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Banking-on-the-Average Rules

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Abstract

In this paper, we argue for a regulatory framework under which a bank's required level of equity capital depends on the equity capital of its peers. Such banking-on-the-average rules are transparent and could also be combined with the current regulatory framework. In addition, we argue that banking-on-the-average rules ensure the build-up of bank equity capitals in booms and thus avoid excessive leverage. Prudent banks can impose prudency on other banks. In a simple model of a banking system, we show that a banking-on-the-average framework can deliver the socially optimal solution because it induces banks to abstain from gambling. Moreover, it alleviates socially harmful consequences of conventional equity-capital rules, which may induce banks to excessively cut back on lending or liquidate desirable long-term investment projects in downturns.

Keywords: banking on the average, equity-capital requirements, banking system, banking crisis

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1 Introduction

Designing equity-capital requirements for banks is a thorny issue because such regulations need to fulfill at least three objectives (see Hellwig (2008)). They should curb excessive risk-taking by bank managers; they should guarantee that equity capital can act as a buffer against negative shocks in order to avoid insolvency; and they should allow for supervisory intervention before banks become insolvent.

The risk-sensitive capital requirements of Basel II suffer from a variety of shortcomings with regard to these objectives.[1] For instance, regulatory capital cannot be used as a buffer against adverse shocks because otherwise the bank would violate the regulation. Moreover, the regulatory framework did not prevent the build-up of leverage by many banks starting in the early 1990s, which made the banking system vulnerable to adverse shocks. Probably the most dramatic drawback is that it reinforces a downward spiral when a boom turns into bust. The reason is that when credit risks increase, an individual bank is encouraged or forced to recoil from risk by shedding risky exposures as quickly as possible. Cutting lending to other banks or industrial firms, however, makes the banking system more unstable, and the ensuing credit crunch reinforces the economic downturn.[2]

In short, during a downturn Basel II tries to ensure the soundness of individual institutions, thereby destabilizing the entire system (see Brunnermeier et al. (2009)). One of the key issues for capital regulation is thus how banks should adjust their balance sheets when losses reduce equity capital.

Recently, Gersbach (2009) proposed a set of rules for capital requirements on a banking-on-the-average principle. In particular, capital requirements for an individual bank should depend on average equity capital in the banking industry, i.e. on the current level of aggregate bank equity in relation to aggregate assets. One of the central ideas

[1]Blum (2008) shows that regulatory capital requirements that are dependent on self-reported risk should be augmented by an additional, risk-independent leverage-ratio restriction.

[2]There is extensive literature on the potential procyclicality of bank-capital requirements and their macroeconomic implications (see Blum and Hellwig (1995), Gordy and Howells (2006), and Hellwig (2008)).

is that a bank is required to have high equity when its peers also have high equity. Capital requirements are lower if an adverse aggregate shock has eaten into the equity of a bank's competitors.

In this paper we present a simple model for a banking-on-the-average capital requirement and explore the properties of, and the rationale for, those rules. We show that such a rule can serve two purposes. First, it can prevent banks from taking excessive risks. Second, it can avoid a downward spiral with high social costs if a detrimental systemic shock has occurred. By contrast, a conventional rule where the required level of equity capital a bank must hold is independent of the equity of its peers is always socially inferior. It either induces banks to gamble or forces them to liquidate valuable long-term investments in the event of a harmful systemic shock.

We also discuss several additional advantages of banking-on-the-average capital requirements. Such rules allow the build-up of bank equity capital in booms, thereby creating buffers for bad times and avoiding excessive leverage. Moreover, such rules are simple and transparent and could easily be integrated into the existing regulatory framework.

The paper is organized as follows: In the next section we explain the concept of a banking-on-the-average capital requirement. A simple model of a banking system is described in Section 3. In Section 4 we show that a capital requirement based on banking-on-the-average is favorable from a welfare point of view. In Section 5 we address some issues to be considered when banking-on-the-average rules are implemented. Section 6 concludes.

2 The Banking-on-the-Average Rule

In this section we outline the regulatory framework of banking on the average (henceforth BoA). In general, a BoA capital requirement specifies that a bank's required level of equity as a fraction of investments is a monotonically increasing function of the average equity-to-investments ratio of other banks. Using e_i to denote bank i's equity capital in relation to its investments and $\overline{e}_{-i}$ to denote the average ratio of equity to investments of the other banks, the equity ratio $e_{i,req}$ required for bank i can be written as

$$e_{i,req} = f(\overline{e}_{-i}), \tag{1}$$

where $f(\cdot)$ is a weakly monotonically increasing function. A possible BoA function is

$$f(\overline{e}_{-i}) = \begin{cases} \overline{e}_{-i} + \kappa(e^* - \overline{e}_{-i}) & \text{for } \overline{e}_{-i} < e^* - D \\ e^* & \text{for } \overline{e}_{-i} \geq e^* - D, \end{cases} \tag{2}$$

where e^*, D, and κ are parameters with $e^* > 0$, $D \geq 0$, and $0 \leq \kappa < 1$. Intuitively, if the average level of equity among a bank's competitors, $\overline{e}_{-i}$, is close to or higher than the level e^*, which is the level desirable for times when no adverse shock hits the economy, the required equity ratio will be e^*. If, however, an adverse shock hits the economy and drives down equity ratios for all banks, capital requirements will be relaxed. In particular, each individual bank is required to have an equity ratio that exceeds the average equity ratio of its competitors by $\kappa(e^* - \overline{e}_{-i})$ in this case.

This term serves two purposes. First, it ensures that equity-capital levels recover gradually after a detrimental systemic shock has reduced the equity of all banks. Second, it prevents the build-up of excessive leverage in the entire banking system during booms. Without this term, a downward spiral could result. Banks may decrease their equity capital, which would result in lower capital requirements and thus enable them to reduce their equity capital further. For positive values of κ, banks will be forced to raise their equity after a short period of time if they jointly engage in leverage build-up. Since increasing equity will be costly for banks, they will refrain from such a strategy in the first place if κ is sufficiently large.

A more sophisticated BoA rule could also allow for higher capital requirements if the average equity-to-investments ratio in the banking system exceeds e^*. For example, if many banks increase equity levels due to a particularly uncertain economic outlook, it may be desirable to force other banks to increase their equity levels as well. Accordingly, a more complex BoA rule would be given by

$$\hat{f}(\overline{e}_{-i}) = \begin{cases} \overline{e}_{-i} + \kappa(e^* - \overline{e}_{-i}) & \text{for } \overline{e}_{-i} < e^* - D \\ e^* & \text{for } e^* - D \leq \overline{e}_{-i} < e^* \\ e^* + \gamma(\overline{e}_{-i} - e^*) & \text{for } \overline{e}_{-i} \geq e^*, \end{cases} \tag{3}$$

where γ $(1 > \gamma > 0)$ would be a parameter determining how strongly a bank would have to adjust its equity capital upwards if other banks had increased their equity capital. Such rules allow prudent banks to induce other banks to also behave prudently.

BoA rules have the potential to improve on standard capital requirement rules. Like standard rules, they may reduce banks' incentives to choose excessively risky investment strategies in good times. At the same time they ensure that banks do not have to liquidate valuable long-term investments or cut back on lending when an adverse shock hits the economy. Hence, equity capital can work as a buffer to cushion harmful systemic shocks. This is shown in the next section.

3 Model

We consider a banking industry with an exogenously given number of banks n. There are two periods. At the beginning of the first period, banks are identical, each of them being endowed with an amount of equity $E^{(1)}$. In a competitive market for deposits, banks finance themselves at the prevailing interest rate r_d. As banks are identical, each bank receives the same amount of deposits, which is denoted by S.[3] Banks use deposits and equity to finance long-term investments I $(I = E^{(1)} + S)$.

Banks can choose between two types of investment, prudent investments and risky ones. We assume that each individual bank invests all its resources either in the prudent or in the risky technology. This assumption simplifies the exposition but does not affect our findings.

Prudent investments are only subject to a systemic shock η. This systemic shock has two possible realizations, $\eta = 0$ and $\eta = -B$ $(B > 0)$. First, "good times" may

[3]For example, this may justified by a large number of depositors, each of them placing savings at all banks with equal probability.

occur with probability p^g. Then the realization is $\eta = 0$ and the net rate of return on investments for bank i is $r_i = \overline{r} + \eta = \overline{r}$ with $\overline{r} > 0$. Second, "bad times" ($\eta = -B$) occur with probability $p^b = 1 - p^g$. In this case, the net rate of return on investments is $r_i = \overline{r} + \eta = \overline{r} - B$.

Risky investments yield lower expected returns and are subject to idiosyncratic shocks in addition to the systemic shock. Specifically if bank i undertakes risky investments, the idiosyncratic shock s_i will take the values $-S$ and $+S$ with equal probability. The rate of return is assumed to be $r_i = \overline{r} + \eta + s_i - \Delta$, where Δ ($\Delta > 0$) measures the difference in expected returns between prudent and risky investments. Despite lower expected returns on risky investments, banks may find it attractive to choose these projects due to limited liability, as will be shown later.

Equity in the second period is $E_i^{(2)} = Ir_i - S(1+r_d)$. It is now convenient to introduce variables for the different realizations of the equity-to-investment ratio $E^{(2)}/I$ in the second period

$$e^{gg} := (1 + \overline{r} + S - \Delta) - (1 + r_d)S/I, \tag{4}$$

$$e^{gb} := (1 + \overline{r} - S - \Delta) - (1 + r_d)S/I, \tag{5}$$

$$e^{g0} := (1 + \overline{r}) - (1 + r_d)S/I, \tag{6}$$

$$e^{bg} := (1 + \overline{r} - B + S - \Delta) - (1 + r_d)S/I, \tag{7}$$

$$e^{bb} := (1 + \overline{r} - B - S - \Delta) - (1 + r_d)S/I, \tag{8}$$

$$e^{b0} := (1 + \overline{r} - B) - (1 + r_d)S/I. \tag{9}$$

The first superscript stands for the realization of the systemic shock (b or g); the second superscript describes whether a negative idiosyncratic shock (b) or a favorable one (g) has occurred. A superscript of 0 means that the respective bank has engaged in the prudent investment technology, for which no idiosyncratic shock is present.

We make the following assumptions on the parameters of our model: First, $e^{gy} > 0$ $\forall y \in \{b, g, 0\}$, $e^{by} > 0$ $\forall y \in \{g, 0\}$, and $e^{bb} < 0$. Intuitively, a bank will only become insolvent if there is a negative aggregate shock, the bank chooses the risky technology, and a detrimental idiosyncratic shock occurs. Second, we assume $-\frac{1}{2}p^b e^{bb} > \Delta$. We will show later that this assumption guarantees that the risky technology would be chosen by banks in the absence of capital requirements. Intuitively, Δ gives the costs for choosing the risky technology rather than the prudent technology. $-\frac{1}{2}p^b e^{bb}$ is associated with the gains from gambling. Due to limited liability, a bank does not incur all of the losses if there are bad realizations of both the idiosyncratic and the systemic shock. Third, we assume $e^{gb} > e^{b0}$. Roughly speaking, this assumption ensures that the effects of the aggregate shock on bank equity are sufficiently strong compared to the potentially negative impact of gambling.

In the following, we work with a sufficiently large number of banks, which enables a tractable formal analysis due to the law of large numbers. Under this assumption, the idiosyncratic shocks average out when computing the economy-wide ratio of equity to investment. Using λ to denote the fraction of banks choosing risky investment projects, the aggregate ratio of equity to investment, $\overline{e}$, takes only two possible values, one for a bad and one for a good realization of the systemic shock

$$\overline{e}^G = e^{g0} - \lambda\Delta, \qquad (10)$$

$$\overline{e}^B = e^{b0} - \lambda\Delta. \qquad (11)$$

The regulator imposes a minimum capital requirement on banks. For simplicity, we assume that the initial equity level is sufficiently high, so the requirement is non-binding in the first period. In the second period, bank i's minimum equity level as a fraction of I is given by a function $e_{req} = f(\overline{e})$.[4] A specific form for this function will be given later.

A bank that violates the capital requirement has to adjust its balance sheet either by raising new equity or by reducing assets I. If the bank decides to raise new equity, the value of old equity will dilute, implying costs for old shareholders.[5] If the bank reduces I, costs may arise because the bank may be forced to sell assets at a price below

[4]Due to the large number of banks we do not have to distinguish between the average equity ratio $\overline{e}$ for all banks and the average ratio among all banks expect for bank i.

[5]Such costs are well documented. The classical literature includes Scholes (1972), Asquith and Mullins (1986), and Mikkelson and Partch (1986).

their fundamental value.[6] Moreover, the bank may be forced to liquidate long-term investments, which is also costly.[7] We will not model this stage of the game explicitly but simply assume that the adjustment costs are proportional to equity.[8] In addition, we assume that the costs are higher in “bad times”, where it may be difficult to issue new equity or to sell assets at a fair price.

Accordingly, we assume that balance-sheet adjustment costs as a fraction of investments are given by $C^g := \alpha^g e_i$ in good times $(1 > \alpha^g > 0)$. These costs accrue to the individual bank but do not represent welfare losses. For example, if a bank is forced to sell assets below their fundamental value, then the bank's shareholders will lose, but the investors purchasing these assets will benefit at the same time. In a similar vein, issuing new shares may dilute the value of old shares. However, new shareholders or debt-holders will gain in proportion. Both effects on aggregate welfare balance each other.

In bad times, balance-sheet adjustment costs are higher; they are given by $C^b := \alpha^b e_i$ with $1 > \alpha^b > \alpha^g$. We assume that these costs are not only incurred by shareholders of the respective bank; they also represent social losses because in bad times issuing new equity or selling assets may be very difficult or even impossible. Banks will have to liquidate profitable long-term investment projects instead, which is also costly from a perspective of aggregate welfare.

Finally, we assume that deposits are guaranteed implicitly or explicitly by the government. The current crisis has highlighted the fact that governments will ultimately step in and protect depositors from bank defaults. Hence, we assume that the insolvency of a bank $(e_i < 0)$ creates social costs $k\,|e_i|\,I$. These costs arise because the government has to bail out the bank, which means that distortionary taxes have to be raised at some point in time.

[6] See Brunnermeier et al. (2009) and Hellwig (2008) for explanations why asset values may fall below their fundamental value in a crisis.

[7] This is a standard scenario in the bank-run framework that goes back to Diamond and Dybvig (1983).

[8] This assumption simplifies the analysis but it is immaterial to our findings.

The sequence of events is given as follows:

- 1st Period
  - Each bank is endowed with a fixed level of equity $E^{(1)}$ and obtains deposits S at a competitive rate r_d.
  - It uses these resources to finance either prudent or risky investments $I = E^{(1)} + S$.
- 2nd Period
  - Nature draws shocks s_i and η.
  - Each bank i observes its new equity ratio e_i.
  - Banks with $e_i < 0$ become insolvent and create social costs $k\left|e_i\right| I$.
  - If the equity ratio e_i of a solvent bank i falls short of the minimum capital requirement e_{req}, the bank has to adjust its balance sheet at costs $\alpha^g e_i$ or $\alpha^b e_i$ respectively.
  - Returns on investment accrue, and depositors have to be paid back.

4 Analysis

4.1 Welfare

As a first step, we focus on the social optimum in our model. Our welfare measure is total output at the end of the second period. Suppose a social planner could choose the banks' investment strategies in order to maximize the welfare expected at the beginning of period 1. We immediately obtain

Proposition 1

A social planner would choose prudent investments for all banks. Moreover, he would never liquidate long-term investments. The resulting level of expected welfare would be

$$W_{opt} = nI\left(1 + \overline{r} - p^b B\right). \tag{12}$$

As risky investments yield lower expected returns, it is clear that the social planner will not pursue them. Moreover, the social planner avoids liquidating long-term investments because this would create costs C^b per bank. We note that total investments are given by nI and the expected rate of return on prudent investments is $1 + \overline{r} - p^b B$. The latter expression can be explained by the observations that good times, which occur with probability $1 - p^b$, involve a rate of return of $1 + \overline{r}$, while bad times, which arise with probability p^b, entail a rate of return of $1 + \overline{r} - B$.

4.2 Equilibrium without capital requirements

As a benchmark case, we study our model without capital requirements, i.e. $e_{req} = 0$. In the absence of capital requirements, banks have an incentive to choose risky investment projects because due to limited liability they are able to roll off some of the losses incurred for bad realizations of the systemic shock and the idiosyncratic shock to the taxpayers.

Banks maximize their expected value of equity, which is equivalent to maximizing the ratio of equity to investments because the total size of investments is fixed. Hence, choosing risky investments is profitable for a bank if

$$\frac{1}{2}p^g \left(e^{gg} + e^{gb}\right) + \frac{1}{2}p^b e^{bg} > p^g e^{g0} + p^b e^{b0}. \tag{13}$$

This inequality can be easily explained. We note that the left-hand side gives the expected value of the equity-to-investments ratio for the risky technology, where we have utilized $e^{bb} < 0$, which implies that the bank becomes insolvent for a detrimental aggregate shock and a risky investment with a negative shock realization. The right-hand side describes the expected value of the equity-to-investments ratio for the prudent technology. As $\frac{1}{2}\left(e^{gg} + e^{gb}\right) - e^{g0} = -\Delta$ and $\frac{1}{2}e^{bg} - e^{b0} = -\frac{1}{2}e^{bb} - \Delta$, the above inequality is equivalent to $-\frac{1}{2}p^b e^{bb} > \Delta$, which holds by assumption.

We immediately obtain

Proposition 2

Without capital requirements, all banks choose risky investment projects. Expected *welfare amounts to*

$$W_{NoReq} = W_{opt} - \Delta nI - \frac{1}{2}p^b k \left|e^{bb}\right| nI. \tag{14}$$

Compared to the social optimum, welfare is diminished by two factors. First, banks undertaking the risky project have expected returns that are reduced by Δ. Second, if the economy is in the bad state, which happens with probability p^b, half of the banks will become insolvent, which will cause costs $k\left|e^{bb}\right| I$ per bank.

4.3 Standard capital requirement rule

In this section, we consider the standard case with a capital requirement for individual banks that is independent of the aggregate level of equity. To put it differently, all banks have to fulfill a required level of the equity-to-investments ratio of e_{req} in the second period.

We obtain

Proposition 3

A rule with a standard equity-capital requirement never ensures the socially optimal level of welfare.

Proof

If $e_{req} \leq e^{b0}$, the requirement is ineffective. First, in the good state it would never bind, as $e^{gb} > e^{b0}$. In the bad state, the realized value of e_i would either be above e_{req} or, in the case of a risky technology with a bad realization of the shock, the bank would be insolvent. To sum up, for $e_{req} \leq e^{b0}$ social welfare is identical to the case without capital requirements.

For $e_{req} > e^{b0}$, social welfare can never attain its maximum value W_{Opt}. First, if some banks chose risky projects, welfare would be lower due to the lower expected returns on risky projects. Second, if all banks chose prudent investment strategies, they would have to adjust their balance sheets, resulting in social losses $\beta e^{b0} I$ per bank.

□

4.4 Banking-on-the-average rule

Finally, we examine a banking-on-the-average rule. We assume a special case of the rule defined in (2). In particular, our model comprises only two periods and thus we do not address how equity levels should recover after a detrimental shock has occurred.[9] Using $\overline{e}$ to denote the average equity ratio in the economy, we specify the following simplified BoA rule:

$$e_{req} = f(\overline{e}) = \begin{cases} e^{g0} & \text{for } \overline{e} \geq e^{g0} - \Delta \\ e^{b0} & \text{for } \overline{e} < e^{g0} - \Delta \end{cases} \tag{15}$$

With this rule we obtain

Proposition 4

Suppose that the costs of violating the capital requirement are sufficiently high such that $-\frac{1}{2}p^b e^{bb} < \Delta + \alpha e^{gb}$. *If the regulator applies* (15), *a unique equilibrium exists. All banks behave prudently, and no bank will ever incur costs from adjusting its balance sheet. Consequently, the maximum level of welfare is attained.*

Proof

As a first step, we examine $\overline{e}$ for the two possible realizations of the aggregate shock. Recall from (10) that $\overline{e}^G = e^{g0} - \lambda\Delta$. As λ represents the fraction of banks behaving imprudently, which lies in the interval $[0;1]$, $\overline{e} \geq e^{g0} - \Delta$ holds in the good state. Thus each bank has to achieve an equity ratio of e^{g0} in the good state, irrespective of the behavior of the other banks.

Next we examine $\overline{e}$ for the bad state. According to (11), the aggregate equity ratio amounts to $\overline{e}^b = e^{b0} - \lambda\Delta$ for the bad realization of the systemic shock. We obtain

$$\overline{e}^b \leq e^{b0} < e^{gb} = e^{g0} - \Delta - S < e^{g0} - \Delta,$$

where we have applied our assumption $e^{gb} > e^{b0}$. Thus $\overline{e}$ is always lower than $e^{g0} - \Delta$ for the bad realization of the systemic shock, which implies that the required equity ratio is always e^{b0} in the bad state.

[9]Such an analysis necessitates a dynamic model with many periods and is left for future research.

An individual bank chooses the prudent investment strategy for

$$p^g e^{g0} + p^b e^{b0} > \frac{1}{2} p^g \left(e^{gg} + (1-\alpha) e^{gb} \right) + \frac{1}{2} p^b e^{bg}, \tag{16}$$

which is equivalent to

$$-\frac{1}{2} p^b e^{bb} < \Delta + \alpha e^{gb}.$$

□

If the condition in the proposition does not hold, the costs of violating the capital requirement will be too low to deter banks from choosing the risky strategy. If it holds, the banking-on-average rule described in (15) will guarantee the socially optimal solution.

5 Discussion

The current regulatory framework stands accused of being largely powerless during the build-up of leverage in the boom and when the boom has turned into a devastating bust. The present paper offers a proposal that could mitigate some of the deficiencies of the current regulatory system. However, like any other approach to banking regulation it is no panacea, as systemic risks have no perfect remedy. In the following, we discuss some of the most important issues to be considered when BoA rules are implemented.

Rules versus discretion

Although we have framed the BoA principles in a set of rules, it may be useful in practice to allow for some degree of discretion, as mechanical formulas may have detrimental aggregate effects in some contingencies. For this purpose, it may be advantageous to start with some values of the required level of bank equity in normal times, e^*, and the adjustment parameter κ (see Equation (2)). The regulatory authority could be allowed to increase parameter κ, thereby raising the speed of adjustment to higher levels of bank equity after a crisis or in a phase in which banks have built up leverage.[10] Hence, it may be desirable to complement BoA rules with a degree of regulatory discretion. However, discretion on behalf of the regulator entails the risk of regulatory capture. The regulatory agency may be unwilling to use its discretion and ask for higher levels of equity because bankers will argue that this will unduly restrict their ability to finance mortgages or loans to firms.[11] If this problem is severe, the non-discretionary part of the framework will have to be chosen to guarantee sufficiently high levels of bank equity.

Additional macroeconomic indicators

The Geneva Report on the World Economy (Brunnermeier et al. (2009)) has proposed that the existing Basel II capital requirements be modified by the inclusion of a systemic-impact coefficient. This coefficient would depend on indicators such as trends in leverage, asset growth, and the maturity mismatch between assets and liabilities. Moreover, with the help of macroeconomic indicators capital requirements should be countercyclical in order to guarantee the functioning of equity capital as a buffer to absorb adverse systemic shocks.

BoA rules rely on only one indicator, namely the average capital of a bank's peers. However, macroeconomic indicators may be useful in varying the discretionary part of the recapitalization adjustment and to prevent banks from jointly pursuing a strategy of building up leverage. Suppose, for example, that all banks tend to increase leverage so that individual and average equity-to-total-assets ratios decline. This development would already be counteracted by the BoA rule, which would imply recapitalization in this case. However, the regulatory authority could further increase the speed of bank-equity recovery in order to make the strategy of increasing leverage even more costly to banks. As a consequence, banks would refrain from engaging in such activities in the first place.

[10]Analogously, the regulator could be allowed to increase parameter γ for the more sophisticated specification (3).

[11]Brunnermeier et al. (2009) also put forward the argument that "taking away the punch bowl" may be difficult in a boom.

Simplicity and ease of implementation

A particular advantage of BoA rules is their simplicity, because only individual and aggregate bank equity matter in conjunction with the parameters of the rule. This allows for ease of reporting and communication with the public. It is conceivable that such reporting in itself will have a disciplinary effect on banks, as a bank may suffer a loss in reputation if its equity capital is lower compared to its peers.

Additionally, BoA rules are very flexible and could also be integrated into the current Basel II framework. One could compute values of risk-adjusted assets utilizing the sophisticated risk weights introduced under Basel II. Then it would be straightforward to implement BoA rules for correspondingly risk-adjusted equity-to-assets ratios. In this way, it would be possible to reconcile the microprudential[12] perspective implicit in Basel II and the macroprudential perspective inherent in BoA rules.

6 Conclusions

In this paper we have proposed a new regulatory framework where the equity capital that a bank is required to hold depends on the equity capital of its peers. Such a rule may alleviate one of the main problems of current risk-sensitive capital requirements, which force banks to maintain high equity capital ratios in a downturn, thus inducing them to cut back on lending, which may invigorate a downward spiral.

In our simple model of a banking system, we show that conventional capital requirements cannot simultaneously achieve the goals of preventing excessive risk-taking by banks and costly liquidation of long-term investment projects in a crisis. However, a framework based on the principle of banking on the average can achieve both targets at the same time, thereby leading to a socially optimal level of welfare.

[12]Borio (2003) argues that the macroprudential orientation of the current regulatory framework should be strengthened. Brunnermeier et al. (2009) note that Basel II takes a purely microprudential perspective, i.e. it attempts to ensure the soundness of the system by guaranteeing the soundness of individual institutions.

Moreover, BoA rules may prevent the build-up of leverage in booms. It is also possible to integrate them into the current Basel II framework. Incorporating BoA principles could be a fruitful approach to integrating the missing macroprudential elements into the Basel II framework.

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