be an economically meaningful quantity. That is, any capital ratio test should reflect the true net worth or capital position of the organisation rather than some artificial number constructed by regulators, auditors, or legislators to meet objectives other than full economic transparency of the true economic conditions of the organisation. This would appear to suggest using capital ratios and net worth requirements based on market values of net worth, i.e., using market value accounting or some close variant. Such a system would potentially reduce the deposit insurance exposure since regulators by using true net worth. Could close a bank before capital is fully dissipated.

CAPITAL REGULATION AND MACROECONOMIC PERFORMANCE

The preceding section of the paper has discussed the regulation of capital and its effects on banks as individual firms. It has noted the implication these regulations have on the liquidity and profitability of the banks. What also seems to be interesting is whether or not these regulations have got some implications on the general pattern of investment in a country as a whole. In other word, do regulations on adequate capital for banks have any implications at macro-economic level? This question is briefly addressed in what follows.

There is almost a consensus among researchers (Bernanke and Lown (1991), Rochet (1992), and Blum and Hellwig (1995)) that capital adequacy regulation for banks may reinforce macroeconomic fluctuations. For example Bernanke and Lown argue that if negative shocks to aggregate demand reduce the ability of firms to service their debts to banks, this reduction in debt service lowers bank equity, and, because of capital adequacy requirement, this in turn reduces bank lending and industry investment. Bernanke and Lown (1991) assert that the "credit crunch" in the United States was at least a consequence of banks scrambling to meet the 1992 deadline for capital adequacy requirement under the 1988 Basle agreement.

According to the simple argument, equity is a buffer stock protecting depositors from asset return risk; by increasing the buffer, capital adequacy requirements improve deposit protection. If this argument is pursued to its logic conclusion, a capital adequacy requirement of 100% is found to be most desirable as it provides depositors with perfect protection; however, there then no depositors left to be protected.[7] However, Bernanke and Lown's model is valid regarding the macroeconomic implications of the capital adequacy requirements if the output price elasticity of bank equity exceeds the output of bank deposits. In this case, a shift from a regime of non-binding capital adequacy requirements to a regime of binding capital adequacy requirements still induces a discontinuous increase in the sensitivity of equilibrium output and price with respect to a demand disturbance. In short, the above literature suggests that perhaps one have to have second thoughts about the current emphasis of banking regulation on fairly rigid capital adequacy requirements.

CONCLUSION

This paper has reviewed the capital regulations in the banking industry primarily for the purpose of establishing the impact such regulations has on the banking risk-taking behaviour. It intended to also establish whether banks tend to be less efficient in allocating their resources due to these regulations. There have been some contradictory argument regarding risk-taking behaviour of banks when their capital is regulated. Some studies have suggested that when banks are regulated find such regulations as incentives for taking more risks than if they were not regulated. Therefore it is inconclusive as to whether or not risk based capital requirement increases incentives for banks to take risks. For this reason it has not been possible to directly document whether the failure probability of some banks increases when they are subjected to capital regulations. However, the review by this paper suggests that more restrictive regulatory systems lead to lower probability of banking crises.

[7] See, Mlum and Hellwig (1995)

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