Chapter 18
Capital Regulation and The Basel Accords

1. Introduction: why capital regulation?

2. Effects of capital regulation

2.2. A model where banks have equity in excess of regulatory demand. There is some empirical evidence that banks choose a composition of funding where the share of equity is larger than what is demanded by regulators. Below we consider a simple model of largely competitive financial markets, due to Allen, Carletti and Marquez (2011), where this is the case.

We consider a one-period economy with firms having access to a risky investment and in need of financing, and banks that lend to the investors and monitor them. An investment requires one unit of funds, and its payoff is y if successful, 0 if not. The loan contract specifies a repayment r_L, and the loan market is assumed to be competitive, so that the firm receives any surplus arising from the project. The bank chooses an amount k of capital which costs $r_E \geq 1$ per unit, and an amount $1-k$ of deposits, for which the pay a deposit rate r_D. We assume that the deposit market is also competitive, so that the deposit rate r_D will be such that depositors maintain the value of their deposits.

In addition, the bank chooses a level q of monitoring the borrower, here measured as the probability of success of the investment, at a cost $q^2/2$ to the bank. This is indeed the key ingredient of the model. We have assumed that monitoring cost has decreasing returns to scale (hence the quadratic functional form), and it is not observable to other agents than the bank. The role of monitoring should be that banks have experience in financial matters and thereby can help investors to achieve a higher expected value.

We begin by considering the *market* case with no regulation. Here the bank firm chooses k and then sets the deposit and loan rates (subject to the conditions given by the market). Then the level of monitoring is set so as to maximize expected profits

$$\Pi = q(r_L - (1-k)r_D) - kr_E - \frac{1}{2}q^2,$$

and the first-order conditions for a maximum gives us the optimal level of q as

$$q = \min\{r_L - (1-k)r_D, 1\}.$$

It is seen that monitoring effort is increasing in both loan rate r_L and capital ratio k, but it decreases in r_D. This suggests that there may be a moral hazard problem, given that monitoring is costly for the bank and cannot be observed by the other agents in the market, so that the bank must be given

incentives to monitor in the proper way.

This of course presupposes that there is some interconnection between monitoring and competitive loan rates. Assume first that there is *no deposit insurance.* If the depositors expect the probability of success of investments to be q, then $qr_D = 1$. In the case of no regulation of k, if competition assures that all surplus goes to the borrower, we find the values of k and the loan rates by maximizing borrower expected profits

$$B = q(y - r_L)$$

subject to

$$q = \min\{r_L - (1-k)r_D, 1\},$$
$$qr_D = 1,$$

together with the constraints that B and Π should be nonnegative and $0 \leq k \leq 1$.

If $r_E \geq 1$ is kept fixed, we can find the solution to this problem. Assume first that Clearly, as long as $q \neq 0$, we have that $r_L \leq y$. If $q < 1$, then $q = r_L - (1-k)q$ means that an increase in q will increase Π without decreasing B, so it may be accompanied by a decrease in r_L giving a larger B. We conclude that $q = 1$ in the optimum. It follows that $r_D = 1$, so that the participation constraint for the bank becomes

$$r_L - 1 + k - kr_E - \frac{1}{2} \geq 0. \tag{1}$$

Also, from

$$1 = q \leq r_L - (1-k)$$

we get that $r_L \geq 2 - k$, and inserting this into (1) we get that $k \geq \dfrac{1}{2r_E}$.

The above result is formally derived under an assumption of perfect competition, so the conclusions of the model tell us that market by itself will discipline banks so as to hold capital above a certain level. However, the distinctive feature is that k is determined by so as to maximize borrowers' expected profits, hence the lower bound on k: Too small a value of k would mean that the bank might settle down with $q < 1$, which would reduce borrowers' profits. If this is a result of market forces, it must be a market where all bargaining power is left with the borrowers, none with the banks. Therefore, it may be questioned whether the result can be seen as a decision by banks to hold more than the minimal capital required.

If instead we introduce a regulator, determining k so as to maximize a social welfare function defined as

$$B + \Pi = q(y - r_L) + q(r_L - (1-k)r_D) - kr_E - \frac{1}{2}q^2 = q(y - (1-k)r_D) - kr_E - \frac{1}{2}q^2,$$

while otherwise everything is as before, then for large enough y (namely $y \geq 2$, the capital ratio k may be chosen as 0, since the banks' gain with $r_E = 2$ is large enough to give incentives for $q = 1$. If $y < 2$, the capital ratio must be positive, whereas q may be less than 1.

2.3. A model where capital regulation may increase risk. To see that capital regulation may work in ways that run counter to intuition, we look at a simple model proposed by Hakenes and Schnabel (2010). It is in many respects close to the one which we used in the discussion of competition and risk (Chapter 11). We assume that there are N banks which are financed either by deposits D_j or by equity E_j, $j = 1, \ldots, N$. The banks compete for depositors and for loans.

Borrowers are entrepreneurs, who may choose risky projects, all of equal size 1, characterized by a payoff s in case of success, which comes with probability $p(s)$, and 0 otherwise; the success probability is assumed to be a decreasing function of the success payoff s. The banks cannot observe the project choices of the borrowers, it can only see whether it was a success or a failure. The demand for loans is given by an inverse demand curve $r_L(L)$ giving the loan rate at which the total amount L of loans are taken by entrepreneurs.

The banks consider equity as costly, investors demand a payoff r_E which is greater than r_D, the deposit rate. We shall assume that banks are subject to capital regulation in the sense that $E_j > \beta L_j$ for each j, for some $\beta > 0$.

In order to create a situation where an increase in β leads to increased risk level, we introduce another feature: Entrepreneurs may have a preference for a particular sector the economy, and if the risk is sector-specific, then choosing all borrowers as belonging to the same sector the bank has arranged loans that are perfectly correlated. Choosing all borrowers from different sectors, the loans become uncorrelated by the law of large numbers. For simplicity, we assume that the bank can select the probability ρ of uncorrelated loans, but that there is a cost connected with this choicesince there is a cost function $c(\rho)$ connected with this choice, so that total cost with loans L_j with correlation parameter ρ_j is $c(\rho_j)L_j$. We assume that $c(\rho) = 0$ for some miminimum value ρ_0 but is higher

Entrepreneurs choose s so as to maximize expected payoff at the loan rate r_L, giving the first order condition

$$s + \frac{p(s)}{p'(s)} = r_L, \tag{2}$$

which gives s as an increasing function of r_L. Banks choose the values of the correlation parameter ρ_j (share of perfectly correlated loans), loans L_j, deposits D_j *and* equity E_j such that profits

$$\Pi_j = p(S)r_L\left(\overline{L}\right)L_j - \left[\rho_j + (1-\rho_j)p(s)\right]\left(r_D\left(\overline{D}\right) + \alpha\right)D_j - r_E E_j - c(\rho_j)L_j,$$

with $\overline{L} = \sum_{i=1}^{N} L_i$, $\overline{D} = \sum_{i=1}^{N} D_i$, is maximal. Here the quantity $\left[\rho_j + (1-\rho_j)p(s)\right]$ is the probability of survival of the bank, which defaults if loans are perfectly correlated and the investment fails. The quantity α is the premium for the deposit insurance, assumed fixed. Taking first order conditions w.r.t. ρ_j, we obtain

$$c'(\rho_j)L_j = -(1-p(s))\left(r_D\left(\overline{D}\right) + \alpha\right)D_j. \tag{3}$$

We add now that equity is chosen such that $E_j = \beta L_j$, (the bank will keep this funding at is minimal level since it is more expensive than deposits), and that $D_j = (1-\beta)L_j$ by the overall funding

constraint of the bank, and we get that the bank must choose L_j so as to maximize

$$L_j\left[p(s)r_L\left(\overline{L}\right)-(1-\beta)\left(\rho_j+(1-\rho_j)p(s)\right)\left(r_D\left((1-\beta)\overline{L}\right)+\alpha\right)-\beta r_E-c(\rho_j)\right] \tag{4}$$

under the constraints given by (2) (with $r_L = r_L\left(\overline{L}\right)$) and (3).

We may now check how a change in the capital ratio β affects the equilibrium. At the outset, it decreases the profits of the banks by increasing the funding cost, and the banks adapt to this by lowering the deposit and loan volumes. This, in its turn, results in a rise in the loan rate, which by (2) forces the entrepreneurs to a choice of more risky investments.

To capture the overall effects, we must also track the changes in correlation. We may rewrite (3) as

$$\frac{d\rho}{d\beta}=(1-\beta)\left[r_D\left((1-\beta)\overline{L}\right)+\alpha\right]\left[p\left(s\left(\overline{L}\right)\right)-1\right], \tag{5}$$

and considering (5) as an equation determining ρ once β is given, we may use implicit function theorem to determine how β influences ρ. Using the notational convention

$$\Phi=\left[r_D\left((1-\beta)\overline{L}\right)+\alpha\right]\left[p\left(s\left(\overline{L}\right)\right)-1\right]$$

we get that

$$\frac{d\rho}{d\beta}=-\frac{1}{c''(\rho)}\left[-\Phi+(1-\beta)\left(\frac{\partial\Phi}{\partial\overline{L}}\frac{\partial\overline{L}}{\partial\beta}+\frac{\partial\Phi}{\partial\beta}\right)\right].$$

Clearly, assuming that $c''(\rho) > 0$, so that higher fraction of uncorrelated loans becomes increasingly costly, we obtain that stricter capital regulation in the form of an increase in β will decrease ρ and thereby the soundness of the loan portfolio if and only if the expression in the bracket is positive, that is

$$(1-\beta)\left(\frac{\partial\Phi}{\partial\overline{L}}\frac{\partial\overline{L}}{\partial\beta}+\frac{\partial\Phi}{\partial\beta}\right)>\Phi$$

3. The earlier Basel Accords

In previous chapters, we have repeatedly referred to regulations following from Basel II. Below we give a brief account of the history of Basel II and an outline of the agreement.

3.1. The Basel Committee. After two major international bank failures in 1974 (see e.g. Heffernan (2005) for an account of some conspicuous bank failures), a standing committee of bank supervisory authorities in the G-10 countries (Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, UK and USA) was created, with a permanent secretariat in Basel and meetings three times a year. The secretariat is located at the *Bank for International Settlements,* which is owned by the central banks, formerly only Western countries but now comprising also some central banks from the emerging economies.

The role of the committee has changed somewhat over the years. At the outset, its main purpose was to assure that international banks did not escape the supervisory authority which typically is

restricted to a particular country, and to ensure that foreign branches and subisidiaries where adequately regulated, since there had been cases where a subsidiaries experienced a bank run but where the central bank of the country where the main bank was situated refused to assist. The initial agreements ("concordats") which were approved by the committee did not however solve the problems of international banking and financial stability, and this led a new approach as withessed by the Basel accords.

3.2. Basel I. The first Basel accord from 1988 marked the beginning of a new style for supervision and regulation of banking, since it established a single system of capital adequacy standards for the international banks of the participating countries, which was to come into effect from January 1993. The main principle was that banks should have to set aside reserves based on the Basel risk assets ratio

$$\frac{\text{capital}}{\text{weighted risk assets}}$$

(a principle taken from the regulation used in the UK and US, where the risk assets ratio was known as the Cooke Ratio). Here "capital" should be understood as consisting of tier 1 and tier 2 capital, where

- tier 1 or core capital consists of equity, disclosed reserves, retained earnings, less goodwill and other deductions, and
- tier 2 or supplementary capital are loan loss allowances, undisclosed reserves, gnereal loss reserves etc.

The risk weighted assets are found by sorting the assets by credit type and assigning lower weights to more creditworthy assets:

0% cash, gold, bonds issued by OECD governments,

20% bonds issued by agencies of OECD governments (as e.g. export credit guarantee agencies), local (municipal) governments and insured mortgages,

50% uninsured mortgages,

100% all corporate loans and claims by non-OECD banks or government debts, equity and property.

Off-balance items (as letters of credit, futures, swaps, forex agreements) were converted into "credit risk equivalents** (a method later abandoned) and weighted by the type of counterparty.

The Basel Accord requires that banks set aside a *minimum* of 8% capital and 4% for core capital. But in practice, the ratios have been higher.

Basel I was critized on several accounts. The rules did not account for the many differences among banks in different countries, where the way of measuring capital might differ quite substantially. This also holds for the determination of tier 1 and tier 2 capital where the rules in one country may result in another classification than those of another country. The off-balance items were considered in a too simplistic way when translated to ordinary assets, since this translation did not take into account the risk in market price, concentrating on default risk. Finally, the weighting used in Basel I are simplistic, since corporate loans with rating AAA still count as 100% while loans to Italian banks can be weighted 20% even though the rating of these banks vary from A+ to AA−. Such

shortcomings of the regulation may be used by the banks to reduce capital requirements without a corresponding risk reduction. Moreover, the rules fail to encourage risk reduction by diversification, the same amount of capital has to be set aside against one big loan and two smaller loans with the same total amount.

3.3. The 1996-amendment. The lack of consideration of price risk led to the incorporation of *market risk* in the additions to the Basel Accord made in 1996. A third type of capital, tier 3 capital, was introduced for the computation of the capital charge for market risk. This is defined as short-time subordinated debt (maturity less than 2 years) which satisfies a number of requirements, among which that neither interest nor principal can be repaid if thereby the bank falls below the minimal capital requirement.

Another new aspect of the Basel amendment was the introduction of the internal model approach for computing the amount of capital set aside for market risk. The bank now has a choice between a standardized and the internal model approach. To use the latter the banks must meet the following requirements:

1. Bank models must compute VaR on a daily basis,
2. The four risk factors to be used are interest rates, exchange rates, equity prices and commodity prices,
3. A one-sided confidence interval of 99% should be used
4, The choice of period should depend on the objective: Banks with liquid trading books should consider daily returns, pension and investment funds can use one-month periods for price changes.
5. There is no requirement of type of distribution, but if a variance-covariance approach is used, then the banks should make allowances for non-linearities, in particular in connection with option positions.

Once the VaR is computed using the internal model, the capital charge is found as

$$\mu_1[\text{10-day market risk VaR}] + \mu_2[\text{10-day specific risk VaR}]\frac{\tau}{8},$$

where μ_1 is a market risk multiplier, taking the value 3 or 4 after decision by the regulator, indicating the quality of the model for detecting systemic risk, and μ_2 similarly takes values either 4 or 5. The quantity τ, known as the trigger, is assigned based on the quality of the bank's control processes and can vary between 8 and 25.

In addition to the above, the amendment introduced limitations on the total concentration of risk: if the risky asset exceeds 10% of the bank's total capital, the regulator must be informed, and advance permission must be obtained for an risk exceeding 25% of the capital.

The standardized approach uses fixed percentages, there are precise instructions for computing capital charge on equity risk, foreign exchange risk, interest rate risk and commodities risk.

2.4. Basel II: The three pillars. In response to the criticism of Basel I and its amendment, a number of changes were made, and all this was collected into the new proposal for an amendment, finally

adopted in 2004. The standardized approach was to be adopted by all G-10 countries by 2006 and the advanced approach by 2007. Although some of the US banks did not follow the timetable, the rules have obtained widespread acceptance, also by countries which are not formally members of the Bank for International Settlements.

The overall structure of the new accord can be subsumed in the table below, showing the three pillars of the Basel accord.

Table 1: The three pillars of the Basel Accord

Pillar 1 **Risk Assets Ratio**	**Pillar 2** **Supervisors**	**Pillar 3** **Market Discipline**
New measurement of credit risk Measurement of market risk Measurement of operational risk	Encourage banks to develop internal methods to assess capital Setting capital targets	disclose methods for computing capital adequacy

In the first pillar, we find the rules for risk capital ratios, which now cover not only credit and market risk, but also operational risk. The idea of a choice between a standardized and a more sophisticated approach, as outlined in Table 2.

Table 2: **Basel II, Pillar 1: Summary of approaches**

Credit Risk	**Market Risk**	**Operational Risk**
(1) Standardized approach (2) Foundation internal ratings based (IRB) approach (3)Advanced IRB approach	(1) Standardized approach (2) Internal model	(1) Basic indicator approach (2) Standardized approach (3) Advanced measurement approaches

The fundamental ratio to be computed in Basel II for the minimum capital requirements is

$$\frac{\text{Capital (tier 1 and 2)}}{\text{Amended credit risk + market risk + operational risk}},$$

and the requirements themselves are unchanged, 4% for tier 1 and 8% for tier 2. The details of the risk capital ratio computations have been given in previous chapters.

In pillar 2, dealing with the role of the national supervisors, there are four principles of supervisory review:

1. Supervisors should ensure that banks use appropriate methodology to determine Basel 2 ratios, and have a strategy to maintain capital requirements.
2. Supervisors should review banks' internal assessment procedures and strategies, taking appro-

priate action if they fall below standards.

3. Banks should be encouraged by supervisors to hold capital above the minimum requirement.
4. Supervisors are expected to intervene as early as possible to ask a bank to restore its capital levels if they fall below the minimum.

There are no details in the Basel Accord about the precise way in which supervisors should behave, but the formulations suggest that the supervisory authorities should have the staff and competences to engage in an ongoing dialogue with the banks about the best way to secure that adequate capital is available.

Pillar 3, which deals with market discipline, is meant to be a reinforcement of the first two pillars. It underlines the availability of timely and transparent information, which should make it possible for the market to discipline the banks. Participating banks are expected to disclose their risk exposure and capital adequacy, but also their methods for computing capital adequacy, as well as all information which, if omitted or misstated, could affect the decisions of agents using the information. This disclosure should take place every half year, and more often if the bank engages in global activities. It is the plan that the Committee will set up special forms for this disclosure of information.

4. Some criticisms against Basel II

Some of the reservations which were raised against the new Basel accord before its final mergence were formulated in Danielsson e.a. (2001), and they pointed to some inherent weaknesses in Basel II as well as possible inconsistencies in the general approach. This can be summarized as follows:

Risk is endogeneous. The introduction of the internal ratings approach for the computation of regulatory capital in the bank was introduced in order to make the reserve requirements respond in a more flexible way to the risk profile of the bank, in particular with regard to credit risk. However, the approach to forecasting risk, based on VaR, neglects crucial aspects of risk in the financial markets. In particular, it is assumed that the bank's own actions, based on its forecast of future volatility, does not affect this volatility.

This is however not the case. Unlike weather forecasts, where the action taken on the basis of the forecast does not change this forecast, financial risk is created by the market behavior of all agents, including the banks which are forecasting their risk. This leads to the contagion phenomena known from financial crises, where expectation of falling prices triggers more sales with an increased downturn of prices as result. Similarly, during financial crises some specific financial markets, typically for derivatives such as futures or credit default swaps, may cease to function due to the fact that all traders are in the same side of the market, so that the pricing breaks down and volatility is increased drastically.

In this context, a regulation based on VaR can have unwanted consequences, in particular in a context where the traders in the market are very different with respect to their risk aversion. Here VaR-based regulation will reduce the possibility of the almost risk-neutral financial institutions (such as hedge funds) to take risk, and therefore the overall willingness of taking risks is reduced; if risk-

averse banks want to get rid of risky assets in a downturn, then there are no buyers, and the downturn is therefore aggravated. What goes wrong here is not that there is some form of regulation, but rather that the regulation works through VaR, which fails to recognize the endogeneity of risk *and* demands that all financial institutions use the same approach.

A possible remedy might be found in the improvement of the information streams, calling for sufficient transparency in the market so that banks are aware of the state of the financial system. The third pillar indeed contains proposals to this effect, but more information does not necessarily solve all problems. It can be shown (Morris and Shin, 2001) that disclosing aggregate positions in financial markets to its participants can have negative as well as positive effects, so openness is not a general answer to such problems. On the other hand, increased information from banks to regulators may give the latter improved conditions for regulating in the proper way.

VaR neglects some crucial information. The use of VaR-based risk measurement is in accordance with practice but it has some flaws, as was mentioned during the discussion of risk measures in Ch.3. Using a point estimate to describe a probability distribution will by necessity induce some loss of information, but in the case of VaR this is aggravated by the fact that VaR is insensitive to distribution of the tail. To this should be added that in practical computations, one often uses methods which implicitly assumes that the underlying probability distribution is normal, which is known not to be the case.

Reliance on ratings. Since both the standardized and to some extent the internal ratings based approaches rely on credit ratings of borrowers, such ratings should be widespread, which they are in the US but not in Europe. The Basel rules take this into account by setting a specific weight for unrated firms, but this again gives rise to some unwanted effects, since it may then be in the interest of the bank to transfer firms with a low rating to the general group of unrated firms. But what is much more important, ratings are only reliable if they are consistent across agencies and through time; many ratings agencies have provided notoriously inconsistent ratings over time of one and the same firm. Consequently, the use of ratings presupposes that supervisors have the possibility of checking the use of the system by the banks and preventing ratings shopping.

Another drawback of the ratings approach is that although ratings may provide some assessment of a company's riskiness, this comes usually after the developments in the market, since the ratings agencies rely on accounting data, they observe only at intervals, and they are generally reluctant to change their assessments if there is a possibility that they must change it back again shortly afterwards, all pointing towards slow reaction to market developments.

Why operational risk? The introduction of capital charges against operational risk was a novelty of Basel II, but it can be argued that this constitutes a break with the very purpose of the Basel accords. Capital adequacy regulations are there to prevent systemic bank failures through contagion. Market and credit risk are risks shared by all the market participants with many common exposures, so that the failure of one bank can spread to another bank since their background is shocks which are common to both. But operational risk is quite different, it is in most cases idiosyncratic risk, that is risk which pertains to a particular bank and does not involve other banks. Losses due to operational

risk hit the shareholders, management, bondholders etc. of this bank but they do not spread to other banks. It may therefore be speculated that the addition of capital charges for operational risk was rather meant as a corrective to the tendency observed after introduction of internal ratings based market and credit charges, where the capital set aside might otherwise become rather too small.

Procyclicality. Riskiness of assets vary over the business cycle and risk assessments reflect this procyclicity, presumably more so with the internal ratings based approaches than with the standardized approach. Consequently, one will experience a similar procyclicality of the capital charges, so that banks set less aside at the top of the cycle, meaning that they are overlending in the late phase of the upturn, and more at the bottom of the cycle. In this way the regulation makes the banks more rather than less vulnerable to failures and can destabilize the economy as a whole. The recent financial crisis lends some additional credence to this argument. However, there is no easy remedy for this problem, since allowing regulators to adjust the capital charges to the business cycle moves the problem elsewhere rather than presents a solution, since the phases of the business cycle typically are very hard to detect. It may be the reliance on capital charges as the one and only instrument of regulation that has to be revised.

5. Basel III

The main points of Basel III can be summarized as follows:

(i) *Increased capital reserves:* In addition to the existing system of capital regulation, two new items are added, namely
  (1) *capital buffer,* which comes into force in cases where the activities of the bank increase very rapidly,
  (2) *countercyclical buffer,* which should prevent the tendency that capital reserves according to the existinng rules will be small during booms and large in slumps,

(ii) *Leverage rule:* This is a rule which is aimed to prevent too small capital reserves even in cases where assets have low risk and therefore would not give rise to building up reserves by using the existing rules,

(iii) *Liquidity rules:* High quality assets should be large enough to cover one month net cash outflow.

The new rules are intended to take care of the specific problems that became visible during the financial crises of 2007-8. However, they still leave some problems open, in particular in relation to the phenomenon of shadow banking (since there are financial institutions not covered by the Basel rules), and the idea of incorporating liquidity problems into the Basel framework may be critized.

6. The arguments for and against a more strict capital regulation

6.1. Consequences of capital regulation. The intuitive justification for capital regulation – banks should set aside some equity so that losses on their assets will not hurt their creditors unless they

surpass a certain limit – has long ago been supplemented by several other arguments pointing to disadvantages of capital regulation, in particular when this regulation has been tightened, as was the case at least with Basel III. Following the discussion in Admati e.a. (2010), we review briefly some of these arguments.

(i) *Increased equity requirements means that banks must "set aside" funds that could otherwise be used for lending.* This argument confuses capital requirements with liquidity requirements, since capital requirements pertains only to the relation between debt and equity in the funding of the bank. No capital is "set aside" as it would have been in the case of liquidity requirements.

(ii) *Increased equity requirements will increase the banks' cost of funding.* Here it is assumed that equity requires a higher return than debt, but the arguments forgets the risk premium. Cchanging the composition of capital between equity and debt means also that the risk premium is changed.

(iii) *Increased equity requirements lower the bank's return on equity (ROE), which means a loss in value.* This argument is another version of the previous one. The first part of the statement is true, but the second is not, since shareholder value depends both on return and on risk.

(iv) *Increased equity requirements will increase banks' funding cost since banks cannot borrow as much as previously with taxation subsidies.* This is actually true, but the problem is not so much capital regulation as the fact that banks are encouraged by tax subsidies on debt to increase leverage, which is not a suitable way of supporting activities which are considered socially desirable.

(v) *Increased equity requirements are counterproductive since debt is necessary for providing "market discipline" to bank managers.* In may indeed be argued that debt may play this role, but on the other hand high leverage creates incentives to take excessive risks, and the evidence of the disciplining role of the markets in the years preceding the financial crisis of 2007–8 is weak.

(vi) *Increased equity requirements will force the banks to reduce lending.* This is not necessarily true, in the sense that there is no mechanical connection between capital ratio and assets. Banks may maintain all their activities by issuing new equity, keeping all assets and liabilities as they were. Banks may not want to do so, since this may be interpreted as a negative signal on the situation of the bank, and instead they would prefer not to exploit lending opportunities, but regulators might require new equity issuance to prevent this.

(vii) *The way banks fund themselves with debt and equity is the optimal way of funding bank activities.* There is no theoretical basis for this statement, since the banking industry is subject to frictions, incomplete competition, and asymmetric information.

7. References

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