

On the Role of Regulatory Banking Capital

BY HARALD BENINK, JÓN DANÍELSSON, AND ÁSGEIR JÓNSSON

In this paper the authors study the role of regulatory banking capital and analyze the incentive effects of the Basel II Accord. They argue that Basel II may become a source of systemic risk due to endogenous risk and the risk sensitivity of the capital requirements. In this context they note that financial instability may enter via the asset side of the banks' balance sheets when banks are forced to sell assets in order to maintain the capital buffer prescribed by Basel II.

I. INTRODUCTION

In June 2004 the Basel Committee on Banking Supervision reached agreement on a new capital adequacy framework to respond to deficiencies in the 1988 Capital Accord on credit risk. This new Basel Capital Accord, usually referred to as “Basel II”, contains a number of new aspects to regulation and supervision of banks and other financial institutions. First, it contains new rules for calculating risk weights for different kinds of loans, thereby introducing a new way of calculating the amount of *regulatory* capital banks need to hold. Second, it calls for expanded, active supervision of financial institutions. Third, it specifies rules for expanded information disclosure in order to enhance the market discipline on banks' risk taking. Fourth, it suggests that capital should be held against so-called operational risk. Basel II is due to be implemented in a large number of countries, including the EU countries as from 2007/2008 and the US as from 2009.

There is general agreement that the risk classification determining capital requirements in the 1988 Basel Accord was too broad making it possible for banks to shift assets to relatively high-risk categories. In the words of the Basel Committee when presenting a first consultative paper on new bank capital rules in June 1999:

The current risk weighting of asset results, at best, in a crude measure of economic risk, primarily because degrees of credit risk exposure are not sufficiently calibrated as to adequately differentiate between borrowers' differing default risks. Another related and increasing problem with the existing Accord is the ability of banks to arbitrage their regulatory capital requirement and exploit differences between true economic risk and risk measured under the Accord. Regulatory capital arbitrage can occur in several ways, for example, through some forms of securitization, and can lead to a shift in banks' portfolio concentrations to lower quality assets.

The first consultative paper intended to replace the existing system of credit risk weightings by a system that would use external rating agencies' credit assessment

for determining risk weights. The Committee mentioned very briefly the possibility that “sophisticated banks” could be allowed to use their internal ratings as a basis for setting regulatory capital charges.

The debate triggered by the June 1999 paper quickly led to greater emphasis on internal ratings. The result is visible in the 2004 Basel II Accord in which the Basel Committee has incorporated internal ratings as an alternative for “sophisticated” banks. Moreover, supervision and market discipline are emphasized as necessary supplements to capital requirements. Market discipline is supposed to be enhanced by increased transparency of financial institutions.

In this paper we study the role of regulatory banking capital and analyze the incentive effects of the Basel II Accord. Although the proposal encourages the development of sound internal systems for risk evaluation, we argue that it does not resolve the incentive problems associated with current regulation, and it provides incentives for banks to develop new ways to evade the intended consequences of the proposed regulation. The proposed third pillar to enhance market discipline of banks’ risk-taking may be too weak to achieve its objective. Furthermore, we argue that Basel II encourages banks to react in the same way to adverse shocks, thereby enhancing so-called “endogenous risk”. Finally, we argue that Basel II may become a source of systemic risk due to endogenous risk and the risk sensitivity of the capital requirements. In this context we note that financial instability may enter via the asset side of the banks’ balance sheets when banks are forced to sell assets in order to maintain the capital buffer prescribed by Basel II.

The paper is organized as follows. In section 2 we review the role of capital and capital requirements for risk-taking incentives of banks. Section 3 presents the Basel II proposal for using banks’ internal ratings to assign risk-weights to loans. Incentives for “gaming and manipulation” of capital requirements under an internal ratings standard, and the “power” of supervision and market discipline are discussed in section 4. Section 5 discusses the concept of endogenous risk and the extent to which Basel II is likely to enhance it. In section 6 we analyze the impact of Basel II on systemic risk. Finally, section 7 concludes the paper.

II. THE ROLE OF CAPITAL AND CAPITAL REQUIREMENTS

As noted by, among others, Benink and Wihlborg (2002), shareholder’s capital in banks as well as in other firms serve three important functions. First, capital is a buffer against unexpected losses causing bankruptcy. Second, equity capital creates incentives for management to manage risk appropriately from the point of view of shareholders. Third, equity capital of sufficient magnitude signals that lenders to the bank will not be taken advantage of. Under limited liability for shareholders the third function is particularly important from lenders’ point of view. Without sufficient capital shareholders have the incentive to invest in excessively risky projects, because the project risk will be borne primarily by lenders.

Banking and, to some extent other financial institutions, are special because most of their creditors are explicitly or implicitly insured. The rationale for this

insurance is banks' role in the payment system and the risk of bank runs and potential contagion among banks caused by one bank's failure. Without going into the economic validity of the risk of bank runs and contagion it is a fact that supervisory authorities in all countries offer a degree of insurance of banks' creditors. There is explicit deposit insurance in many countries, and expected bailouts imply a degree of implicit insurance. This implicit insurance may be extended to shareholders as well.

The insurance of the banks' creditors implies that the latter will not monitor risks. If, in addition, the insurance is not priced, then banks have incentives to deliberately take too much risk, since relatively risky assets are likely to offer high returns.¹ Furthermore, under any system wherein banks do not compete by risk evaluation skills there is a high likelihood that these skills will be "underdeveloped". Thereby, the banking system as a whole may non-deliberately fail to take important risks into consideration. Capital requirements in excess of the willingly held equity capital are intended to ensure that shareholders have a stake in all projects, and to reduce incentives for risk-taking (as noted by, among others, Calomiris 1999).

The capital requirement for a particular asset determines its cost of capital. Thus, if assets with different risk-return characteristics have the same capital requirement, banks favor those assets that offer a relatively high expected rate of return. They can, as mentioned, engage in regulatory arbitrage and choose relatively risky assets offering the highest expected return among those with a certain cost of capital.

To avoid regulatory arbitrage it would seem that the "optimal" risk-weighting system should be detailed and based on the "true" or "best available" measure of the risk of each particular asset. However, different banks may evaluate the same loan differently. As a consequence, the regulatory dilemma that the Basel Committee has had to struggle with is that if supervisors specify risk buckets that are too broad, then a bank's expertise can be used for regulatory arbitrage, while if they specify risk buckets that are too narrow, then the incentives for banks to develop expertise in risk assessment are removed.

III. THE INTERNAL RATINGS PROPOSAL

The proposed solution to the regulatory dilemma of either allowing regulatory arbitrage with broad risk buckets or removing incentives for banks to develop risk-assessment expertise is to allow internal ratings as the basis for risk weighting.

The New Basel Capital Accord allows two approaches to internal ratings of loans. In the first one—the foundation approach—the ratings are based on banks' estimates of probabilities of default (PD) on various loans. The second approach—the advanced approach—would take "loss given default" (LGD) into account as well. Any approach taken by a bank must be evaluated and accepted by the bank's supervisory authority. If a bank is able to apply only the foundation approach,

¹ See, for example, Dewatripont and Tirole (1994) and Freixas and Rochet (1997) for expanded treatments of the economics of bank regulation.

then supervisors will provide the bank with a standardized method for arriving at LGD estimates. Neither the foundation nor the advanced approaches incorporate portfolio considerations.

A substantial challenge facing banks and supervisors of the internal ratings approach is to map an internal ratings method into risk weightings that are consistent across banks. Only if clear quantitative ratings are produced will it be possible to easily compare internal ratings across banks. To achieve comparability banks must at a minimum translate their ratings into estimates of probabilities of default (PD). A number of proposals for implementation of internal ratings approaches exist, however, and much work is on-going (see, for example, Krahnen and Weber 2000). More refined approaches may be adopted in the future within the framework of the New Accord.

IV. GAMING AND MANIPULATION; THE ROLE OF SUPERVISION AND MARKET DISCIPLINE

The potential for risk arbitrage existing under the current Accord will remain to an extent under Basel II as well. First, all banks will not qualify for use of internal ratings either because they do not have sufficient expertise, or because they must have five years of history of estimating (at least) probabilities of default for various types of loans. Second, internal ratings need not be continuous, but loans may still be placed in relatively broad risk buckets.

Additional opportunities for risk arbitrage exist under an internal ratings standard, because risk weights are based on banks' private information rather than on external, verifiable variables.² A major problem facing the supervisors is to check the truthfulness of even estimates of probabilities of default. As noted, there are great difficulties already for the banks themselves to translate their own ratings into probabilities of default. The additional opportunities for risk arbitrage under an internal ratings standard are created by the scope for "gaming and manipulation" of ratings. Banks generally have access to private credit risk-relevant information that can be excluded from the system for risk-weighting presented to the supervisory authority.

One type of "gaming and manipulation" would occur if a bank uses its private information to place relatively high-risk and high-return credits in a lower risk bucket. For example, if the foundation approach is used, then the probability of default reported to the supervisory authority can be made to differ from the bank's true estimate. The latter probability may have been updated by the bank based on information that is not available to supervisors. If the probabilities of default are based on a more refined credit scoring system that has been deemed acceptable by regulators, then private information within the bank would make manipulation of the credit scores prior to translation into probabilities of default possible. The

² See Benink and Wihlborg (2002), Benink and Benston (2005) and European Shadow Financial Regulatory Committee (2000) for an elaborate analysis on risk arbitrage and internal ratings standards.

quantitative importance of “gaming and manipulation” has been estimated by Carey and Hrycay (2000). They conclude that officially reported default rates for a given rating can be made as low as half the bank’s private estimates.

There is some discussion of penalties to be imposed on banks that systematically and deliberately “miss-judge” risks, thereby placing the bank’s liabilities at risk. The difficulties of implementing a penalty system are great, however. One reason is that the required data to prove deliberate, as opposed to non-deliberate, miss-judgement is hard to come by even if a bank’s errors are systematic. A second reason is that the penalty-system may lack credibility if penalties primarily will have to be imposed on banks in distress.

Both the European Commission and the Basel Committee recognize the potential scope for gaming and manipulation. Two pillars of the capital adequacy framework, supervision and market discipline, carry the weight of having to limit this scope. Supervision and market discipline should also limit the scope for non-deliberate underestimation of risk by raising the consciousness and quality of risk assessment.

However, under the Basel II Accord most of the burden of controlling banks’ internal risk assessment is placed on expanded and active supervision. Supervisory authorities are expected to build up their expertise substantially in both quantitative and qualitative terms. In fact, supervisors are expected to work closely with the banks, when they develop and upgrade their internal risk-scoring models. This envisioned very close cooperation between banks and supervisors is naturally intended to reduce the information- and knowledge asymmetry between banks and supervisors. However, banks will always be able to make decisions based on private information. The intensified involvement of supervisors could instead lead to greater “regulatory capture” in the sense that supervisors identify themselves more strongly with the banks they supervise.

V. ENDOGENOUS RISK

A key feature of the system for regulating banks, as envisioned by the Basel II Accord, is the central role played by risk models. Financial institutions, especially under the advanced ratings approach, are expected to employ sophisticated risk models in their internal risk management function, and use the same models to calculate regulatory capital. While this may superficially seem like an attractive notion, this approach carries with it a number of adverse consequences. For example, it is inevitable that the supervisor has an intimate knowledge of the bank’s risk management system and allows or disallows the use of certain models. Effectively, we might say that the supervisor becomes the risk modeler of last resort. Furthermore, the dependence on models in determining bank capital inevitably implies the bank capital becomes even more procyclical and generates prime conditions for endogenous risk (see Danielsson and Shin 2003) which in turn increases financial instability.

The perverse results of relying on the regulators for determining industry models has been known for a long time. For example, the greatest engineer of the Victorian

era, Isambard Kingdom Brunel, when asked about the idea of the government prescribing regulations for the design of the bridges, declared in 1847:

“In other words, embarrass and shackle the progress of improvements of tomorrow by recording and registering as law the prejudices and errors of today”.

The concerns raised by Brunel ring true today, regulatory design is inevitably based on the technology at the time of writing the regulations, and in the case of Basel II, much of the approach to risk is based on late 20th century thoughts on the nature financial risk. Of course, it is not only Basel II which suffers from this. The subprime crisis of 2007 is a clear example of how the over reliance on models has the potential to create a financial catastrophe.

In the subprime crisis, rating agencies were happy to allow financial institutions to use credit rating models in an iterative, or gaming fashion, so that a bank intending to sell a SIV could continue to tinker with the composition of assets until the vehicle got the desired rating, often AAA. This of course is a prime example of what econometricians call data mining which undermines the basic statistical assumptions behind the model. Indeed, it is quite unlikely that a portfolio of high risk assets could have a AAA rated tranche without underestimating the dependence structure. The basic faultlines in the ratings process for asset backed securities in turn enabled scrupulous or incompetently run financial institutions to sell vehicles with a suspect rating. In the case of the SIVs this is not necessarily a concern for banking regulators, but with the conduits it's a different matter. Considering that the off-balance-sheet conduits effectively get onto a regulated bank's books at the time of liquidity concerns, i.e., when the asset backed securities market becomes concerned with the quality of the SIV. In this case, unwarranted belief in equality of models on behalf of the supervisors and the banks is a key factor in the current crisis.

Under the Basel II Accord models are meant to be used for the determination of risk-weighted bank capital. Superficially, this represents a considerable improvement over the situation in the Basel I Accord where the riskiness of underlying assets has only a cursory connection with the level of capital, prompting undesirable behavior on behalf of banks and undermining the guarantees provided by bank capital. Under Basel II, capital is to be directly connected to the riskiness of the underlying assets. This however has a number of undesirable consequences. Besides doubts about model quality, as discussed above, it also is procyclical especially in times of financial uncertainty, given rise to the notion of endogenous risk. Danielsson and Shin (2003) classify financial risk into two categories, endogenous and exogenous.

Exogenous risk is whereby a market participants receives market prices, acts upon them, but her trading decisions do not affect prices, in other words, her price impact is zero. This is akin to playing the roulette in a casino. Most of the time, and especially for smaller financial institutions, this is a relatively innocuous assumption, since a large number of market participants all the different beliefs

and preferences will act in a way that broadly cancels out the behavior in the individual market player.

Endogenous risk is a situation whereby a substantial number of market participants act in concert and therefore in aggregate exerts significant price impact. This is akin to playing poker in a casino where the fortunes of each individual player are directly affected by the performance of the other players. This situation does not arise in day-to-day market activities, but at times of financial turmoil this changes. To illuminate these ideas consider the specific case of speculative attacks on currencies. Market participants with a stake in the currency of a country with unsound fundamentals are only willing to be long the currency if they don't believe a devaluation is imminent. Furthermore, if they believe a devaluation is about to happen they will all want to sell the currency. This leads to a situation whereby prior to a speculative attack a large number of market participants stay long the currency but are willing to jump on a moment's notice to sell the currency. This leads to an extreme sensitivity to their idea of the state of the fundamentals of the economy and more importantly the belief of what other market participants may do. If one trader thinks another trader is about to sell, she will attempt to sell immediately. Therefore the beliefs and actions of the other traders directly affect all traders, and leads them to act in concert in attacking the currency. Effectively, risk becomes endogenous.

Financial regulations directly affect the propensity for endogenous risk. The more diverse market participants are, in beliefs and preferences, the lower the chance of endogenous risk and therefore the lower the chance of financial crisis. Financial regulations in general, and Basel II in particular, directly affect both the beliefs and preferences. By requiring financial institutions to employ risk models throughout the business and directly control the type of models used, as well as requiring banks to adhere to a minimum risk-weighted capital, means that their behavior is harmonized. In times of uncertainty risk models indicate higher risk, implying falling capital ratios and motivating banks to sell risky assets and buy safe assets. This by itself may be sufficient to bring on a crisis episode.

The use of risk models in the internal operations of banks has proven to be very useful for financial institutions and has increased financial stability. However, the application of the very same models for regulatory purposes carries with it considerable danger without much apparent benefit. An overbelief in models implies that both banks and regulators may not be as alert as they otherwise would be, as in the case of the 2007 subprime crisis. The use of risk models for calculating risk sensitive bank capital increases endogenous risk and hence the propensity for financial crisis.

VI. BASEL II AND SYSTEMIC RISK

As with any form of regulation, the case for regulating bank capital presumably rests on some sort of market failure, or externality. In this case, the externality is that bank failures have systemic costs that are not fully borne by the bank in

question. In designing a regulatory mechanism, the authorities have traditionally relied heavily on minimum risk-weighted capital-based regulations, i.e., on the asset side of the banks' balance sheets. This special emphasis stems from the asymmetric loss function which the banks face. The banks essentially handle other people's money as they intermediate funds between savers and investors, and since bank equity is only a small portion of the outstanding funds, their loss function is asymmetric. They reap the total financial gains from taking risk, but only assume a fraction of the ensuing losses, resulting in moral hazard. As a consequence, there is popular demand for outside regulatory safeguards against risk seeking behavior by banks.

In fact, most discussions of bank capital regulation start from the premise of keeping the probability of bank default below some fixed target level. It is common to speak of, say, a 99.90 percent confidence level, which means that the bank has only a 0.10 percent probability of default over the next year. Once this target level is set, one can use information on the bank's portfolio—along with various other assumptions—to figure out how much capital it will take to achieve the target (see e.g., Gordy (2003)). The Basel II approach can be summarized in terms of a single "risk curve," which relates the capital charge for any given loan to the risk attributes of that loan, such as its probability of default.

However, a social planner might not only think about bank defaults *per se*. She should also think about the efficiency of bank lending, that loans with a positive net present value are still to be made during periods of recession. In reality, most banks are not at the capital constraint at any given time. However, the risk of breaching the constraint is very real. Van den Heuvel (2001 and 2002) has shown in a model calibrated with U.S. data that a low-capital bank may optimally forgo profitable lending opportunities in order to lower the risk of future capital inadequacy. Therein lies the contradiction of current risk regulations. The banks are supposed to retain capital reserves as a hedge against risk and future losses, and thus guard against potential failures. However, the capital is never really intended to be used. At a certain point in time during an economic downturn the regulatory capital constraints can become binding and cut off the loan supply. This occurs both because banks usually suffer capital losses during a downturn and also because the assessment of credit risk as measured by the internal rating based (IRB) system will increase during a downturn and demand a higher regulatory capital charge. Thus, by conforming to the current capital regulation focusing on the asset side of their balance sheet the banks are forced into actions that go against their chief functions in the macroeconomy—the creation of new liabilities—by cutting down the credit supply in time of economic downswing.

In a downturn the banks' capital base is likely being eroded by loan losses. Its existing (non-defaulted) borrowers will be downgraded by the relevant credit-risk models, forcing the bank to hold more capital against its current loan portfolio. It is invariably difficult or costly for banks to raise fresh external capital in bad times, which will force them to cut back on its lending activity, thereby contributing to a worsening of the initial downturn. Thus, the new Basel II regulatory framework

is likely to have pro-cyclical effects which can lead to over-lending in booms and underinvestment during recessions.

Moreover, as demonstrated by Bliss and Kaufman (2003), a binding regulatory capital constraint can effectively block the transmission of monetary policy. This occurs because even when the Central Bank increases M0 thereby creating excess reserves in the banking system, the banks are unable to respond by extending new credit into economy since they are constrained by their capital adequacy ratios. This has been named “virtual liquidity trap” (see Jónsson and Danielsson (2004)). There is no inter-bank market for bank equity and, therefore, it is not only the average capital that matters but also its distribution among the banks. This is especially important when a significant proportion of the assets and liabilities of the banking system is denominated in foreign currency (see Danielsson and Jonsson (2006)). Thus, forcing financial institutions to keep minimum risk-weighted capital is not only procyclical, it can be destabilizing at times of uncertainty and contradict macroeconomic stability.

Bank capital supplies one of the main bases for market liquidity, both through lending with financial assets as collateral and also by the operation of proprietary desks that act as key market makers. It is during downswings that capital becomes more intensive and risk absorption of financial institutions becomes a critical factor. However, at this very time banks are likely to have diminished capital due the economic downturn and the subsequent capital losses. Given this scenario the Basel II capital requirement might become binding and cease to provide liquidity. Even though the constraints would not become binding, the risk weights attached to the capital might bias trading on financial markets, as certain risk heavy assets are dumped. The regulation of bank capital carries important consequences for both financial markets and the wider economy because of the procyclicality.

The Basel II process has at least two impacts on bank behavior during a crisis. First, it harmonizes bank behavior by legally oblige banks to maintain their 8% minimum capital, causing them to withdraw from risk activities as a result. This is further reinforced by mechanical behavior rules that kick in as soon as the market deviates from a staple environment, e.g., due to risk modelling and risk limits. In addition, Basel II harmonizes knowledge since banks had to run sophisticated risk models, usually based on standard authorized techniques, implying that banks use similar information, and run similar risk models. The consequence is that banks want to sell the same assets at the same time with adverse consequences for market liquidity.

The cyclicity of bank assets tends to exceed output fluctuations over the business cycle, with lending expanding faster in upturns and contracting faster in downturns. This pattern is more important for banks than most other sectors of the economy because the banks provide demand deposits, the largest part of the money supply (M1 and M3), and provide credit to other business. Furthermore, for the Central bank, the banking system is the main transmittant of monetary policy into the economy. Thus, it seems that the attempt to correct for one

externality—namely the public costs of bank defaults—is bound to create another in the form of an increased systematic risk.

VII. CONCLUSION

In this paper we study the role of regulatory banking capital and analyze the incentive effects of the Basel II Accord. We argue that Basel II may become a source of systemic risk due to endogenous risk and the risk sensitivity of the capital requirements. In this context we note that financial instability may enter via the asset side of the banks' balance sheets when banks are forced to sell assets in order to maintain the capital buffer prescribed by Basel II.

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IX. NOTES ON CONTRIBUTORS/ACKNOWLEDGMENTS

Harald Benink has been Full Professor of Finance at RSM Erasmus University in Rotterdam, the Netherlands since 1999. Name of the chair is "Institutional Design of Integrating Markets". Prof. Benink is also a Senior Research Associate to the Financial Markets Group at the London School of Economics. He holds a Master's degree in Economics from Tilburg University, a Master's degree in Financial Economics from TIAS Business School (Tilburg University) and received his Ph.D. degree in Finance and Economics from Maastricht University. The thesis was entitled "Financial Fragility". Prof. Benink's research focuses on banking and finance and on European financial and monetary integration. He has published in various academic journals (including *The Journal of Finance*) and has also published a couple of books (including "Financial Integration in Europe"). He is also frequently cited in international financial newspapers such as *Financial Times* and *The Economist*. Furthermore, he is Founder and Chairman of the *European Shadow Financial Regulatory Committee* (1998) and Founder and Invited Member of the *Latin American Shadow Financial Regulatory Committee* (2000), the *Asian Shadow Financial Regulatory Committee* (2004) and the *Australia-New Zealand Shadow Financial Regulatory Committee* (2006). The Shadow Financial Regulatory Committees consist of prominent professors and other independent experts, issuing policy recommendations in the areas of regulation and supervision of financial institutions and markets.

Jón Danielsson has a Ph.D. in Economics from Duke University, and is currently a Reader in Finance at the London School of Economics. His research areas include financial risk, hedge funds, regulation of financial markets, market volatility, liquidity, models of extreme market movements, and microstructure of foreign exchange markets. He has been a Visiting Professor at universities in the United States, the Netherlands, Germany, Iceland, and Spain, and has published in a range of academic and practitioners' journals.

Ásgeir Jónsson has a Ph.D. in Monetary Economics from Indiana University (2001). He has been the Chief Economist of Kaupthing Bank since 2003 and is also an Assistant Professor in Economics at the University of Iceland. His main research areas include international finance, financial markets, financial regulation, and monetary policy.

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