

Does one size fit all? On the Impact of Capital Regulations*

Jón Daniélsson
London School of Economics

Ásgeir Jónsson
Kaupthing Bank

June 2004
Preliminary Draft

*Our papers can be downloaded from www.RiskResearch.org.

1 Introduction

“The game of professional investment is intolerably boring and overexacting to anyone who is entirely exempt from the gambling instinct; whilst he who has it must pay to this propensity the appropriate toll.”

Keynes (1936)

The new Basel-II capital accords heralds a major shift in the global regulation of financial institutions. While it was conceived as a regulatory structure for the largest global financial institutions and their equally large clients, it is likely to be implemented across-the-board in European countries regardless of the size of financial institution and clients or size and development level of the country. This broadening of the scope of international capital regulations has passed almost unnoticed, even though the implications for financial stability, small and medium-sized enterprises, and monetary policy are profound. Our objective is to analyze some of the impacts of Basel-II, focussing on likely outcomes.

Banking regulation in our view has two key purposes, consumer protection and financial stability, or microprudential and macroprudential, respectively, in the terminology of Crockett (2000). Of these, microprudential regulation is mostly domestic in nature, limited for reasons of moral hazard. Our interest here is in the macroprudential, whose purpose is to contain panics and prevent systemic crisis, and ensure stable business environments by keeping regulations as unintrusive, transparent, and efficient as possible. For the banking supervisors who have to design the regulatory mechanisms it is often a thankless task, for they get little credit for a smoothly functioning financial system, but are quickly blamed when something goes wrong. As a consequence, the supervisors need to balance several goals, e.g. keep the regulations effective and efficient, as well as minimizing moral hazard, regulatory arbitrage and regulatory capture, while at the same time preventing political fallout. Given the often confused discussion about financial regulations it is of interest to mention what falls outside the scope of financial regulations. Examples include prevent individual banks from failing, the protection of shareholders and other investors (except limited deposit insurance), and prevention of panics since countries with panics do better because too much stability is the by-product of heavy government regulation which stifles growth and innovation. Countries with overbearing regulations like India or the Soviet Union enjoy financial stability, but suffer in economic performance, whilst countries with more liberal regulatory regimes suffer from occasional

crisis, but do much better economically in the long run.

A cornerstone of the current regulatory regime is capital charges. We maintain that the regulatory maxim of requesting a capital buffer for any sort of risk has carried through into modern regulatory structures with—perhaps—obsessive zeal. While it is sensible for individual financial institutions to carry reserves, and for supervisors to require them for purpose of consumer protection, the link between reserves and financial stability, or the macro-prudential, is rather tenuous. The risk inherent in this one sided approach are twofold.

First, by only focusing on the perceived market failure of excessive risk seeking on the behalf of banks, other possible market failures are ignored. Worse, a narrow focus on just one market failure can exacerbate the other. In 1996, the Basel Committee proposed an amendment using lower capital surcharges as a carrot for adopting internal models for used to measure market risk. This represented a fundamental change in regulatory thinking. The Basel Committee was essentially applying state-of-the-art risk management methodology, successfully used for internal risk management, to the financial system at large. Thus, as argued by Danielsson and Zigrand (2003), the Committee ignored the fact that if the banking system behaved in an increasingly identical manner, as often is the case during an economic downturn and especially financial crisis, the internal risk models create a system wide externality. In other words, a financial institution seeking to sell a risky asset during times of economic distress to free up some capital would not find a counterparty to the trade. Worse, when many institutions in a similar situation all seek to sell the same assets, it creates a downward spiral in market prices while at the same time exacerbating financial instability. Investors cannot sell their assets as markets are inoperative. If investors need to sell some assets to pay margin calls or other obligations, the shutting down of the market for some assets and the impossibility to retrieve their deposits may lead to domino effects of defaults. The key to this doomsday scenario and the initial spark of the transmission mechanism lie clearly in the fact that if markets do not operate properly, the trades that are required to self-finance positions and to keep firms and financial institutions solvent cannot be executed at a reasonable, or at any, price. If this situation lasts, the real effects mentioned above may follow.

Thus, the current vogue of risk regulation ignores the fact that market risk is endogenously affected by the regulatory standards. By developing more risk sensitive capital charges without a mechanism to really use the capital as buffer in critical times may turn a minor crisis unto a major crash since every financial institution is supplied with identical feed-back response concerning

shocks affecting the system. Essentially, *endogenous risk* as proposed by Daniélsson and Shin (2003) undermines the regulatory structure.

Second, if the calculation is poor or limited, (see e.g. Daniélsson, 2002) the resulting capital charge will only create unsound incentives for the operation of financial institutions. This especially true, if the narrow defined targets for individual institution clash with macro prudential. This point can be illustrated with a famous fable from a screw factory in the Soviet Union which highlights the inherent risks of risk regulation. The workers in the factory where — sensibly enough — compensated for their labor in relation to their output. Absent a market valuation of screws in the Soviet command system, the output was — sensibly enough — measured in physical terms by the weight of the screws. However, given the incentives, the management started to substitute between metals in the production, the screws gained weight and both their practicality and production cost increased. In other words, regulation that seem sensible at the outset can have non-sensible outcomes due to incentives they give.

In designing an efficient regulatory structure it is important to consider the actual market failure meriting regulation, in particular, the notion of systemic crisis. Whilst there are various, often vague, interpretations of this concept, in our view it is essential to define this concretely. Considering the regulatory and academic literature on the subject, what most people have in mind is a failure of markets to clear orderly, bringing with it a collapse of the financial system due to insolvencies leading leading to a domino effect in defaults. The costs of such an event, while hard to quantify, are likely to be enormous, as the crisis will directly impact on the production and consumption sectors of the economy. (see De Bandt and Hartmann, 2000, for a survey) This is especially a pressing issue for small open economies and emerging markets whose financial markets are more prone to external disturbances, such as exchange rate disturbances, and liquidity is more fragile due a much thinner markets. Ultimately, we feel that the Basel-II regulatory structure is based on two fallacies of modern risk regulation.

1. by ignoring the externality the distress of one financial institution as on other financial institutions
2. by disregarding the macro prudential aspects of microprudential regulation.

Therefore, there is strong indication that these two fallacies, if carried through with Basel-II, might seriously affect the financial health of many small open

economies. First, by ignoring the externality the distress of one financial institution as on other financial institutions and second to disregard the macro prudential aspects of micro prudential regulation. Thus, forcing financial institutions to keep minimum risk-weighted capital is not only pro-cyclical, it can be destabilizing at times of uncertainty and contradict the macroprudential of financial regulation.

2 The Mechanism of Financial Regulation

2.1 From Basel-I to Basel-II

Traditionally, financial institutions have been regulated on a national or local levels. This was fine as long as financial institutions were small, but increased globalization and technological improvements has created increasing demands for harmonization and the erection of firewalls against financial contagion. The fall of Bankhaus Herstatt in 1974 and Banco Ambrosiano in 1982, was a wakeup call to supervisors that banking is an international business, requiring international coordination for supervision to be effective. The pioneering effort was provided by the Basel Committee (BC), established by the central bank Governors of the Group of Ten countries in 1974. In 1988, the Committee decided to introduce a capital measurement system commonly referred to as the Basel Capital Accord. This system provided for the implementation of a credit risk measurement framework with a minimum capital standard of 8% by end-1992. Since 1988, this framework has been progressively introduced not only in member countries but also in virtually all other countries with active international banks.

A key feature of the 1988 Accord is that capital is *risk weighted*, a feature which has remained an integral part of subsequent regulatory proposals. However, this reliance on bank capital as a regulatory tool dates back to the traditional notion — mentioned above — that financial institutions need to have some reserves against potential loan losses. Soon after Basel-I its flaws became increasingly visible, especially that regulatory capital does not adequately reflect risk. For example, loans to private firms give the same risk weight from the hotdog stand to Microsoft, while loans to OECD governments (e.g. Mexico, Turkey, and Japan) get a zero risk weight. In addition, under Basel-I, financial institutions focus excessively on the management of regulatory capital. Finally, Basel-I focuses on the institution level risk and not on systemic risk. In 1996, the Basel Committee proposed an amendment using lower capital surcharges as a carrot for adopting internal models for

measuring market risk. This represented a fundamental change in regulatory thinking. The Basel Committee was essentially applying state-of-the-art risk management methodology, successfully used for internal risk management, to the financial system at large. The perceived success of the 1996 Amendment, and the rather visible flaws in the original Accord have motivated the Basel Committee to apply the methodology of risk based regulation to operational and credit risk. In 1999, the Basel Committee issued a proposal for a new capital adequacy framework to replace the 1988 Accord.

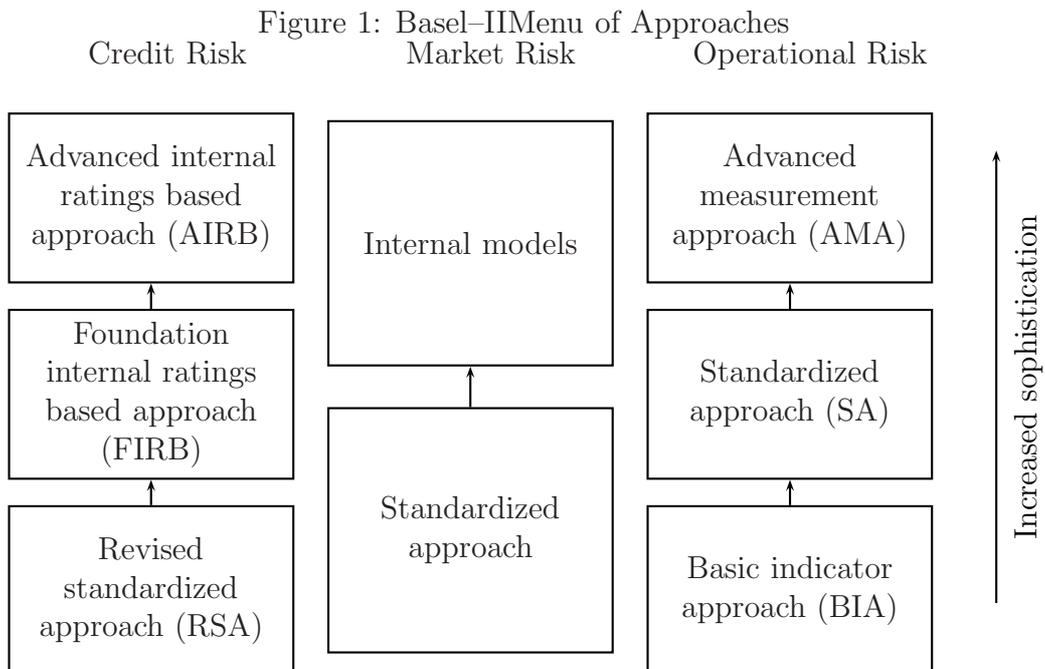
It is based on the following three pillars

Minimum capital requirement is based on the notion that a bank is able to communicate its overall operational risk level via one number to the supervisors

Supervisory review process is designed to ensure that this risk number is generated in a satisfactory manner

Market discipline depends on the communication of key statistics to the community at large

Financial institutions can in theory pick from the menu of approaches presented in Figure 1.



Following an extensive consultation process, the Basel Committee issued a final consultative document in 2003, with a view to introducing the new framework at end or 2006, the so-called Basel-II.

Central to the Basel-II process is the notion that the regulatory treatment of individual banks reflect their riskiness, e.g., so that more risky banks have to carry a higher capital charge and perhaps be subject to closer scrutiny by regulators. In specific implementations the supervisors require financial institutions to measure and aggregate their risks as well as reporting some of this risk to the authorities and the financial community. Within this system, banks do have some leeway in how risk sensitive their regulatory treatment is, with smaller banks perhaps opting for the more standardized models in measuring risk, with the larger (and more relevant) banks opting for the internal models approach, where the bank designs its own models which are then approved by the supervisors.

The Basel-II process is excessively focused on the institutions rather than the system, which in our view does not correct the fundamental flaw of Basel-I. Basel-II appears to be designed with the largest international investment banks in mind, following their technical expertise, client base, and asset/liability mix. The one size fits all approach of Basel-II has been criticized, e.g. by Davies (2002) then heading retail market risk at Barclays Bank. He suggests that a requirement to adopt a Basel-II style risk model poses a serious dilemma for those institutions who already have a high-quality but different risk management system in place. Will those banks run two systems in parallel, or abandon the existing system in favor of the Basel-II style model?

While Basel-II is designed by the G10 central banks, it only issues guidelines, and it is left to the individual national regulators how and if implement it. Based on this, the US announced in Feb. 2003 that Basel-II would only apply to its 10 largest banks, having 95% of foreign assets and 69% of domestic assets. The stated reason was that US banks already have more than 8% capital ratio, and meet similar supervisory standards as in Basel-II. An important factor in the decision by the US supervisors were worries about the impact on small and medium sized enterprises (SMEs) and smaller financial institutions.

Within the EU, financial regulation is contained in the capital adequacy directive (CAD), currently in the second iteration CAD2. The EU has not yet formally stated its preferences, but is fully expected that it will apply Basel-II in a strict form across the financial system, regardless of how appropriate these regulations are for smaller institutions, in CAD3.

2.2 The Implications of Basel–II and the Purpose of Financial Regulation

In our view the primary purpose of financial regulation is financial stability, i.e., the ex ante prevention of excessive systemic risk and ex post containment of systemic risk episodes. The Basel–II fails to address either, for example by essentially ignoring liquidity risk which is probably the most systemic of all risk categories. In addition, the reliance on aggregate crude risk measures, and 99% probabilities says very little about systemic events. The fact that a bank violates its 99% VaR implies very little about its chance of failing or a systemic event occurring. This, moreover, misses the point, the focus is still on the institution level risk, feedback effects are disregarded, and it relies on correlations which say little about dependence in times the crisis.

In Basel-II the potential for procyclicality is downplayed by the Basel Committee (2002) when it states that “To help address potential concerns about the cyclicity of the IRB approaches” banks should perform stress testing. The best way would be to implement systemwide stress tests. This has been considered by the Committee but ultimately dismissed, “The group concluded that, under ideal circumstances, aggregate stress tests could potentially provide useful information in a number of areas. . . . However, the group also noted that it is as yet unclear whether such ideal circumstances prevail.” Committee on the Global Financial System (2000) Related is the question of effectiveness of stress tests, even the absence of endogenous risk. A common practice is to use some heavy tailed data related by correlations. Unfortunately, almost regardless of the correlation coefficient and tail fatness, the probability of a joint extreme drop is very low. It is essential to incorporate non-linear dependence in the design of stress tests to effectively capture the joint extreme price drops across assets observed in market crashes. This is still very uncommon and the supervisors have been silent on this issue. This exemplifies the first fallacy mentioned above by ignoring the external effect of one institution’s risk adjustment on the open market on the other by using systemic industry wide information to design standards aimed at the survival of individual institutions.

The Basel accord aims at putting a lesser weight on low impact high frequency risk concerning credit risk, and a greater weight on large-impact rare events concerning operational risk. The method proposed in estimating this these risks are assumptions of linearity of risks with size of banks, additivity of capital charges across widely different types of risk and estimated of unexpected losses as multiples of expected losses. The Committee wants to leave the overall level of capital requirements in banking system more or less

unchanged, and if carried out as requested in the most advanced approaches, the calculations would justify only negligible capital requirements for common risk but perhaps enormous capital requirements for exceptional risk. Industry wide data might prove helpful in making a check-list of what disasters might possibly befall on individual firm, but firm specific estimates should take into account the particular business profile of individual firms. This exemplifies the second fallacy of risk regulation where the macroeconomic implications of bank capital are ignored. It is true that operational losses can be bring individual institutions to their feet by working of a rogue trader, terrorist event, a crippling lawsuit, etc. Should such disaster strike how much reserve capital is needed to make difference? However, the losses that pose the gravest danger to the financial system and the economy are most likely to be systematic – the result of an economy wide contraction – but not idiosyncratic. If banks suffer a deterioration in their balance sheets, and so have a substantial contraction in their capital, they have two choices: either 1) they can cut back on their lending in order to shrink their asset base and thereby restore their capital ratios, or 2) they can try to raise new capital. However, when banks experience deterioration in their balance sheets, it is very hard for them to raise new capital at a reasonable cost. Thus, the typical response of banks with weakened balance sheets is a contraction in their lending, which slows economic activity. The proposed capital charges for operational risk do not alter this scenario since no provisions are actually for this capital to be used in times of economic distress when it is needed.

In short, a Basel-II regulatory system has strong implications for the behavior of financial institutions. It increases their sensitivity to risk measured by the backward looking statistical models required by Basel-II, and increases their dependence on advanced measurement technology computational, statistical, and managerial. As with any important change in regulatory structures, Basel-II has both winners and losers. We expect that the winners will be the largest banks, large corporations, consultants, some regulators, and thought leaders including universities. The losers will be small and medium-sized banks, small and medium-sized enterprises, developing economies, perhaps even society.

3 The Informational Scale Economics of Risk Regulation

A fundamental component in the philosophy of Basel-II is that financial institutions be incentivized to “scientifically” measure all risk, i.e., to use

state-of-the-art risk modelling techniques to measure market, credit, and operational risk. Of these, the primary impact is due to credit risk since it directly affects their cost and access to loans. This will imply fundamental changes in how banks lend money, and how firms borrow. The changes to be especially large for smaller firms and banks. At the moment, much lending to small and medium-sized enterprises (SMEs) is based on informal local knowledge and local business considerations. A strict implementation of Basel-II as is expected in CAD3 implies that banks will be required to implement formal credit risk modelling of most loans. This of course creates a new type of scale economics in both providing and processing information, and may result in more syndication and credit derivatives expected. All these factors favor the the large and the sophisticated. This is not likely to impact much on the largest corporations and largest banks, since sophisticated credit risk techniques are already used to price loans in this case. However, there are economics of scale in using such techniques, with average costs increasing as the financial institutions and/or clients gets smaller.

3.1 Impact on Small and Medium-Sized Enterprises

Basel-II implies that financial institutions are promised lower capital surcharges for using formal credit risk tools to manage their loan portfolio and price individual loans and corporate bonds. The fundamental source of credit information will be credit rating agencies, with financial institutions inputting that information into their credit risk engines.

Credit rating agencies are large international firms whose business it is to provide credit rating for client firms, whereby a firm pays a fee to get rated. This of course is quite costly, especially for smaller corporations, and such firms will either have to pay relatively much higher fees to get rated, or do without. Furthermore, the credit-rating agencies credibility is somewhat in doubt. For example, a firm can buy a so-called pre-rating whereby the credit-rating agency for a fee confidentially tells the firm what expected credit-rating will be. If the firm is not happy with this credit-rating it can approach the next credit-rating agency and repeat the process until it gets an acceptable rating. The moral hazard issues in this of course considerable and cast doubt on the process. In addition, the credit-rating agencies have demonstrated weakness in face of political pressure. For example, the German government applied considerable pressure on rating agencies to prevent them from publishing new ratings for Landesbanks.

This whole process affects SMEs especially hard. Informal or unquantifiable

information is downgraded or rendered almost worthless. What was local bank information, becomes costly formal knowledge which is bought from external sources. Thus costs of financial intermediation are increased for both small lenders and creditors. Credit ratings from rating agencies exclude smaller firms with rating agencies becoming capital gatekeepers. This is especially problematic for new entrants and smaller firms.

Indeed, the SMEs are struck by a double whammy. They get burdened by a large sunk cost in getting rated as scale economies in providing and processing credit information favors the large firms. In addition, they are likely to become subject to higher costs of getting credit, or increased credit risk implying that it becomes more costly to lend to SMEs.

This is unfortunate because the SMEs are crucial to the economy. Small firms account for most economic growth, since almost all job creation is now within small firms. Furthermore, much technological innovation depends on upstart high-tech companies with good ideas having ready access to capital. It is therefore unfortunate that EU economic policies are expected to discriminate against SMEs.

3.2 Impact on Financial Institutions

Banks have particular advantages over other financial intermediaries in collecting information and solving asymmetric information problems because of their long-term customer relationships and line of credit arrangements. Moreover, their ability to scrutinize the checking account balances of their borrowers provides banks with an additional advantage in monitoring the borrowers' behavior. Banks also have advantages in reducing moral hazard because, as demonstrated by Diamond (1984), they can engage in lower cost monitoring than individuals, and because, as pointed out by Stiglitz and Weiss (1983), they have advantages in preventing risk taking by borrowers since they can use the threat of cutting off lending in the future to improve a borrower's behavior. Banks' natural advantages in collecting information and reducing moral hazard explains why banks have such an important role in financial markets throughout the world. Furthermore, the greater difficulty of acquiring information on private firms in emerging market countries makes banks even more important in the financial systems of these countries. A large part of this information, so vital for the banks and the broader economy, can be described as local knowledge spillovers that is difficult quantify. The importance of local knowledge is very well described in the Church-tower principle, that banks have a comparative informational advantage over

the area visible from the nearest Church tower. These local place specific advantages are one of main reason for that smaller banks and savings funds are able to hold their own in competition with larger rivals. These smaller players do not have resources, technical sophistication or scale economies to transform the - often informal - knowledge spill-overs into standardized system and therefore be proportionally burdened by the new regulatory requirement. Therefore, it must be concluded that Basel-II will precipitate a even greater concentration in banking and investing.

4 Risk Regulation and Monetary Policy

4.1 The Macro Externalities of Risk Regulation

When analyzing risk regulation it is important to focus on what externalities or market failures regulators are aiming at. Modern financial regulation has its origin in the doctrine of lending of last resort (LOLR) proposed by Bagehot (1873) and first used in the rescue of Barings in 1890. LOLR depends on the central bank (CB) providing liquidity to financial institutions in crisis. As a such, it can be very effective in preventing the spread of contagion if used properly, provided that it's not overused, and moral hazard kept at minimum. The banking system is essentially funded by short-term deposits and profits by granting long-term loans, and therefore their liabilities are short-term and liquid and the assets are long term and illiquid. Hence, it makes sense for financial institutions as well as regulators to focus on maintaining a liquid buffer to remain solvent against any alterations in the balance between assets and liabilities. It is important to note that the doctrine of LOLR has explicit links with monetary policy since injecting liquidity into the financial system is synonymous with expanding the money base, which might contrast other policy goals, such as price stability or fixed exchange rate targets. It can be argued that the adherence of the gold standard prevented the US Fed from playing this role in Great Depression and Calvo (2000) has argued that LOLR is option is extremely complicated in many emerging markets since it usually associated with outbursts of inflation.

In designing a regulatory mechanism, the authorities have traditionally relied heavily on minimum risk weighted capital based regulations. This special emphasis stems from the asymmetric loss function which the banks face. The banks essentially handle other people 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. However, an unfortunate side-effect is that regulatory interventions aimed at protecting bank customers, such as a deposit insurance, may actually boost the risk seeking incentives of banks since a third party – the government – will ultimately take the loss. This was the case in the US Savings and Loan crisis of the 1980's. The focus on bank capital in risk regulation is thus intended to make the banks more risk averse, both by keeping their loss function within certain bounds and by affecting the price of risk by connecting capital requirement to a perceived risk assessment.

The minimum capital requirements also have a direct link with the conduct of monetary policy as the banks provide demand deposits, the largest component of the money supply. The central bank expands the money base by creating excess reserves in the banking system which then enter the economy as outgoing loans and circulate back to create demand deposits via the money multiplier. Should the the minimum capital requirement ever become binding – say, after a huge loss on the balance sheet due bankruptcies during a recession – the credit channel of monetary policy is effectively blocked since a troubled banking system usually has difficulty attracting new capital.

4.2 Capital Regulations and Procyclicality

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. Effectively, in a boom, there are gains in asset markets that raise the valuation of private capital and create larger collateral for loans while the increased aggregate demand enhances the profitability of the private sector and boosts EBITDA ratios, and thus lowering the overall risk of the total loan portfolio. At the same time, there are also gains in bank equity ratios due capital gains from stock or bond portfolios, increased profit or new IPOs. Furthermore, an increase in money demand increases the flow of sight deposits into banking sector, thus increasing the supply of loanable funds and lowering the cost of financing. In a downturn, this chain of event is reversed. Bank capital becomes scarce, and lower collateral, slimmer equity ratios and eroded profitability lead to

a greater risk sensitivity, with the loan supply contracting. Some financial institutions will choose to withdraw from the market, by selling risky assets and buying safe assets. This realignment in asset prices presents an opportunity for others who will choose to buy risky assets during the crisis. The former behavior is procyclical while the latter behavior is countercyclical, often associated with hedge funds.

4.3 Regulatory Capital and the Effectiveness of Monetary Policy

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. Indeed, 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 is especially important when a significant proportion of the assets and liabilities of the banking system is denominated in foreign currency. Thus, forcing financial institutions to keep minimum risk-weighted capital is not only procyclical, it can be destabilizing at times of uncertainty and contradict the macroprudential of financial regulation.

Therein lies a 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 and by conforming to the microprudential regulation the banks are forced into actions that go against the macroprudential, by cutting down the credit supply in time of economic downswing.

5 Risk Regulation and Liquidity of Financial Markets.

5.1 Procyclicality and Liquidity

Notions of procyclicality and liquidity are fundamental for the economic analysis of banking and banking regulation. Unfortunately, there are no fixed definitions of these terms. In the case of procyclicality it both refers to the tendency of financial institutions to increase lending in economic upswings and reduce lending in downturns, thus amplifying the business cycle. Procyclicality can also refer to the behavior of financial institutions in a financial crisis, which is much shorter in nature, usually only a few days, where the flight to safe assets by financial institutions is also procyclical, (see e.g. Daníelsson and Zigrand, 2003). As a result, banking is procyclical, and banking regulations as well since they encourage procyclical behavior by banks.

The notion of liquidity is harder to pin down. One notion of a perfectly liquid asset is an asset for which individuals can buy and sell as much as they want at current prices. This notion of liquidity suggests that many markets are essentially perfectly liquid from the perspective of small investors since prices do not change much, if at all, in response to their desired trades. This relates to the definition of the Committee on the Global Financial System in December 1997 “A liquid market is a market where a large volume of trades can be immediately executed with minimum effect on prices.”

5.2 Capital Constraints and Market Liquidity

The concept of procyclicality and liquidity are interrelated as argued by Marès (2001) as being the output of financial intermediation on the secondary market. Thus, the cost of production of liquidity is the amount of capital that a dealer requires, given technology, guarantees she can quote firm two-way prices at a given time. The underlying idea here is that the higher the degree of liquidity in the market, the less additional capital would be required to produce a marginal unit of liquidity, and therefore the lower the average cost of production of each unit would be as the overall amount grows. In order to execute transactions there must be a willing counterparty. The first agent is the consumer of liquidity, the second is the producer, or provider. The provider, by agreeing to enter into a financial transaction, agrees, by definition, to be exposed to a financial risk. His ability to enter

into a transaction therefore depends on his capital base.

Given this intuition one can easily derive the three way connection between procyclicality, bank capital and liquidity. 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. Liquidity comes cheap during an upswing where asset prices are heading up, profit opportunities are abundant and speculators flock into the markets. It is during downswings that markets dry up, the buyers exit and liquidity becomes more capital intensive. It is at this time bank capital and risk absorption of financial institutions becomes a critical factor. However, at this very time banks are likely to have diminished capital due to 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 obliging 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 stable 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 and more similar information, and run similar risk models. Therefore, they want to sell the same assets at the same time with adverse consequences for market liquidity.

5.3 Risk Constraints, Liquidity, Volatility, and the Propensity for Financial Crisis

Daniélsson and Zigrand (2003) analyze the impact of capital risk regulations on market prices, volatility, liquidity, and market clearing with a general equilibrium model. Their model is a standard general equilibrium model, providing baseline results. The effects of externally imposed risk constraints are analyzed by subjecting some, but not necessarily all financial institutions to value-at-risk (VaR) type risk constraints. While it is to be expected that a constrained general equilibrium model will generate qualitatively differ-

ent results than an unconstrained model, some of the implications of risk constraints are quite interesting.

In theory, a notion of systemic crises should suggest some form of optimal regulation. Danielsson and Zigrand (2003) however focus on the general framework of the 1996 Amendment and the Basel-II proposals (VaR), and limit the amount of risk agents are allowed to bear. Providing that these risk constraints are sufficiently restrictive, such regulation can effectively reduce or even eliminate systemic risk due to excessive risk taking.

Imposing Basel style constraints has real consequences on outcomes, and a detailed understanding of these secondary impacts is essential for the effective evaluation of the pros and cons of the chosen regulatory structure. In the risk-constrained economy risk-sharing, risk premia, volatility, liquidity, asset price comovement, and market clearing are all affected. Furthermore, the tighter the constraint, the greater the impact becomes. Market prices and liquidity will be lower in the regulated economy with volatility and expected excess returns are higher. In their final result, they demonstrate that risk constraints may prevent market clearing in some circumstances. Furthermore, the probability of markets not clearing increases with the tightness of the risk constraint. The only way to ensure market clearing in all circumstances is to exempt some institutions from risk constraints. Some remnants of this effect may have been present during the LTCM crisis.

6 Risk Regulation, the Small Open Economy, and Emerging Markets

All the fault lines of Basel-II mentioned above apply especially to emerging market economies, as well as small open currency areas. The reasons are twofold. First, smaller market usually more sensitive to the informational scale economics and the provision of liquidity. Therefore, the long run structural aspects of the Basel-II are likely to be more adverse than in larger markets. Second, emerging economies, especially whose dependent on exports, are usually more prone to business cycles. Moreover, in small currency areas, a significant portion of asset and liabilities in the banking sector are typically in foreign currency by direct loans or currency linked bond issues. Therefore, the capital constraints implied by Basel-II are more likely to become binding during the course of the business cycle with adverse effects on macroeconomic performance.

6.1 Informational Scale Economics

There are economics of scale in using modern risk modelling techniques as prescribed by Basel-II, with average costs increasing as the financial institution and/or client gets smaller. For small or less-developed economies this may be especially problematic since credit-rating agencies may choose not to rate firms in such countries but rather to use country rating as proxy for private sector as a whole. In a small open economy a substantial part of total debt — private and public — is likely to be external. The domestic banks act as intermediaries borrowing funds with bond issues on international capital markets and re-issuing currency linked loans to businesses and individuals in domestic markets. The banks credit rating is contingent on the economy-wide sovereign credit rating, reviewed bi-annually by the main rating agencies. In the event of an adverse trend in the macro or fiscal situation, the foreign component of the national debt is downgraded across the board in portfolios of international investment houses even though different trends affect sectors of the economy in a different way. It is likely that the Basel-II regulatory requirements will have a spatial dimension to them as the credit markets of smaller localities must also suffer from the same informational scale economics as collecting, standardizing and quantifying credit information must bear a disproportionate cost. Thus, the cost of financing for firms in less populated regions will increase. This is especially true of localities that have idiosyncratic properties and do not aggregate well with surrounding areas. This process is well described by Segoviano and Lowe (2002) who compare the assumed capital charges for Mexico using the standard and IRB approach and show the regulatory burden during the 1994 crises would have been significantly heavier if the proposals of Basel-II had applied. In other words, under Basel-II, country risk rating would prove to be an important propagator of macroeconomic shocks into the financial sector with implication for financial stability.

6.2 Liquidity

Liquidity is usually more precarious and costly in production in smaller financial markets, and thus a proportionately larger capital is needed to be supplied than in larger and thicker market. In many smaller economies, such as Scandinavia, the government actually subsidizes the provision of liquidity by paying market makers for keep the market active. The new capital requirements proposed by Basel-II are likely to have adverse effects on the liquidity provision of financial markets of small open economies, with impli-

cations both in short, medium and the long run. The short–run implications are discontinuous pricing and excess market volatility which are the direct consequence of the shutdown in the production of liquidity in financial markets. The medium–run effects are larger risk premia on certain types of assets given a higher liquidity risk since investors who anticipate a potential future need to sell off assets quickly at some unexpected future date to meet cash flow obligations may desire holdings of relatively liquid assets in order to minimize the transaction costs associated with future forced sales. This desire for relatively liquid asset holdings should be reflected in equilibrium asset prices and returns. The long run effect touches on the informational scale economies previously described. The general requirements of standardized technology in risk management may lead to an agglomeration of financial firms, and thus creating a host of larger and more homogenous players – the very two characteristics that have an adverse effect on liquidity as demonstrated by Pritsker (2002). Furthermore, market liquidity becomes much more sensitive to financial crisis by both homogeneity of beliefs and homogeneity of actions, i.e., if most market participants read the market the same way and behave in the same way. This acts as to amplify financial crisis generating what Danielsson and Shin (2003) term endogenous risk. In this situation, diversity of actors in financial markets prevents systematic breakdowns, whilst diverse opinions diffuse deviations in the markets and preserve liquidity at all times.

6.3 Monetary Policy

Emerging market economies and small currency areas share two key characteristics. First, business cycles are usually more volatile and the financial hinterland is much smaller than in the larger or more developed economies. Second, both types of countries have a large proportion of their liabilities in a foreign currency. Calvo (2000) terms this as “partial dollarization.” The banks may be constrained from taking direct currency risk, but not indirect risk, increasing the the likelihood of institutional default with a weakening currency. As the result, the equity ratio of the banking system is quite sensitive to fluctuations in the exchange rate. Essentially, since the covariance between exchange rate fluctuation and business is usually both large and positive in emerging and small open economies, these two characteristics have interlinked effects. A sharp depreciation following an output contraction automatically reduces the capital adequacy ratio of the banks, possibly constraining their lending. Furthermore, a depreciation might also increase the assessment of credit risk as the burden of currency linked debt is increased

for domestic debtors due to a weaker currency.

The typical response of banks with weakened balance sheets is a contraction in their lending, which slows economic activity. However, since a breach of international rules, such as those proposed by Basel-II, brings serious consequences for the creditworthiness international capital credit markets, the banks would be forced to respond rather drastically to adjust their capital adequacy ratios. The result could be described as “credit crunch” a sharp contraction in lending with serious adverse effects on output. Moreover, the banks would be tempted to free some capital by dumping the most risky domestic assets and possibly default on a currency linked debt, leaving them with an unhedged currency position.

Under these circumstances the monetary authorities are in a tight spot. The credit link of monetary policy would be completely blocked by factors beyond the reach of the Central Bank as any creation of excess reserves by the Central Bank would not result in increased lending creating a virtual liquidity trap. Such operations would furthermore be complicated by pursuit of other monetary goals, such as preventing the exchange rate from falling beyond certain bounds. Under these circumstances, monetary authorities might have to resort to direct capital injections into financial institutions in order for them to conform regulatory constraints. One could also argue — employing rational expectations — that banks would hedge themselves by maintaining a capital buffer sufficient to cover such eventualities. In that case, the ex ante likelihood of large swings in bank capital would be priced into small financial markets by higher longer-term operating cost of financial institutions. However, the counter argument could be made — also employing rational expectations — that the shocks to the banks balance sheets due such external or economy-wide events would not prompt banks to hedge against such outcomes. Instead, they would come to expect a collective rescue operation by the government.

References

- Bagehot, W. (1873). *Lombard Street*. H.S. King, London.
- Basel Committee (1996). *Amendment to the Capital Accord to Incorporate Market Risks*. Basel Committee on Banking Supervision.
- Basel Committee (2002). *Basel Committee reaches agreement on New Capital Accord issues*. Basel Committee on Banking Supervision, 10 July 2002 edition.
- Bliss, R. R. and Kaufman, G. G. (2003). Bank procyclicality, credit crunches, and asymmetric monetary policy effects: A unifying model. *Journal of Applied Finance*, 12:23–31.
- Calvo, G. A. (2000). Capital markets and the exchange rate.
- Committee on the Global Financial System (2000). Stress testing by large financial institutions: Current practice and aggregation issues. CGFS Publications 14, Bank for International Settlements.
- Crockett, A. (2000). Marrying the micro- and macro-prudential dimensions of financial stability. The General Manager of the Bank for International Settlements; <http://www.bis.org/review/rr000921b.pdf>.
- Daniélsson, J. (2002). The emperor has no clothes: Limits to risk modelling. *Journal of Banking and Finance*, 26(7):1273–1296.
- Daniélsson, J. and Shin, H. S. (2003). Endogenous risk. In *Modern Risk Management — A History*. Risk Books.
- Daniélsson, J. and Zigrand, J.-P. (2003). What happens when you regulate risk? Evidence from a simple equilibrium model. Working paper, LSE, www.RiskResearch.org.
- Davies, B. (2002). Basel lags behind the banks. In *Bumps on the road to Basel: An anthology of views on Basel 2*, pages 18–21. Centre for the Study of Financial Innovation.
- De Bandt, O. and Hartmann, P. (2000). Systemic risk: a survey. Discussion paper series, no. 2634, CEPR.
- Diamond, D. (1984). Financial intermediation and delegated monitoring. *Review of Economic Studies*, 51:394–414.

Keynes, J. M. (1936). *The General Theory of Interest, Employment and Money*. London: Macmillan.

Pritsker, M. (2002). Large investors: Implications for equilibrium asset returns, shock absorption, and liquidity.

Segoviano, M. and Lowe, P. (2002). Internal ratings, the business cycle and capital requirements: Some evidence from an emerging markets economy. Bis working papers no. 117, BIS.

Stiglitz, J. E. and Weiss, A. (1983). Incentive effects of termination: Applications to credit and labor markets. *American Economic Review*, 73:912–927.