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M.A. in Economic Policy in Global Markets

The Impact of Financial Regulation on Bank Risk-Taking; Capital Adequacy Regulation vs Deposit Insurance

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Abstract

This paper, based on the reviewed literature, conducts a secondary analysis to understand what are the incentives which increase the level of risk-taking in the banking sector, whether there is intense competition giving significant grounds to the banks for excessive risk-taking. Additionally, it discusses how financial regulation impacts the risk-taking in the banking sector and the possible flaws of the regulation. A comparison is conducted between two preventive governmental interventions: Capital adequacy requirement and Deposit Insurance. Further policy recommendations have been made to improve the financial regulation in the banking sector.

Keywords: Bank Risk-taking, Capital Adequacy Requirement, Competition, Deposit Insurance, Financial Regulation, Government Intervention

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Introduction

Banks have the role of financial intermediaries linking the borrowers of loans and the depositors of savings together. Hence, in the case of free-market competition, banks simultaneously need to compete for both borrowers and depositors. Banks have the market power of altering loan interests via setting acceptance criteria and providing a variety of loan contracts with different combinations of credit risk and loan interest. They also have the market power of defining the risk of their portfolio and setting the deposit rate correspondingly, thus allowing the investors to choose how much to invest in each bank. But as the deposit resources are scarce, banks face increased competition for deposits which gives them the incentives to increase the deposit rates to attract investment meanwhile forcing the banks to take on extreme risk (in literature is accepted as the highest possible risk level for the deposit rate).

Most banks have a limited liability status performed via standard debt contracts provided to the depositors; both the managers and the shareholders of the banks are not personally responsible for the bank's irrecoverable debt. Moreover, in the case of bankruptcy, the welfare cost of failures, such as the costs of financial distress and economic distress is not completely internalized by the banks (Berger et al., 1995). There are also such external costs as an interruption in the payment system, failure in the interbank agreements and information contagion effects of bad information; one bank's failure, carrying a piece of bad information for another bank with a similar portfolio, can have a negatively signaling effect and can even trigger bank runs (when a large portion of customers simultaneously withdraw their money from the bank). Connected through interbank agreements, banks also have high interbank exposure as they are linked via bank guarantees, open credit lines, credit insurance, and credit default swaps (CDS).

Bank failures generate negative externalities (Kupiek and Ramirez, 2009); the failure can leave direct and negative shocks to the banking sector pushing the other banks in the sector react to the bank failure triggering the exogenous risk (associated with the news, causing volatility in the market) to become an endogenous risk (caused by the interaction among market participants) (Maes and Kiljanski, 2009). Thus, having a systemic nature, the significant probability of bank failure has attracted government regulation through preventive and corrective financial interventions.

Competition has often been viewed as a reason for excessive risk-taking in the banking industry both in the free market and in the market with risk-based insurance (Matutes and Vives, 1998). There is a negative relationship between the competition and bank risk-taking; the increase in the market power negatively affects bank risk-taking (Jimenez, et al., 2010). In case of a monopolistic banking system (imperfect completion) and in the case when banks compete for the loans as free-market competition, banks take on risk but generally avoid extreme risk-taking. Whereas when banks compete in the deposit market, they have incentives to invest in the extremely risky assets which might pay back high interests on deposits; the increase in the deposit interest rates attracts depositors meanwhile also increasing the bank's risk-taking. Hence, the competition for deposits has a more significant impact on the stability of the bank and alerts the need for regulators' attention (Niinimäki, 2004).

Banks are unique with their capability to create liquidity by transforming short-term funds into long-term investments. Hence, they are highly exposed to liquidity risk which might be caused when a large fraction of the assets is forced to get withdrawn at materially significant discounts (Maes and Kiljanski, 2009). Apart from the liquidity risk, banks also have significant exposure to credit risk, commercial risk, moral hazard, systemic risk, reputational risk, and insolvency risk.

Having both preventive and corrective nature, the government interventions aim at minimizing the instability in the banking sector through such regulatory facilities as the capital adequacy requirement (capital adequacy ratio of equity that needs to be maintained), licensing requirements (requirement set by the regulators mandating the banks need to comply with), deposit insurance, bank monitoring and such rescue measures as lender of the last resort (state aid debt) to prevent and diminish the instability in the banking sector which might result in bank runs – large withdrawals of money from the bank.

II. Body of the Thesis

1.1. An overview of the risks that banks are exposed to

Through its everyday business activities, banks have significant exposure to liquidity risk, credit risk, commercial risk, market (systemic) risk, moral hazard, interest rate risk, earning risk, reputational risk and insolvency (default) risk. To secure itself against the emergency cases demanding a significant amount of cash, banks should retain the proper level of liquid assets; hence, the inability of maintaining the sufficient level exposes banks to liquidity risk. Credit risk arises when the borrowers, experiencing financial difficulties, are unable to pay back the debt to the bank. Commercial risk arises when the banks give credit to the borrowers without securing their credit with collateral. Market risk (also referred to as systematic risk) can arise because of fluctuations in the values of the assets triggered by systemic factors. Material variations in the interest rates will also alter the bank's incomes and expenses, thus putting the bank's profits under the risk of high volatility. The increase in the banking competition has a high chance of decreasing the spread between the return on the investment and cost of the investment; can suppress the possible high returns on the investment, thus increasing the bank's exposure to earning risk. The

bank can also be exposed to reputational risk because of having a high chance of reputational harm resulting in a lack of reliability among the customers. Insolvency risk arises when banks are exposed to having a substantial amount of bad debts and (or) having a significant decrease in the value of investments can decrease the capital and lead to capital losses which can trigger insolvency if many counterparties simultaneously react by extensive withdrawals of the capital from the bank. Asymmetric information, triggered by unequal information between the counterparties, can also expose the bank to a risk triggered by the moral hazard and adverse selection issues. (Tursoy, 2018).

1.2. The impact of competition on bank's risk-taking

Competition is essential for the bank's efficiency; with the incentive of sustaining and increasing their market power and with the purpose of profit maximization, banks tend to become more efficient. As the marginal improvement in the efficiency declines, the banks simultaneously need to apply another approach for high profitability, targeting high risk for a high return. Whether competition affects the banks positively or negatively depends on which approach is dominating in the bank's strategy. If banks target the increase in efficiency more than they target the high risk for high return approach, the strategy will not harm the stability of the bank. Whereas the strategy of the high risk for a high return approach dominating over the efficiency maximization can trigger financial instability largely exposing the bank to insolvency risk (Ren and Schmit, 2006).

In most of the literature reviewed, the decrease in the market power (market concentration) is viewed as the result of an increase in the competition since the market power of the bank declines with the number of the banks increasing in the sector. Similarly, the increase in competition is viewed as an incentive and a trigger for an increase in efficiency.

Banks simultaneously compete both in the loan market and in the deposit market. The increased competition for the borrowers decreases the loan's interest rate to the zero-profit level. The interest of the loan varies based on the risk level the borrower chooses. Hence, there is a variety of interest rate and risk level sets which all bring zero-profit to the bank because of increased competition in the loan market. It is considered that, as the preferred risk level affects the interest rate of the loan solely by the cost of operation, the cost of risk-taking is not entirely included in the interest rate set by the bank. This gives the borrowers additional incentives for risk-taking. In the case the borrower is unable to repay the loan, the bank must face the cost of the lost loan. If the total loan loss to the bank passes the acceptable threshold, it can trigger financial instability increasing the bank's exposure to insolvency risk. In case of bank failure (bankruptcy), the depositors to the bank are at the most vulnerable position, as they will have to suffer the complete cost of the failure; thus, government protection is essential for them (Niinimäki, 2003).

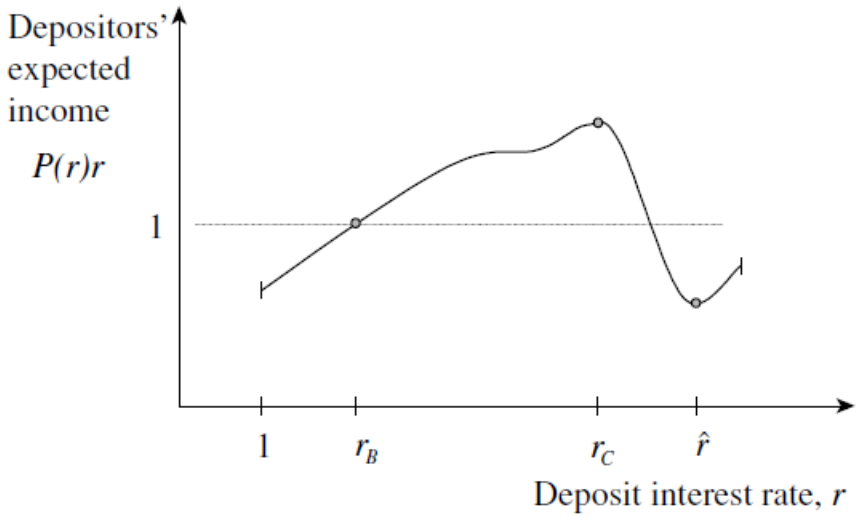
While competing in the loan market, banks have more market concentration and can increase the interest rate up till the zero-profit level of the borrowers, in the deposit market banks have to face increased competition for scarce deposits. The banks need to maximize the expected income (maximize the utility) of the depositors to attract the most investment to the bank, but on the other hand they need to maximize the expected income of the depositors conditioned with the bank's participation constraint (banks should earn minimum zero profit) and incentive constraints (the combination of selected risk level and its corresponding deposit rate). It is assumed that the depositors are rational investors realizing that the high deposit rate is associated with a high level of risk.

$$\frac{dU(r)}{dr} = p + r\frac{dp}{dr} = 0$$

The following equation shows the impact that the increase in the deposit rate can have on the depositor's utility. First, p, which presents a positive number, indicates that in case the bank is successful, the depositors will be rewarded with more income. Whereas the second term, $r\frac{dp}{dr}$, states the decrease in the expected income of the depositor resulting from the decrease in the probability of gain. In case the sum of p and $r\frac{dp}{dr}$ is positive for any p, the first impact occurs, and the depositors receive more income when the bank is successful. Hence, as the depositors strive to maximize their utility, they chase the highest possible deposit rate for higher income in case the bank is successful (Niinimäki, 2003).

Graph: The effects of competition on bank's risk-taking (Niinimäki, 2003)

The depositor gets the highest utility if the expected income is maximized, at the deposit rate r_c



Where r_c is the optimal deposit rate maximizing depositors' utility when the deposits are not protected via deposit insurance. To maximize the depositors' utility, the banks are pushed to go for "extreme" risk-taking ($r^{\wedge}$) as they want to satisfy the depositors' demand for high rates to get the scarce deposits invested in the bank. Increased competition for deposits increases the deposit rates triggering the banks to go for more risk, up till the "extreme" risk ($r^{\wedge}$) is reached

maximizing the depositor's utility in case of success. The "extremely" risky projects have negative NPV (Net present value), hence for a very risky investment, the expected income to the depositors is negative. Thus, if the bank chooses the "extreme" risk level, the possibility of success is correspondingly very low putting the depositors at a vulnerable position of losing their savings and alerting of possible measures of protection for the depositor's savings (Niinimäki, 2003).

2.1. The importance of financial regulation in the banking sector

The intense competition in the loan market gives the banks the incentives to ease the acceptance criteria for the loans to meet the demand of borrowers. Although loose acceptance criteria help the bank engage more borrowers into their loan portfolio, it also negatively impacts the quality of the loan portfolio by bringing in more people who are less eligible for the loan they receive. Since the acceptance criteria are less strict, the riskier loan applicants, who would otherwise have been rejected, get the loan because of intense competition within the banks for loans. From the bank's perspective, the intense competition pushes the banks to choose between increasing their market power in the short-term (via easing the borrowers' acceptance criteria, which can significantly expose the bank to insolvency risk) and having more stability in the long-term (Bolt and Tieman, 2004).

Banks differ from other companies and institutions with their necessary attribute of holding a large portion of liabilities in the capital structure of the bank and at the same time having a large distribution of depositors investing in the bank. So, from one side, the large portion of liabilities in the bank's balance sheet puts the bank at a vulnerable position via greatly exposing it to insolvency risk, on the other side the number of small depositors is so high that they are unable to fully monitor the decisions of the bank and the risk levels it targets (Matutes and Vives, 1998).

In case there is insolvency, and the bank faces failure, the failure of the bank creates negative externality for the other competitor banks in the sector by loosening their position and exposing it to market risk and reputational risk (Maes and Kiljanski, 2009). The bankruptcy of the bank creates a welfare cost of failure which is estimated to be quite large. The welfare cost of the bank's failure involves financial distress cost and economic distress cost. If the bank fails, the cost of failure is not completely covered by the failing bank as it consists of both internal and external fractions. The internal fraction of the welfare cost of failure is fully covered by the depositors and the shareholders of the banks. While the external fraction of the cost can include such aspects as breaking the long-term relationship between the borrowers of loan and the bank, leaving them without a reliable source of financing; also, there is a cost for information contagion effect which will affect the expectations of other similar banks and might even trigger uncertainty among its customers (Matutes and Vives, 1998).

The failure of a bank has a systemic nature and can affect the whole banking system since the banks have interbank exposures and bank guarantees towards each other, open credit lines and credit insurance for long-term. To prevent and minimize the instability in the banking sector, which can also be a side-effect of intense competition, the sector is financially regulated via preventive and corrective measures set by regulatory authorities that are a part of the government (state) for most of the countries (Maes and Kiljanski, 2009).

The franchise value of the bank, which is the capitalized value of expected future profits that the bank will accrue, also has a significant impact on the risk level the bank will target. If the franchise value is high enough, this gives the bank incentives to make more careful lending decisions and encourages more deposit collection; the high franchise value gives more confidence to the depositors and increases the reliability to deposit at the bank at the rates corresponding their

deposit risks (Laurenceson, 2007). Hence, if the discounted future profits are quite high, the bank's high franchise value can be a constraint for the bank not to go for more risk-taking as in this case the future value that is foregone due to the bank's failure is quite significant .

Since in the banking sector mostly there is a separation between the shareholders and the managers of the banks, a high chance of a conflict of interest between those entities is possible; the managers might be inclined to favor the decisions that are profitable in the short term but might increase instability for the bank in the long term. Hence if the banking sector is properly regulated, it will not only protect the savings of depositors but also encourage investors to purchase shares of the banks.

2.2. An overview of government interventions in the banking sector

The government intervention in the banking sector can have both preventive and corrective nature: financial regulation of the banking sector via setting obligatory requirements for the banks to avoid instability and corrective measures to diminish the welfare cost of failure in case of bank insolvency. The financial regulation includes such regulatory mechanisms as Capital adequacy regulation (CAR), Licensing requirements, Deposit insurance, Bank supervision. The government intervention can also have corrective measures via being the Lender of the last resort (State aid) to rescue the bank from a failure (Maes and Kiljanski, 2009). Financial regulation is viewed as an essential feature of such government intervention. Although these preventive features are mandatory in most of the developing and developed countries, there is still lots of controversy around whether financial regulation or financial liberalization is better for the long-term financial stability of the bank (Laurenceson, 2009).

The financial regulation is costly (having both material and non-material costs); hence a certain regulatory mechanism should be implemented if the welfare effect of the intervention is

higher than its welfare cost. Additionally, there can be some flaws in the regulatory design and implementation process resulting in material differences between the expectations of the intervention and its real long-term outcomes. Among such flaws in the government intervention can be imperfect monitoring by the regulators and inadequate supervision which might create grounds for moral hazard for the banks (when the bank increases its exposure to risk if insured). Some financial institutions, including banks, have become "too big to fail" (TBTF) and "too interconnected to fail" (TITF), expecting that as the welfare cost of their failure is very significant, they will either benefit from insolvency insurance or other rescue mechanisms. Thus, the banks might get additional incentives for excessive risk-taking counting on the high possibility of government support and pushing their competitors to do so to maintain similarly competitive deposit rates and interest rates to attract borrowers and depositors. It is crucial to evaluate whether there is a distortion in the banking sector created by the intense completion and in case of its presence, how it can be minimized through government regulations. While the government intervention, on the contrary, should strive not to encourage the banks to go for more risk-taking and not to reward or compensate them for their individual failure. Thus, a question arises, whether giving the regulators more power or decreasing their level of control will diminish the "extreme" risk-taking and contribute to the increase of stability in the banking sector (Maes and Kiljanski, 2009). The main emphasis will be put on two preventive financial regulatory instruments supervised by the regulatory authority: Capital adequacy requirement and Deposit insurance. As implementing those financial regulations simultaneously has significantly high welfare cost, a comparative analysis will be conducted between them to discussion the advantages and dis-advantages of each of them, concluding with the preferred financial regulation tool or an adjustment to it.

3.1.1. An introduction to Capital Adequacy Requirements (CAR)

Capital adequacy requirement (CAR) is the capital adequacy ratio, which, required by the financial regulators, needs to be kept as equity to control he maximum level of leverage that banks can have to minimize the possibility of bank's insolvency. CAR is defined by setting the minimum level of the fraction of equity and debt that the banks must maintain; it is set by the regulators to decrease the cost of bank supervision, which is one of the welfare effects of it, CAR also has the goal of limiting the bank's capacity of creating liquidity, hence another welfare cost emerges from the financial regulation (Van den Heuvel, 2005).

3.1.2. An introduction to Deposit Insurance

Deposit insurance is another category of financial regulation that aims at protecting the savings of the depositors to encourage the investment of scarce deposits to the bank and to prevent the bank runs through full or partial insurances (Niinimaki, 2003). Deposit Insurance was first introduced in the 1930s in the US. There is a flat rate deposit insurance (with regulating the rate or putting limits on the deposit amount) and risk-based (considered to negatively affect the level of risk-taking of the bank and hence decrease the bank failures) (Matutes and Vives, 1198).

4. A comparison between CAR and Deposit Insurance

The minimum capital adequacy requirement, as of 2019, is 8% under Basel III's rules. Capital adequacy requirement decreases the possibility of moral hazard as the banks, knowing that they will have to fully carry the internal cost of failure, avoid taking excessive risk. Additionally, another advantage of CAR is that it decreases the possible costs of bank supervision and regulation. On the other hand, there is a welfare cost resulting from the minimum CAR requirement: it diminishes the bank's capacity to create liquidity (Diamond and Rajan, 2000). Since there is a

minimum required ratio for equity, CAR decreases the portion of the bank's risk-weighted assets which can be financed with bank's liabilities (nominated as deposits) and so, it diminishes the bank's ability to create liquidity. Using U.S. banks' data for the model, the welfare cost of the regulation has been compared with the decrease of liquidity showing that 10 percent increase in the welfare cost corresponds to 0.1 – 0.2 percent decrease in the consumption, thus indicating that the welfare cost of the CAR (forgone amount of liquidity) is quite high (Van den Heuvel, 2005).

Banks have the unique feature of generating liquidity via the deposit contracts. Hence, the deposit insurance, on the contrary to CAR, improves the capability of the banks to generate liquidity (Diamond and Dybvig, 1983). Contrasting to this advantage of deposit insurance, CAR alleviates the problem of moral hazard (when the bank has its incentives to target excessive risk) that deposit insurance can trigger.

If the bank has a significant franchise value, the financial regulation in the banking sector can positively impact the mobilization of savings and attract scarce deposit resources (Laurenceson, 2009). With the aim of minimizing the bank's failure rate, the financial regulators should choose between minimizing the welfare cost of CAR (via decreasing regulatory ratio to allow the banks create more liquidity) and decreasing the regulatory costs of supervising and monitoring which is preferable in case of mandatory deposit insurance (Van den Heuvel, 2005).

As the deposit insurance can give grounds for moral hazard, this regulatory intervention should be applied in combination with risk-based regulation (when the deposit insurance is risk-weighted and comes at a cost to the bank) to avoid the creation of moral hazard. In developed countries deposit insurance is quite common for two reasons: for the purpose of preventing /minimizing the systemic risk and supporting the small investors. In case there is full insurance available, the depositors are indifferent between the level of risk that banks are taking because they

would get repaid by insurance funds anyway. Banks at the same time might adjust their expectations in a way that they count on government support in advance (Matutes and Vives, 1998). The mandatory deposit insurance can have flat-premium rate and risk-based rate. The flat-premium rates can induce the banks to target more risk-taking as the rate is not dependent on the level of risk; this makes the depositors indifferent and they do not penalize the bank for targeting high-risk levels. If the deposit insurance is risk-based, it makes banks more liable for their choice of risk level, thus the excessive risk-taking of the banks is discouraged. The welfare effect of deposit insurance greatly depends on how well the rate is regulated to include the full risk-taking level (Matutes and Vives, 1998).

From the bank's perspective, because there is significant welfare cost resulting from the lost capacity of creating liquidity, it is more expensive to increase the equity rather than attract deposits. To avoid costly regulatory actions, banks are induced to keep more equity than the regulation requires. The bank capital can have the function of a buffer in the excess need of covering the large cash withdrawals and unexpected loan losses. Additionally, having an additional capital will support to cover the unexpected losses without getting any type of expensive state aid as an intervention (Bolt and Tieman, 2004).

The Modigliani-Miller theorem states there is no significant difference whether the bank finances itself via debt or equity. While, according to the theorem, it is assumed that the decline in the risk level of the bank (resulting from tightening the CAR and decreasing the level of leverage of the bank) can decrease the required return to the shareholders of the bank via making the shares of the bank less risky. An empirical study conducted by Baker and Wurgler (2014), on the contrary, has indicated that although better-capitalized banks have decreased the level of insolvency risk, they have a higher return on the stocks both with risk-adjusted and non-adjusted grounds.

Table: Gross Welfare Costs of Liquidity and Capital Requirements

(welfare equivalent permanent consumption loss in percent)

Welfare cost of:	Sample	
	2001-2007	1993-2010
10% liquidity requirement	0.031	0.024
10% capital requirement	0.181	0.173

Using U.S. data (for sample year periods 2001 – 2007 and 1993 – 2010) to analyze the relationship between the welfare effect, welfare cost of CAR and the level of liquidity of the bank. It was shown that 10 percent increase in the liquidity requirement equals to 0.03% loss in the consumption. It was also shown that 10 percentage increase in the capital requirement cost of the liquidity requirements is equal to 0.18% increase in the welfare cost of capital requirements. The welfare cost of capital requirement is 0.17% higher than the welfare cost of liquidity requirement, but the added value to the financial stability of the bank has been viewed as more important than the welfare cost of it (Van den Heuvel, 2018).

III. Concluding Remarks

The additional equity reserved as capital can decrease the per period profits in the short run and can have a significant welfare cost because of negatively impacting the level of liquidity of the bank. Whether the level of capital affects the profitability and risk-taking of the bank in the long-run depends largely if the bank is in the low-income country, lower-middle income country or high-income country. In fact, using the Canadian data for the period 1982 – 2010 (Guidara et al., 2013), it was shown that the Canadian banks have been highly capitalized, holding a significant fraction of capital buffers, which can explain how those banks could minimize their exposure to the financial crisis.

In comparison to deposit insurance which can put the investors at an indifferent position in terms of the level of risk their bank targets, the increase in the capital requirement can diminish the level of risk the bank targets via decreasing its risk-appetite. The larger the bank is, the better it is at managing its risk and hence, as the level of risk drops, the need for capital adequacy requirement will also decrease.

There are such Asian countries as Philippines, Singapore, and Indonesia that are tightening their capital requirement after the financial crisis. On the contrary, there are also such countries as South Korea and Japan, easing the capital requirements after the crisis. Generally, the regulators advise and encourage the banks to increase their capital adequacy ratio with the level of increase in the risk to preserve the "buffer" function of the capital. Inefficient banks are exposed the higher risks than the efficient ones as those banks tend to have lower risk levels. Hence, capital adequacy ratio gives different long-term benefits to the banks depending on their level of efficiency. Thus, having one optimal CAR for different economies cannot be applicable for the banks.

IV. Policy Recommendation

The deposit insurance schemes have been created to protect the small investors, to encourage the investment of scarce deposit resources and protect the banks from the possibility of large withdrawal of depositors' savings. The moral hazard problem, which is a result of information asymmetry, can arise if there is flat-rate deposit insurance putting the depositors at an indifferent position towards the risk and giving the banks enough grounds to target "excessive" risk. So, for the countries where deposit insurance is mandatory, the recommendation is to fully switch to risk-based insurance rate which can penalize the bank in case they target "excessive"

risk level. Another option can be linking high risk appetites of the banks with higher taxes to give them the incentives to maintain the optimal level of risk.

Having both CAR and Deposit insurance simultaneously has quite high welfare cost. Based on the advantages stated above, CAR is preferred over the Deposit insurance if it was possible to choose between two of them. On the other hand, it is impossible to remove Deposit insurance as the small investors need protection for their savings. In terms of decreasing the excessive risk, CAR is preferred over Deposit Insurance. But as Deposit Insurance should also be in place to attract scarce deposit resources, it is also advised to have deposit rate celling (maximum possible rate which defines maximum acceptable risk level) to avoid excessive risk-taking meanwhile keeping the incentives for appropriate risk-taking to generate desired returns for the optimal risk.

The CAR should not be kept fixed for a long time; it would have been preferred to havean increase in the Capital requirements during the periods of strong economic growth when the banks can afford to accumulate more capital. Whereas if there are recession times it would have been desired to have a reduction in the capital requirement to provide more flexibility for the banks, ability to generate more liquidity and an opportunity to survive during the downturns without government intervention and state aid.

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