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CESifo Economic Studies

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Contents

Why Are There so Many Banking Crises?

Jean-Charles Rochet*

Abstract: *The last 25 years have seen an impressive number of banking crises all over the world. These crises have renewed interest of economic research on the causes of fragility of banks and the possible remedies to it. The justifications and organisation of public intervention in the banking sector have also been put into question. This article builds on this recent research in order to understand better the causes of banking crises and offer policy guidelines for reform of regulatory and supervisory systems. The main conclusions are:*

- *Although many banking crises have been initiated by financial deregulation and globalization, these crises were largely amplified by political interference.*
- *Supervision systems face a fundamental commitment problem, analogous to the time consistency problem confronted by monetary policy.*
- *The key to successful reform is independence and accountability of banking supervisors.* (*JEL* E58, G21)

1 Introduction

The last 20 years have seen an impressive number of banking and financial crises all over the world. In an interesting study, Caprio and Klingebiel (1997) identify 112 systemic banking crises in 93 countries and 51 borderline crises in 46 countries since the late 1970s (see also Lindgren et al., 1996). More than 130 out of 180 of the IMF countries have thus experienced crises or serious banking problems. Similarly, the cost of the Savings and Loans crisis in the USA in the late 1980s has been estimated to over USD 150 billion which is more than the cumulative loss of all US banks during the Great Depression, even after adjusting for inflation. On average the fiscal cost of each of these recent banking crises was of the order of 12 percent of the country's GDP but

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Prepared for the Venice Summer Institute of CESifo (13-20 July 2002). I thank the organizers, Phil Davis and Gerhard Illing, for inviting me. This article is based on a forthcoming monograph (Rochet, 2004). It was written while the author visited the London School of Economics as the B.P. centennial Professor. Hospitality of the LSE, and in particular the Department of Accounting and Finance and the Financial Markets Group, is gratefully acknowledged. I benefited from the helpful comments of two anonymous referees, Sudipto Bhattacharya, Claudio Borio, Phil Davis, Charles Goodhart, Gerhard Illing and Hyun Shin. Responsibility for possible errors is entirely mine.

exceeded 40 percent in some of the most recent episodes in Argentina, Indonesia, Korea and Malaysia.

The map on the next page shows the universality of the problem.

These crises have renewed interest of economic research about several questions: The causes of fragility of banks and the possible ways to remedy this fragility, the justifications and organisation of public intervention. This public intervention can take several forms:

- emergency liquidity assistance by the central bank acting as a lender of last resort;
- organization of deposit insurance funds for protecting the depositors of failed banks;
- minimum solvency requirements and other regulations imposed by banking authorities;
- and finally supervisory systems, supposed to monitor the activities of banks and to close the banks that do not satisfy these regulations.

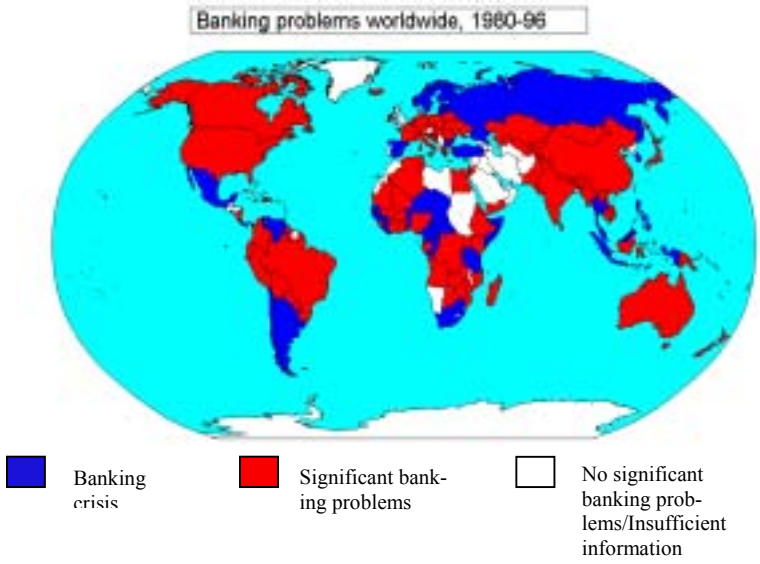
Important reforms have recently been introduced in banking supervisory systems. For example, the American Congress has enacted the Federal Deposit Insurance Corporation Improvement Act in 1991 after the Savings and Loans crisis. Several countries, notably the UK, have created integrated supervisory authorities for all financial services including banking, insurance and securities dealing. Finally, the G10 countries have harmonised in 1989 their solvency regulations for international active banks. This harmonisation, known as the Basel Accord, since it was designed by the Basel Committee of Banking Supervision, was later adopted at national levels by a great number of countries. The Basel Committee is currently working on a revision of this Accord, aiming in particular at giving more importance to market discipline.

The objective of this article is to build on recent findings of economic research in order to understand better the causes of banking crises and possibly offer policy guidelines for reform of regulatory supervisory systems. In a nutshell, my main conclusions will be:

- banking crises are largely amplified, if not provoked, by political interference.

- Supervision systems face a fundamental commitment problem, analogous to the time consistency confronted by monetary policy;[1]
- and finally the key to successful reform is independence and accountability of banking supervisors.

The plan of this article is the following. I will start by studying the historical sources of banking fragility, then I will examine possible remedies: creation of a lender of last resort, and/or deposit insurance combined with solvency regulations. Then I will try to draw a few lessons from recent crises; And finally I will conclude by examining the future of banking supervision.

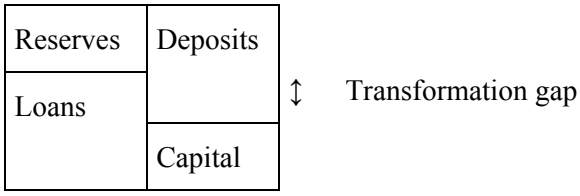


This map was constructed by the author from Table 2 in Lindgren et al. (1996).

[1] After finishing this paper, I became aware of an article of Quintyn and Taylor (2002), also presented in the Venice Summer Institute of CESifo (July 2002), that basically arrives to the same conclusions.

2 The sources of banking fragility

Historically, banks started as money changers. This is testified by etymology. "Trapeza", the Greek word for a bank refers to the trapezoidal balance that was used by money changers to weigh the precious coins. Similarly 'banco' or 'banca', the Italian word for a bank, refers to the bench used by money changers to display their currencies. Interestingly, this money changing activity naturally led early bankers to provide also deposit facilities to merchants using the vaults and safes already in place for storing their precious coins. In England the same movement was initiated by goldsmiths. Similarly, some merchants exploited their networks of trade-posts to offer payment services to other merchants, by transferring bills of exchange from one person to the other instead of carrying species and gold along the road. In both cases, early bankers realised very soon that the species and gold deposited in their vaults could be profitably reinvested in other commercial and industrial activities. This was the beginning of the fractional reserve system in which a fraction of demandable deposits are used to finance long term illiquid loans. This is represented below by this simplified balance sheet of a representative bank.



As long as the bank keeps enough reserves to cover the withdrawals of the depositors who actually need their money, which is much less than the total amount of the deposits, the system can function smoothly and efficiently. But this system is intrinsically fragile. If all depositors demand their money simultaneously, as they are entitled to (the situation is referred to as a bank run) the bank is forced to liquidate its assets at short notice, which may provoke its failure.[2] Whereas bank runs are often inefficient, bank closures are also necessary in order to eliminate inefficient institutions. Such closures correspond to what are known as fundamental runs, where depositors withdraw their money because the banks assets are revealed to be bad investments. This Darwinian

[2] A spectacular example of a bank run occurred in October 1995 in Japan where the Hyogo Bank experienced more than the equivalent of USD 1 billion withdrawals in just one day.

mechanism is useful to eliminate unsuccessful banks and incentivise bankers to select carefully their investments. But, unfortunately, bank runs can also happen for purely speculative reasons. A recent example of a speculative run occurred in 1991 in Rhode Island in the USA, where a perfectly solvent bank was forced to close after the TV channel, CNN, used a picture of this bank to illustrate a story on bank closures, which led the bank's customers to believe the bank was insolvent, whereas it was not.

As we will see, small depositors are now insured in many countries, which means that the modern form of a bank run is more what is called a silent run, where professional investors stop renewing their large deposits, or Certificates of Deposits as they are called, which is the case for example in the Continental Illinois failure in 1984 in the USA.

The mechanism of a speculative run is simple. If each depositor anticipates that other depositors are going to withdraw en masse then it is their interest to join the movement, even if they know for sure that the bank's assets are fundamentally safe. Given that these speculative runs are seriously damaging to the banking sector, several mechanisms have been elaborated to eliminate those speculative runs. The first example was the institution of a lender of last resort.

3 The lender of last resort

The lender of last resort, which consists of emergency liquidity assistance provided by the central bank to the bank in trouble was invented, so to speak, in the UK and the doctrine was articulated in 1873 by the English economist Walter Bagehot, elaborating on previous ideas of Henry Thornton. Bagehot's doctrine was influenced by the systemic crises that followed the failure of Overend & Guerney and Company in May 1866. Overend & Guerney was at the time the greatest discounting house, that is a broker of Bills of Exchange, in the world. During the previous financial crisis of 1825 it was able to make short loans, i.e. provide liquidity assistance to most of the banks on the London place and it became known as the bankers' banker. After the death of its founder, Samuel Guerney in 1856, the company was placed under less competent control. Experiencing big losses on some of its loans it was forced to declare bankruptcy in May 1866 with more than UKP 11 million in liabilities. As a result of this failure, many small banks lost their only provider of liquidity and were forced to close as well, even though they were intrinsically solvent. In order to avoid such crises, Bagehot recommended that the Bank of England be ready to provide liquidity assistance to individual banks in distress. The main points of Bagehot’s doctrine were that the central bank should a) lend only

against good collateral, so that only solvent banks might borrow, and that the central bank would be protected against losses; b) lend at a "very high" interest rate so that only "illiquid" banks are tempted to borrow and that ordinary liquidity provision would be performed by the market, not by the central bank; and c) announce in advance its readiness to lend without limits in order to establish its credibility to nip the contagion process in the bud. The doctrine was first put into application by the Bank of England in the Baring crisis of 1890. It was then adopted in continental Europe, resulting in the absence of a major banking crisis for more than 30 years. In the USA, prior to the creation of the Federal Reserve System in 1913, commercial banks organised a clearing house system which served as a private lender of last resort for several decades.

Among more recent examples where Bagehot's doctrine was followed to the letter are the Bank of New York case of 1985 and the second Barings crisis in 1995. On 21 November 1985 the Bank of New York experienced a computer bug. It was a leading participant in the US Treasury bond market and the computer had paid out good funds for the bonds bought by the bank, but would not accept cash in payments for the bonds sold. This quickly led to a USD 22.6 billion deficit. Even if there was no doubt about the solvency of the Bank of New York, no single bank was in a position to cover such a huge deficit by an emergency loan. Similarly there was not enough time to organise a consortium of lenders. So the New York Fed solved the problem by providing an emergency loan against good collateral.[3] Similarly, on 24 February 1995, Barings (once again!) made it known to the Bank of England that its securities subsidiary in Singapore had lost USD 1.4 billion, three times the capital of the bank, due to the fraudulent operation of one of its traders.[4] The Bank of England decided that, since bilateral exposures were relatively limited and the source of Barings failure was a specific case of fraud, the threat of contagion in the UK financial system was not large enough to justify the commitment of public funds. As a result the bank failed on 26 February. However, the Bank of England clearly made public its willingness to provide adequate liquidity to the UK banking system in case of a market disturbance and, as matter of fact, the announcement itself was enough to avoid any such disturbance.

It is interesting to notice that in these two episodes the intervention of the central banks was triggered by different types of situations. It was a failure of the market to provide liquidity assistance to a solvent bank in the case of the Bank of New York, and in the Barings case, it was a desire to provide liquidity support to the market, and more specifically to the bank, that might have been

3 This account is drawn from Goodhart (1999).

4 This account is drawn from Hoggarth and Soussa (2001).

affected by the closure of a major participant. However, in both cases Bagehot's doctrine was followed and tax payers' money was not involved. This is unfortunately not always the case. There are indeed several reasons why the central bank might consider supporting insolvent institutions. The first is systemic risk, i.e. the fear that the failure of a large institution might propagate to the rest of the financial system. Given that the central bank is typically responsible for the overall stability of the financial system, it is conceivable that it considers assisting large insolvent institutions whose failure might propagate to other banks. This reason was invoked on several occasions, for example in the bailout of Johnson Matthey Bankers by the Bank of England in 1984, even if the BOE waited for more than a year before organising a consortium. A similar case is that of Continental Illinois in the USA, also in 1984. Incidentally, the bailout of Continental Illinois (which effectively amounted to subsidizing the bank's shareholders and uninsured depositors with taxpayers' money) led to the unfortunate notion of a bank that would be "too big to fail".

A second reason why insolvent banks might be bailed out is political interference. Let me take as an illustration the case of my own country, France, where it is interesting to contrast two episodes. The first episode corresponds to the failure in 1988 and 1989 of two Franco-Arab banks, Al Saudi Bank, and Kuwaiti-French bank, who were essentially recycling petro-dollars in loans to developing countries. They experienced important losses on their lending portfolios. The Bank of France decided not to intervene and the two banks were forced to close. By contrast the largest French bank at the time, the Credit Lyonnais, whose slogan was ironically "The Power to Say 'Yes'", started in 1988 a disastrous policy of bad investments which initially resulted in a spectacular increase of the size of its total balance sheet (30 percent in two years) and a 200 percent increase of its industrial holdings. However, very soon, heavy losses materialised: the equivalent of USD 0.3 billion in 1992, USD 1.2 billion in 1993 and USD 2 billion in 1994. After some time the French government felt compelled to intervene. The total cost of the three successive rescue plans that were implemented was estimated to USD 25 billion which, in per capita terms, is of the same order of magnitude as the total cost of the saving and loan crisis in the USA. A similar situation occurred in Japan during the Jusen crisis in 1995–99. Jusens were non-deposit taking subsidiaries of banks, created to provide affordable home financing for individual borrowers. The frenetic lending activity of these institutions contributed to the building up of the Japanese real estate bubble. When this bubble burst in 1995 the Japanese authorities had to inject the equivalent of USD 24 billion in order to avoid a collapse of the Japanese financial system. Japanese banks are also famous for several spectacular episodes of fraud. For example, in 1990 it was disclosed by Daiwa Bank that a security trader in its New York branch had been able to conceal a cumulative loss of USD 1.1 billion on the US Securities over 11 years. Simi-

larly, in 1996 Sumitomo acknowledged that one of its copper traders was responsible for fraudulent transactions that amounted to a cumulative loss of USD 1.8 billion over ten years.

Let me now turn to two other fundamental mechanisms of public intervention in the banking sector, namely deposit insurance and solvency regulations.

4 Deposit insurance and solvency regulations

In the USA the first federal deposit insurance fund was created in 1934,[5] when the FDIC was set up in order to prevent bank runs and to protect small and unsophisticated depositors. The initial coverage was USD 2,500 but it was gradually increased to the present figure of USD 100,000. In the UK the system is less generous, its coverage is only limited to 75 percent of the first USD 20,000. In continental Europe deposit insurance has long been implicit in the sense that losses were often covered ex-post by tax payers' money or by a compulsory contribution of surviving banks, what the Bank of France used to call "solidarité de place". A European Union directive of 1994 requires a minimum harmonisation among member countries, with the implementation of explicit deposit insurance systems having a minimum coverage of 20,000 euros, funded by risk based insurance premiums. It has been argued that these deposit insurance systems were partly responsible, paradoxically, for the fragility of the banking system, whereas in fact they were imagined, or designed, exactly for the opposite purpose. Several studies of the IMF tend indeed to show that countries that have implemented such systems are more likely to experience banking crises, surprisingly. The proposed explanation is that in such countries bankers feel free to take excessive risks, given that their insured depositors are not concerned by the possibility of a failure of their bank, since they are insured in all cases. In the absence of a deposit insurance system, like is the case in New Zealand, for example, bankers are disciplined by the threat of massive withdrawals when depositors become aware of any excessive risk taking by their bank. The doctrine in New Zealand since December 1994 is thus "freedom with publicity". Banks are not really supervised but are only required to disclose detailed information on their accounts to their customers, and bank directors are personally liable in case of false disclosure statements.

In most other countries the reaction to banking crises has been on the contrary, to reinforce banking regulations and in particular solvency regulations. This started at the international level where the Basel Committee of Banking Super-

[5] State deposit insurance funds were created much earlier, starting in 1829 (New York State). For a good history of deposit insurance in the USA, see FDIC (1998).

vision enacted in 1988 a regulation requiring a minimum capital level of 8 percent of risk weighted assets for international active banks of the G10 countries. The different weights were supposed to reflect the credit risk of the corresponding assets. This regulation was later amended to incorporate interest rate risk and market risk. It was also implemented with small variations at the domestic level by the banking authorities of several countries. In particular in the USA, the reform of the Federal Deposit Insurance Corporation system introduced an important notion, that of prompt corrective action which is some form of gradualism in the intervention of supervisors in order to force them to intervene before it is too late. This is based on a full set of indicators known as CAMELS Ratings.

Let me now discuss the justifications for these solvency regulations, which are essentially two fold. First, they provide a minimum buffer against losses on bank's assets and therefore decrease their probability of failure. The second justification is to provide incentives to bank stockholders to monitor the bank manager more closely, because these stockholders have more to lose in case of failure. This was the spirit of the Basel Accord of 1988 which was however severely criticised for being too crude and encouraging regulatory arbitrage by commercial banks. It was argued in particular that it was responsible for a credit crunch in the 1990s because banks found it profitable to substitute government securities to commercial and industrial loans in their portfolios of assets.

5 Lessons from recent crises

Let me try to draw some lessons from the crises of the last 25 years, which have provided very useful evidence for research. Economists have examined several questions. For example, the evaluation of the social cost of these crises is not easy. Hoggarth et al. (2001) criticise the use of fiscal costs, that is the amount transferred from taxpayer to creditors of failed banks, as a true measure of the economic cost of banking crises. Indeed those fiscal costs are more a transfer than an aggregate cost to society. So they propose instead to evaluate the output loss, i.e. the amount of wealth that would have been provided or produced in the country in the absence of a crisis. They find that this estimated output loss is large, around 15 to 20 percent of the annual GDP and even larger in the case of a twin crisis, that is to say a currency crisis occurring simultaneously with a banking crisis. This confirms previous studies of Kaminsky and Reinhardt (1996, 1999) who also show that a different pattern seems to emerge in, respectively developed countries and developing countries. In developed

countries, banking crises alone are already very costly whereas in developing countries it seems that the cost is significant only in the case of a twin crisis.[6] Other economists, like Bell and Pain (2000) or Davis (1999) have tried to establish common patterns of banking crises and derive indicators for predicting those crises. Davis argues in particular that the East Asian crisis that started in 1997 exhibited features very similar to earlier crises in Scandinavia or Japan, namely vulnerability to real shocks, such as export price variations and foreign currency exposure. However, the East Asian crisis had very little impact on the securities market of the OECD countries by contrast with the Russian crisis of August 1998. The reason seems to be that the moratorium on Russian public debt generated an unwinding of leverage positions on US Treasury markets – USD 80 billion for LTCM alone, more than USD 3,000 billion for commercial banks altogether. By contrast, the Asian crisis only resulted in bank runs instead of affecting markets and so the consequence was only failure of several domestic banks.

Also, economists have tried to assess the characteristics of banking systems that were more likely to be associated with a large probability of crisis or a large cost of resolution. Honohan and Klingebiel (2000) show in particular that pre-crisis provision of liquidity support, which is often used by governments to delay the recognition of a crisis is the most significant predictor of a high fiscal cost, once the crisis erupts.

Finally, the Scandinavian banking crisis (1988–93) was much more dramatic in Finland and to a lesser extent in Norway than in Sweden. The common causes were the deregulation of financial markets, an economic boom and an asset market bubble (accompanied with a spectacular increase in USD denominated foreign debt) followed by a real shock. In the case of Finland it was the collapse of the Soviet Union. After the rise in European interest rates in 1989, Finland and to some extent other Nordic economies, faced a serious competitiveness problem partly due to their indebtedness. An attempt to defend fixed exchange rates led to very high interest rates and deflation. The final result in Finland was a massive devaluation, followed by an asset bubble burst. Some large commercial banks and the entire saving bank sector had to be taken over by the government. Non-performing assets were separated and transferred to a bad bank. Public support to all of the banks was provided, but the stockholders of the banks were not expropriated and some managers remained in charge. As a result the cost was huge, of the order of 8 percent of GDP.

If you compare with Norway (it is even more compelling in the case of Sweden) the causes were the same as in Finland except that the real shock was

[6] For a thorough analysis of currency crises and international financial architecture see Tirole (2002).

more an oil price decrease than the collapse of the Soviet Union as for Finland. But the symptoms were similar: three large commercial banks and two regional saving banks had to bailed out by public funds because they incurred large losses on their loan portfolios, and as a result became under-capitalised. But the Norwegian government was tougher: it injected money only in exchange for drastic reduction in loan portfolios, import and cost cuts, and shareholders were fully expropriated, which was not the case in Finland. Of course the shareholders of failed Norwegian banks later required compensation arguing that the banks were not actually closed, but they lost the case. Bank managers and directors were almost systematically replaced and as a result the cost of the crisis was much smaller, less than 3 percent of GDP.[7]

6 The future of banking supervision

Let me now conclude by trying to assess the possible future of banking supervision, starting with the remark that the traditional approach to banking supervision was very paternalistic. In the 1960s and 1970s, banks were in many countries protected from competition through entry restrictions and price controls, in exchange for accepting to follow the detailed prescription of supervisors. This quid pro quo between banks and governments is not viable anymore, for several reasons.

First of all, globalisation and deregulation have made competition very fierce, in particular by non-banks, i.e. firms that are not regulated. Also, the increased complexity of financial markets and banking activities implies that supervisors are not any more in a position to monitor closely the activities of all banks. This feature is illustrated by the failure of the Basel Committee to impose the standardised approach to market risks. Instead, the Committee was obliged to accept that large banks use their own internal models. It is expected that in the future few banks will follow the standardised approach, since they will probably prefer to use one of the models developed by the large banks.

The proposed reform of the Basel Accord is supposed to rely on three "pillars". The first pillar is a refined capital requirement with very complex weights, designed to be more in line with market assessments of risks. The second pillar is a more pro-active role of banking supervisors, and finally the third pillar is an increased recourse to market discipline. The problem is that supervisors have a general tendency to interfere too much when the banks are well run and intervene too less when the banks have problems. Too much

[7] The rebound of oil price due to the Gulf war may also have helped the crisis resolution. I thank Jon Danielson for this remark.

attention in my opinion has been devoted to the first pillar, namely the design of a very complicated system of risk weights. In my opinion it is not the job of the regulators to tell the banks what they have to do when they are not in trouble. On the contrary, their job is to take care of ailing banks. Thus, I believe more attention should be devoted to the two other pillars of Basel II, namely supervision and market discipline. In particular, it should be stated precisely when and how supervisors will intervene and which instruments should be used to generate market discipline. Several US economists, for example Calomiris (1998) and Evanoff and Wall (2000), have proposed such an instrument, namely compulsory subordinated debt. Without going into the details, let me just mention why subordinated debt can sometimes be a good instrument for generating market discipline. It can indeed provide direct market discipline since the cost of issuing new debt increases when the risk profile of the bank increases. Thus, if the bank is forced to issue subordinated debt on a regular basis, it will have incentives not to take too much risk. But there is also indirect market discipline because the price of subordinated debt in secondary markets decreases when the risk of failure of the bank increases. So the secondary market price of subordinated debt provides additional information to the regulator on the perceived risk of failure of the bank. But the real concern is supervision, not regulation. One needs to be sure that supervisors impose corrective measures or even close the bank before it is too late. The core of the problem is that any bank is always worth more alive than dead. This is so in particular because the informational capital of the bank is lost in case of a closure. So, even a competent and benevolent planner would always find preferable ex-post to provide liquidity assistance to a bank in distress. But of course, if this is anticipated by bankers ex ante, this can be the source of moral hazard. Proper incentives can only be provided if stockholders and top managers are truly expropriated in case of problems, like the Norwegian case is a good illustration. Empirical evidence on the resolution of bank defaults suggests that failed banks are more often rescued than liquidated. For example, Goodhart and Schoenmaker (1995) show that the effective methods of resolving banking problems vary a lot from country to country, but in most cases they result in bail outs. Out of a sample of 104 failing banks, Goodhart and Schoenmaker find that 73 resulted in rescue and only 31 in actual liquidation.[8] This is confirmed by other studies. For example, Santomero and Hoffman (1998) show that in the USA the discount window, that is the lender of last resort facility, was often used improperly to rescue banks that subsequently failed. So market discipline can be useful in two respects: by directly penalis-

[8] The "Purchase and Assumption" method, whereby the failing bank is merged with a safe bank is often used in the USA. This allows to some extent a preservation of the failed bank's "informational capital".

ing the banks who take too much risk without the need for an intervention by supervisors; by indirectly providing new objective information, like private ratings, interest rate spreads or secondary prices of debt that can be used by supervisors. But market discipline can also be dangerous. In particular, market prices become erratic during crises and diverge from fundamentals. Coordination failures may occur between investors whereby each of them has a good and justified opinion of the solvency of a given bank but refuses to buy its subordinated debt because it anticipates that other investors will not lend to the bank. This is what game theoreticians call self fulfilling prophecies. The theoretical analysis of this was done by Morris and Shin (1998) for currency crises and later Rochet and Vives (2002) developed an extension for banking crises.

But there are other dangers of market discipline. For example, it is proposed by the reform of the Basel Accord to condition capital requirements on private ratings. But can we really trust rating agencies? They often have less information than the supervisors and sometimes even less than other banks. Secondly, the market for ratings is not really competitive and conflicts of interests between auditing and consulting activities may occur as was exemplified by the recent Enron-Andersen case. Finally, market discipline can be the vehicle for contagion. It could be a good disciplining device during good times, in particular subordinated debt, but it can also be the source of systemic risk during crises.[9]

However, the main difficulty is to obtain credibility of regulation and to get rid of political pressure on banking supervisors; The source of this difficulty is not only corruption and regulatory capture, but more fundamentally the absence of commitment power of governments. It is a classical time consistency problem, that is even more severe in the case of democracies than in the case of corrupt regimes. I therefore argue in favour of independence and accountability of banking supervisors like has been done for monetary policy. So, instead of discretionary power given to bank supervisors, sometimes referred to as constructive ambiguity proposal, I advocate in favour of an explicit mandate given to banking supervisory agencies. This is of course difficult to design and is a challenge for further research. For example, it would be useful to define objective criteria for deciding when a bank has to be bailed out for systemic reasons; and also how to organize ex-post accountability with sanctions on supervisors if they don't perform well.

To summarize, I believe the main reason behind the frequency and magnitude of recent banking crises is not deposit insurance, is not bad regulation, is not

9 A theoretical analysis of this is provided in Rochet and Tirole (1996).

incompetence of supervisors. It is essentially the commitment problem of political authorities who are likely to exert pressure for bailing out insolvent banks. The remedy to political pressures on bank supervisors is not to substitute supervision by market discipline, because market discipline can only be effective if absence of government intervention is anticipated. So, the crucial problem is credibility of political authorities and the way to restore this credibility is to ensure independence and accountability of bank supervisors. More work needs to be done for specifying the precise institutional reforms that are necessary to achieve this goal.

References

Bell J. and D. L. Pain (2000), "Leading Indicator Models of Banking Crises: A Critical Review", *Financial Stability Review*, December, Bank of England.

Calomiris, C. (1999), "Building an Incentive Compatible Safety Net", *Journal of Banking and Finance* 23(10), 1499–1519.

Caprio G. and D. Klingebiel (1997), "Bank Insolvency: Bad Luck, Bad Policy or Bad Banking?", in: M. Bruno and B. Pleskovic (eds.), *Annual World Bank Report* IBRD, Washington.

Davis, E. P. (1999), "Financial Data Needs for Macroprudential Surveillance", *Lecture Series* (2), Bank of England.

Evanoff D. D. and L. A. Wall (2000), "Subordinated Debt as Bank Capital: A Proposal for Regulatory Reform", *FRB of Chicago Review* 24(2), 40–53.

FDIC (1998), *A Brief History of Deposit Insurance in the USA*, http://www.fdic.gov/bank/historical/brief/brhist.pdf.

Goodhart, C. (1999), "Myths About the Lender of Last Resort", *FMG special paper* 120, London: London School of Economics.

Goodhart, C. and D. Schoenmaker (1995), "Institutional Separation between Supervisory and Monetary Agencies", *FMG Special Paper*, London: London School of Economics.

Hoggarth G. and F. Soussa (2001), "Crisis Management, Lender of Last Resort and the Changing Nature of the Banking Industry", in: R. A. Brealey et al. (eds.), *Financial Stability and Central Bank* – A Global Perspective, London und New York: Routledge, CH. 6.

Hoggarth G., R. Ries and V. Saporta (2001), "Costs of Banking System Instability: Some Empirical Evidence", *FSR*, Summer, Bank of England.

Honohan P. and D. Klingebiel (2000), *Controlling Fiscal Costs of Banking Crises*, mimeo, World Bank.

Kaminsky G. and C. Reinhardt (1999), "The Twin Crises: The Causes of Banking and Balance-of-Payments Problems", *American Economic Review* 89(3), 473–500.

Lindgren, C. J., G. Garcia and M. Seal (1996), *Bank Soundness and Macroeconomic Policy*, Washington DC,: IMF.

Morris S. and H. Shin (1998), "Unique Equilibrium a Model of Self-Fulfilling Currency Attacks", *American Economic Review* 88, 587–597.

Quintyn, M. and M. Taylor (2002), "Regulatory and Supervisory Independence and Financial Stability", *IMF discussion paper*.

Rochet, J. C. (2004), *Why Are There So Many Banking Crises?*, Oxford University Press (forthcoming).

Rochet J. C. and J. Tirole (1996), "Interbank Lending and Systemic Risk", *Journal of Money Credit and Banking* 28(4), 733–762.

Rochet J. C. and X. Vives (2002), "Coordination Failures and the Lender of Last Resort: Was Bagehot right after all?", *FMG discussion paper*, LSE, London UK.

Santomero A. M. and P. Hoffman (1998), "Problem Bank Resolution: Evaluating the Options, Financial Institutions", *working paper*, the Wharton School, University of Pennsylvania.

Tirole, J. (2002), *Financial Crises, Liquidity and the International Monetary System*, Princeton: Princeton University Press.

On the Feasibility of Risk Based Regulation

Jón Daníelsson*

Abstract: *Risk based regulation has emerged as the primary ingredient in the Basel-II proposals, where a bank capital is to become a direct function of a bank's riskiness. While the notion that bank capital be risk sensitive is intuitively appealing, the actual implementation, in the form of Basel-II, carries with it a host of potentially perverse side effects. Basel-II may increase financial risk, both for individual institutions and the entire banking system, and hence promote financial instability. This can happen, e.g., due to the endogenous nature of risk.* (*JEL* G2)

1 Introduction

Over time, financial regulation has evolved considerably, from lending of last resort[1] approach to deposit insurance and activity restrictions.[2] The latest fashion in banking regulation is *risk based regulation* which is a system whereby a bank's minimum capital is determined by a sophisticated risk model, operated within the bank, and audited by the supervisors. This idea is at the heart of the Basel-II Proposals. It is beyond the scope of this paper to discuss the rationale for banking regulation in general. The history of bank failures and their economic cost suggests that some form of regulation is inevitable. My interest here is to explore the twilight zone of Basel-II, in particular the financial economic context of the Proposals, their scope for effectiveness and any potential side effects.

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1 Lending of last resort (LOLR) was proposed by Bagehot (1873) and first used in the rescue of Barings in 1890. LOLR depends on the central bank providing liquidity to financial institutions in crisis. As a such, it can be very effective in preventing the spread of contagion if used properly. Of course, LOLR inevitably implies moral hazard as well.

2 Deposit insurance was set up to prevent crisis by reinforcing public confidence in the banking systems. Deposit insurance however carries with it its own baggage of problems, and its dual use for consumer protection has proved to be especially problematic. Activity restrictions refers to regulators deciding what activities financial institutions can be engaged in. Along the way banking regulation have added e.g. solvency requirements, minimum capital, and supervision.

Banking regulations have traditionally been designed and implemented on a local or national level. The fall of Bankhaus Herstatt in 1974 and Banco Ambrosiano in 1982, however, served as a reminder that banking is an international business, where international coordination is necessary for supervision to be effective. The absence of international cooperation can amplify the impact of individual failures, as it did in the Herstatt case. Herstatt and Ambrosiano prompted new thinking in banking regulation, with the Basel Committee (BC) on Banking Supervision given the role of formulating capital adequacy rules, culminating in the 1988 Capital Accord, setting minimum capital at 8 percent. 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. In 1996, the Basel Committee proposed an amendment to the original Accord suggesting the use of internal models for the measurement of market risk. 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, with liquidity risk perhaps to follow.

Risk based regulation is based on the premise that the regulatory treatment of individual banks reflects 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. The objective of these regulations is more macroprudential than microprudential in the terminology of Crockett (2000). In specific implementations the supervisors require financial institutions to measure and aggregate their risks and report some of this risk to the authorities and the financial community. Basel-II suggests a particular interpretation of risk based regulation by means of its three pillars; *minimum capital requirements*, the *supervisory review process*, and *market discipline*. 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 banks design their own (supervisory approved) risk models.

On the face of it, the concept of risk based regulation is very appealing. Some banks have successfully applied sophisticated risk models in their internal operations, and much would be gained if others did the same. After all, bank failures are costly, and impose significant externalities on the economy (e.g. Honohan and Klingebiel, 2002), and in many cases are contagious, as a single institutional failure triggers a domino effects in bank failures.

But beauty is only skin deep, and the Basel-II Proposals have perhaps received more criticism than the Basel Committee and other proponents expected.[3] Most of the criticism of Basel-II originates from lobbying by individual banks and other special-interest groups. However, the Proposals have received more fundamental criticism, expressed both in the official comments as well as subsequent papers. This criticism ranges from doubts about the statistical models advocated in Basel-II, to financial economic analysis of the implications of Basel-II. In this paper I focus on two criticisms of Basel-II:

A Procyclicality: The potential for procyclicality is downplayed, both in the actual Proposals as well as public statements by supervisors. Recent financial economic research suggests that the possibility of vicious feedback loops between prices, volatility, and liquidity is considerable in times of crisis, and that the current Basel-II proposals may actually amplify these vicious feedback loops.

B Statistical Measurement of Risk: The Proposals place considerable faith in the ability of statistical models to accurately measure risk. ("Banks are pretty well able to price credit risk" Crockett, 2003) However, recent methodological advancements, e.g., coherent risk measures and nonlinear dependence, cast considerable doubt on the accuracy of measured risk.

While the proponents of Basel-II sometimes acknowledged some of these criticisms, the common rejoinder is that banks are too important to be left unregulated and that Basel-II is the best regulatory mechanism on offer. I think such comments are shortsighted. A criticism of Basel-II does not imply that banks should not be regulated, indeed, while banking regulations are probably inevitable, it is important to make sure they are effective without imposing too many burdens on the institutions themselves. This is the test that Basel-II fails. The financial system is a complex organism, comprising of a large number of individuals making decisions. This implies that the financial system, especially in the aggregate, is not easily amiable to be described by a set of engineering equations describing risk. Such modelling of risk is much akin to the old-style Macro models where the entire economy was described by a relatively small number of equations. As demonstrated by *rational expectations*, a key flaw in the old-style macro models is that they are not invariant under observation. The same flaw applies to traditional risk models, implying that risk is endogenous.

An effective regulatory mechanism needs to take into account the possibility of procyclicality and incorporate recent advancements in the statistical modelling of risk. As the quotes below demonstrate, key banking supervisors dismiss

[3] Witness the official comments "The New Basel Capital Accord: Comments received on the Second Consultative Package", currently at www.bis.org/bcbs.cacomments.htm.

such criticism, but it is revealing that the propensity for procyclicality is rejected out of hand without any evidence. Hence, the basic criticism stands. It would be much better if the Basel Committee acknowledged that the world is more complex than assumed by Basel-II, and incorporate risk endogeneity and non-linear dependence into the Capital Accords.

2 On the nature of financial risk and decision making

Suppose before leaving your house you note that the weather forecast reports a high probability of rain, and as a consequence you carry an umbrella. You are therefore hedging against rain. Perhaps other people make the same observation and also carry the rain hedge. In spite of this, the probability of rain does not change; the probability of rain is *exogenous* to the decision-making process.

Alternatively, suppose that after checking the financial news in the morning you reach the conclusion that risk in the markets has increased which in turn prompts you to hedge against this risk. In doing so you have an infinitesimal effect on the statistical properties of market prices. If somebody else reaches the opposite conclusion, i.e., that risk is decreasing, perhaps the effects of both of your trading strategies cancel each other out. If however this person agrees with you, then the impact on the statistical properties of market prices is even higher. If a significant number of people reach the same conclusion, the impact on market prices could be substantial. In other words, in contrast to the weather, market prices are *endogenous* to the decision-making process, implying that hedging and risk based regulations have the potential to be procyclical.

Recent research has studied the heterogeneity in bank behavior, addressing such issues as the impact of risk constraints and risk regulations on the statistical properties of market prices. The focus of this research is not on average or typical market conditions but instead on financial crisis. Two such research agendas are the global games model of Morris and Shin (1998, 1999) and the constrained general equilibrium model of Danielsson and Zigrand (2003).

2.1 Global games and endogenous prices

The idea that investors not only react to economic fundamentals dates back to the very beginning of modern economic analysis. An interesting take on this is provided by Keynes (1936, General Theory, pp. 156):

> "professional investment may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole"

Morris and Shin (1998, 1999)[4] (MS) formalize this idea where they surmise that economic agents do not play *a game against nature* but instead a game against nature and other agents, simultaneously.

The key innovation of MS is in identifying a model where one equilibrium, and thus one price, characterizes the model solution. This unique equilibrium emerges because agents use *switching strategies*, where agents change positions depending on their view of the fundamentals and each other.

In their model, in the minds of market participants, market fundamentals vie with the opinions of other market participants as a guide to investment strategy. Each agent makes a decision based on his view of the fundamentals, where he also explicitly considers that other agents are doing exactly the same. In this case, the actions of various market participants become mutually reinforcing. However, while most information is common to all market participants, some is not. This can happen because the sheer volume of information is so overwhelming that no single agent can absorb it. These assumptions lead to one equilibrium. MS tackle this problem with a unique theoretic device called *global games*.

The intuition behind the global games model can be demonstrated by analyzing speculative attacks on a currency. Suppose that some financial institutions regard a particular currency overvalued, and attempt to exploit this, perhaps by selling the currency in futures markets. If however other market participants do not share this opinion, the trading strategy may lead to losses. In contrast, if many or most other market participants agree, and execute similar trading strategies, this becomes a self-fulfilling prophecy, the currency becomes a subject to a speculative attack, possibly leading to a devaluation. In this case, a small change in the external environment can *trigger* a large and sudden change in the actions of market participants. For example, suppose exchange rates are at a particular level, a small remark by a government official can trigger an instant big change in exchange rates.

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[4] Heinemann (2000) shows was that when there is large noise, the exact distribution of the noise is important for the equilibrium outcome. When noise is small, there is always a unique equilibrium. Note that the statement by Jorion (2002, pp. 120) "Heinemann (2000), for example, has shown that the conclusions of Morris and Shin (1998), which are the basis for their more recent paper, can be overturned in a more general Model." is apparently based on misunderstanding. Moreover, Heinemann and Illing (2002) show that this solution can be obtained as an iterated dominance solution.

2.2 Surprising consequences of risk constraints

A related question is how imposing risk constraints on optimizing economic agents alters their behavior. Daníelsson and Zigrand (2003) (DZ) address this question in a general equilibrium model. Their model is a standard general equilibrium model, providing baseline results. They follow common modelling practice by endowing financial institutions with their own utility functions (such as in Basak and Shapiro, 2001). 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 different results than an unconstrained model, some of the implications of risk constraints are quite interesting.

The benchmark DZ model is a standard two period general equilibrium model with heterogeneous risk averse agents and noise traders. In the first period, agents have heterogeneous random endowments of a number of risky assets as well as a riskless asset. The risky assets provide normally distributed payoffs in the second period. The agents are also heterogeneous in risk aversion, and have CARA utility. The noise traders simply submit market orders. This in turn induces trading, price formation, and a price volatility level. Note that market clearing is assured. The benchmark economy results in first-best outcomes and hence has no externalities that merit regulation.

DZ consider systemic crisis to be an event where the entire financial system collapses, capturing an event where the real outputs of all assets drops to zero. A free-riding externality induces agents to disregard the eventual effects of their actions on the global system. The probability of a systemic crash increases along with imbalances in agents risk taking. This is a stylized way of capturing the domino effects resulting from the failure of extremely levered financial institutions. This gives rise to externalities because market participants do not internalize this domino effect into their optimization. Their notion of extreme risk taking increasing systemic risk is analogous to a Lucas (1978) tree asset economy.

In theory, this formulation of systemic crises would suggest some form of optimal regulation. DZ 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 on the benchmark economy obviously 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.

Compared to the benchmark economy, market prices and liquidity will be lower in the regulated economy with volatility and expected excess returns higher. This is reminiscent of the effect of portfolio insurance on optimal asset holdings found in (e.g. Grossman and Zhou, 1996; Basak and Shapiro, 1995; Gennotte and Leland, 1990). Note that the constraint in this case is different than in Basak (2002) explaining why his results are different.

Even if assets have independent payoffs, sufficiently binding regulations will cause some agents to adjust their risk position by scaling down their holdings in the risky assets, thereby introducing comovements. This effect will be most pronounced during financial crisis, introducing the potential for an endogenous increase in correlation. In their final result, DZ 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.

2.3 Incentives for effective risk management

Daníelsson et al. (2002) study the impact of risk based supervision on a financial institution's preference for alternative risk management systems. They model the bank as a principal-agent relation between a bank's board of directors (principal) and a dedicated risk manager (agent), where the bank is subject to risk regulation. They consider two alternative categories of risk management systems, one with *fine risk monitoring* and the other *with coarse risk monitoring*. These systems are based on the IRB and standard approaches, respectively.

They reach three main results. First, in the absence of regulatory supervision, financial institutions prefer the higher quality *fine* system, if the direct costs of such a system are sufficiently low. Second, the addition of regulation may cause the financial institutions to reverse this choice, i.e. financial risk regulation provides incentives for banks to implement a lower quality risk management system than they would in the absence of regulation. Finally, when the supervisor decides to affect the implementation of the system, he affects asset volatility and hence introduces procyclicality.

3 Risk is endogenous

Most, if not all, risk management models in operation are implicitly based on the assumption that financial institutions are price takers, i.e., the financial institution can measure the statistical properties of prices, and forecast some of these properties, but does not influence them. From the point of view of individual financial institutions, these assumptions are relatively innocuous, especially in times of stability. A fundamental assumption in these models is that they are backward looking, i.e., risk is forecasted and the models designed and tested with historical data. A good example of such methodology is value-at-risk, (see Appendix A for more details on VaR.). Indeed, such backward looking statistical models can provide a relatively accurate measures of risk, especially when advanced modelling techniques are employed, explicitly addressing non-normality and non-linear dependence. In day-to-day applications, such as pricing or hedging, assuming that prices are exogenous is typically a simplifying assumption in the modelling process, and incorporating endogeneity or liquidity risk may not be of much value. In this, the risk models resemble the old-style macro models of the 1950s and '60s, which were effectively put to rest by economic events in the '70s and rational expectations economics.

It is however important to recognize that risk is not exogenous and that the endogeneity appears at the worst moment, when markets are unstable or in crisis. It is of course this property of endogenous risk that makes it so hard to model because very few financial crisis are observed, and it is not possible to effectively model endgogeneity with statistical methods when markets are more stable. The nature of endogenous risk can be illustrated by real world examples, e.g., the 1987 crash, the 1998 Russia/LTCM crisis, and the 1998 yen/dollar carry trades.

3.1 The 1987 crash

No consensus exists about the causes of the 1987 stock market crash, and several plausible explanations have been advanced. Indeed, it is likely that several factors contributed to the crash. It is however clear, (e.g. Brady Comission, 1988; Shiller, 1987), that a major contributory factor to the 1987 crash was the

use of portfolio insurance for the dynamic replication of put options.[5] When the market was generally on the rise, executing these trading strategies was a simple matter, however, when the market started falling, everybody employing portfolio insurance had to execute similar trading strategies. Effectively, a large number of market participants were acting as one.

According to the Brady Commission, about USD 60–90 billion was in formal portfolio insurance, or about 3 percent of pre-crash market cap. On Oct 14 1987 (Wednesday) to Oct 16 (Friday) market decline was 10 percent, and sales dictated by dynamic hedging, were USD 12bn. while actual sales (cash + futures), were USD 4bn., implying substantial pent up selling pressure the next Monday.

Portfolio insurance implies using the option *delta* as a key part of dynamic hedging portfolio management. When the stock price falls, delta increases, and investors needs to either sell the stock or acquire more of the hedge to retain the insurance. Conversely, if the stock price increases the investors would sell the hedge and buy the stock. Therefore, portfolio insurance is a sell cheap – buy expensive trading strategy. During the crash, portfolio insurance contributed to the formation of a vicious feedback loop between prices, volatility, and liquidity. The recovery of the market soon after the crash implies that no fundamental factors were responsible.

3.2 The 1998 Russia/LTCM crisis

Endogenous risk also played a key role in the 1998 Long Term Capital Management (LTCM)/Russia crisis. A key LTCM trading strategy was *carry trades* and *convergence trades*, for example on the run-off the run treasuries. The success of LTCM attracted competition both from other hedge funds as well as the proprietary trading desks of commercial banks. As a result, spreads were narrowing, and LTCM was forced to venture into uncharted territory in search of profitable trades. One important bet made by LTCM was volatility, which was close to its historical high in the summer of 1998, and at its second highest monthly volatility since the great depression, after October 1987. Contrary to expectations, volatility did not decline, and in late summer LTCM was

[5] The actual causes of 87 crash are still controversial. In particular, empirical studies of the crash have met with limited success. Furthermore, Roll (1988, 1989) argues that (US) domestic explanations for the crash are not valid because of the international nature of the crash, i.e., all major markets experienced the crash at the same time. However, this argument ignores the price dominance the U.S. equity markets have over the rest of the world. By focusing on daily data, Roll's is affected by asymmetry in exchange opening hours, and the relative coarse granularity is observation frequency implies that it is impossible to observe causality patterns which are likely to happen intraday, and wash out in the daily aggregate.

extremely levered. It only took a small shock, i.e. the Russian default, to trigger the crisis. In a stylized scenario, whilst extremely levered, LTCM received margin calls, forcing it to unwind leveraged trades, causing prices to drop further, causing more distress, and more margin calls. A vicious feedback loop was formed because of the mutually reinforcing effect of de-leveraging. Furthermore, distress and margin calls entails increasingly short trading horizons. Was LTCM just hugely unlucky? What is the probability of experiencing the price moves seen in 1998? By looking at historical data prior to the crisis, it looks like LTCM was hit by "a perfect storm". However, by analyzing this from an endogenous risk point of view, the probability of the crisis was very high.

3.3 The Yen/Dollar carry trades in 1998

Related factors were at work in the yen/dollar crisis in 1998. Coming after the Asian crisis, Japanese interest rates were much lower than U.S. interest rates, while at the same time the Japanese economy was much weaker than the U.S. economy, implying that the yen could be expected to depreciate. This suggests a particular trading strategy, i.e., carry trades. Borrow yen at the low Japanese interest rate, exchange them into dollars and earn the higher U.S. rates. By this a speculator gains both on interest rate differential and the depreciation of the yen. This trading strategy was profitable in the first half of 1998 as the yen continued to depreciate. This situation was however unstable. A small appreciation in the yen led to margin calls for some speculators who had to reverse out of the strategy, buy yen and sell dollars leading to further appreciation of the yen, more distress, and more margin calls. A vicious cycle was formed.

3.4 Analysis

Both the theoretical analysis and the examples presented above suggests that it would be a folly to ignore endogenous risk. It might be relatively innocuous in stable market conditions to assume that prices are exogenous, however, it is important to recognize that the endogeneity of risk is always present, it is simply less visible when markets are stable. There are three main factors that determine the importance of endogenous risk:

(i) Diversity of beliefs

(ii) Diversity of actions

(iii) Length of horizon (leverage, regulation)

In normal market conditions the actions of market participants are sufficiently diverse for risk to be effectively exogenous. It is however in a crisis situation that price endogeneity becomes crucially important. At the onset of crisis market participants note the increase in risk (less diversity of beliefs), and hedge against it (less diversity of actions). At the same time risk limits and margin calls shorten the time horizon. These factors exasperate the crisis, reinforcing the actions of the market participants. In other words, a vicious cycle between prices, volatility, and liquidity is established.

4 Statistical properties of market prices

In analyzing the effectiveness of risk management systems and regulatory designs, it is important to consider the statistical properties of data generated by financial markets, e.g. risk clustering, fat tails, and non-linear dependence. Any risk model needs to incorporate these effects if it is to provide reliable answers. Furthermore, given the rapid development of statistical methods for measuring financial risk, sufficient flexibility needs to be built into the actual regulatory methodologies.

The key problem in modelling financial risk arises because risk is a latent process implying that it can't be measured directly, instead it has to be inferred incorrectly from market prices. Complicating this is the fact that models have to be designed and tested with historical data, indeed, given the need for backtesting were statistical accuracy dictates a sufficient number of "violations". Backtesting a VaR model at the 99 percent significance level requires more than 10 violations or thousand days (four years) of daily observations. Reserving one year for model estimation risk models implies that in general risk models are created with data that is more than five years old. Granger and Timmermann (2002) argue that searching for violations of market efficiency with old data and new technology is somewhat contradictory. I suspect the same might apply to financial risk because financial institutions are constantly improving their risk forecast models invariably affecting prices in the process.

The main stylized facts about financial returns are risk clustering, fat tails, and non-linear dependence.

4.1 Risk clustering

It is well known that financial returns have risk or volatility clusters, a property exploited by the Engle (1982) ARCH model. Unfortunately, volatility clusters are not regular, not only does the return data have long run clusters, spanning

years or decades (see Figure A1), it also has much shorter clusters spanning days. This implies that forecasting volatility is very imprecise, in some cases volatility forecasts appear to be as uncertain as the underlying returns data. Volatility models are highly dependent on the estimation horizon because the model parameters give the steady-state to which short-term shocks revert to. It is however in the forecasting of covariance matrices that volatility models become much more unreliable because the only way to estimate large covariance matrices is by using factor models, which effectively model the aggregate behavior and not the dynamic interactions between two assets. In addition, multivariate volatility analysis depends on a linear dependence, which is known not to hold for financial data.

4.2 Fat tails

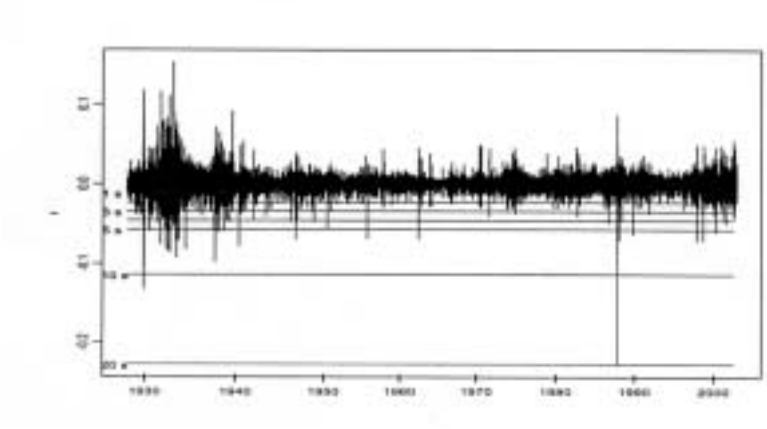
A key property of financial returns data is fat tails, implying that outliers or extreme events are much more likely than for normally distributed data with the same mean and variance. The difference between the actual return distribution and the normal distribution is substantial. Consider, e.g., Figure 1 which shows the daily S&P 500 return from 1929 to 2003. Superimposed on figure are the standard errors of the data. The largest one day drop is in 1987 which is 20 standard errors (sigmas) from the mean. Under the normal distribution a 20 sigma event occurs every 4×10^{88} days. In contrast, the earth is estimated to be about 10^{14} days old, and the universe 10^{17} days old. Similarly, a 5 sigma event under the normal distribution happens once every 3×10^{6} days or once in 10,000 years. The data sample contains about 30 5 sigma events since years. Similar results apply to other financial data.

This suggests that methods depending on volatility, either directly, or indirectly (like typical implementations of VaR) are bound to be unreliable.[6]

[6] Conditional volatility models do not generally perform well in forecasting the risk of extreme outcomes.

Figure 1

S&P-500 Index returns: 1928 to 2003 with superimposed sigma events



4.3 Non-linear dependence

The most important stylized fact about financial return data, at least from a supervisory point of view, must be non-linear dependence. Embrechts et al. (2000) identify three fallacies about financial data:

Fallacy 1 Marginal distributions and their correlation matrix uniquely determine the joint distribution. This is true for elliptical families, but wrong in general.

Fallacy 2 Suppose that we have VaR (X) and VaR (Y). Is the VaR of the sum VaR ($X + Y$) ≤ VaR (X) + VaR (Y)? This is true for elliptical families, but wrong in general (noncoherence of VaR).

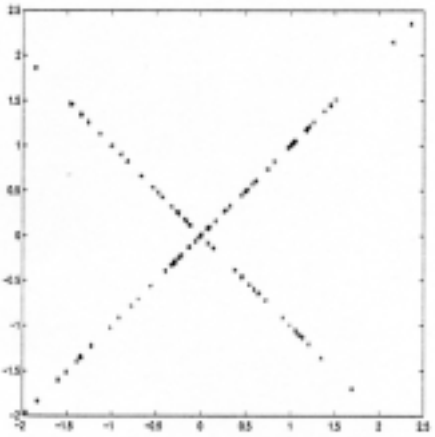
Fallacy 3 Small correlation of (X, Y) implies that X and X are close to being independent. This is true for elliptical families, but wrong in general, see Example 1.

Example 1 *Suppose we have 2 countries, with risk factors X and Y, respectively. Define the random variable Z ~ N(0,1) and the contagion generator* $U \sim UNIF\left(\{-1,+1\}\right)$, *Pr (U = – 1) = 1/2 = Pr (U = 1), and independent from Z. Let X = Z ~ N (0,1) and Y = UZ ~ N (0,1). It is clear that the two country risk factors X and Y are uncorrelated because Cov (X, Y) = E (XY) = E* (UZ^2) = $E(U)E(Z^2) = 0$. *Hence p(X,Y) = 0. However, X and X are strongly dependent:*

with 50 percent probability comonotone, with 50 percent countermonotone Note that X and Y are not jointly normally distributed. See Figure 2.

Figure 2

Contagion example



Financial data is in general non-linearly dependent, implying that linear measures of dependence, i.e., correlations do not show the full picture. For example, several studies have demonstrated that dependence is much stronger in the lower tail than in the upper tail, implying that when markets are generally increasing some assets increase in values whilst others decrease. In contrast, when markets are dropping, most assets fall together. As a result, correlations overestimate diversification effects when markets are rising and underestimate joint downside risk when markets fall.

Non-linear dependence further demonstrates the problem with relying on correlations in designing stress tests. Almost regardless of the marginal distributions, if different assets are linked together by linear dependence only, there is almost a zero probability of them falling together.

4.4 Analysis

Recently, much research on statistical risk measures has emerged, from theoretical, empirical, and practitioner points of view. Issues such as fat tails

and non-linear dependence are now widely understood, and risk models incorporate them whenever they can. Unfortunately, despite of all these risk modelling techniques, accurate risk measurements are as elusive as ever. The new models may provide accurate risk forecasts for historical data, but less so for future risk. There are many reasons for this, e.g., increased sophistication in financial products and trading systems, implies that risk models are always catching up. But the quality of risk forecasts depends very much on the risk level.

Modern models can now provide robust risk forecasts for relatively low risk levels, such as 90 percent or 95 percent, even up to the regulatory 99 percent. It is important to keep in mind that at a daily frequency these probabilities correspond to the worst outcome in two-weeks, one month, and five months respectively. From the point of view of internal risk management this may be sufficient.

However, the fact remains that a financial institution violating its 99 percent VaR has little bearing on its overall stability. Indeed, it is the extreme risk levels, the once a year event, or the once a decade event, that are relevant from a systemic risk point of view. Unfortunately, forecasting risk at those levels is somewhat challenging.

The presence of non-linear dependence in financial data is perhaps even more insidious than fat tails because non-linear dependence can be harder to detect and is more difficult to model than fat tails. The implications of non-linear dependence are however quite severe. It implies that financial institutions underestimate the joint risk of extreme outcomes, and that supervisors may underestimate systemic risk. Much discussion about dependence between different assets, portfolios, or institutions focuses on correlations. Unfortunately, correlations are an *average* concept, describing relationships in the typical situation. Financial crises are nothing but typical. Relying on the average measurement of dependence implies under appreciating downside risk in markets under stress. Hence, ignoring non-linear dependence provides a sense of false security.

5 Procyclicality and Basel

The Basel Committee has adopted these assumptions whilst designing Basel-II, in particular the idea that prices are exogenous. This implies that, banks are price takers, able to measure prices and risk, hedge against risk, but not affect the statistical properties of prices and risk in any way. There is, however, no *a priori* reason to believe that this is correct. For example, while each bank may be viewed as a price taker, in aggregate that is not true. If regulations make banks behave in a more similar way than before, prices can no longer be

viewed as exogenous, and a direct feedback loop from regulations to prices is established.

The intuition of the theoretical models discussed above cast considerable doubt over the validity of backward looking risk models as a regulatory tool. Suppose that observations on past market prices show nothing out of the ordinary, and as a result, risk models forecast business as usual. Furthermore suppose that some market participants believe a crisis is imminent, and that this view is spreading. If a sufficient number of financial institutions share this view, it becomes rational to act on it by altering the asset mix, hedging against downside losses, and selling risky assets. This in turn can be sufficient to actually trigger the crisis. In this case, backward looking risk models show nothing out of the ordinary, while the actual probability of a market crash steadily increases.

The primary causal effect is the harmonization of preferences that the crisis brings about, and the resulting herding behavior of market participants. The effects of this preference harmonization are especially important for volatility and liquidity, or as stated by Committee on the Global Financial System (1999) in the "five guiding principles for the design of deep and liquid markets" including "heterogeneity of market participants".

5.1 Other views on Basel-II

The complexity of the Basel-II is e.g. addressed by the General Manager of the BIS:

> "To the criticism of complexity, there are two answers. First, banking itself has become more complex. ... The second answer is that, for banks with straightforward business models and non-complex loan portfolios, the new accord really adds very little in the way of complexity." (Crockett, 2002)

Other supervisors appear to disagree with this view:

> "I have consistently expressed profound concern about the level of detail and specificity of the Basel proposal. In my view, the complexity generated in Basel-II goes well beyond what is reasonably needed to implement sensible capital regulation." (Hawke, 2003; Comptroller of the Currency)

These arguments for procyclicality are of course controversial. While I am not aware of many studies arguing that these arguments are wrong, some opposing

views have been expressed. Within the academic community Jorion (2002) states:

> "The 'vicious circle' argument for market risk charges, however, is being generalized to credit risk as a criticism of any risk-sensitive capital requirements. We should also note, however, that such criticisms fail to offer plausible alternatives. The history of failures in banking systems and enormous costs on the economy provides a powerful rationale for regulation. Having no capital requirement at all is not realistic." (Jorion, 2002)

At least two supervisors have expressed their disagreement with analysis of the type presented above:

> "First, the sophistication and structure of risk-management models vary widely. This point applies with full force to value-at-risk models in use at commercial banks, an area the Federal Reserve has some knowledge of through our supervisory oversight. Our examiners have observed that banks implement a common objective-measuring the value-at-risk of the bank's trading account in highly diverse ways. Given their early stage of development and the diversity with which they are implemented, the use of these models does not seem likely to create herding behavior.
>
> Second, other sources of diversity exist among financial firms, including differences in risk appetites, customer bases, and product lines. These additional sources of variation create considerable heterogeneity in financial firms' trading strategies, in their risk-taking, and in how they respond to market shocks.
>
> Finally, ... risk models are never likely to be the dominant driver of the actions of financial firms and are therefore unlikely to generate significant herding behavior." (Ferguson, 2002; Vice Chairman of the Board of Governors of the Federal Reserve System)
>
> "A second criticism is that the new accord might reinforce procyclicality in financial behaviour. ... A first point to make in response to this criticism is that procyclical behaviour of this type is endemic to financial systems, and not simply the result of regulatory requirements. Of course, it is important that regulation does not inadvertently amplify the economic cycle. Several approaches can help here, and have been incorporated by the Basel Committee. Firstly, it can be made clear that minimum capital requirements are just that – minimum requirements. ...

> Second, capital requirements under Pillar I of the accord should not be applied blindly or mechanically. ... Third, it is desirable to use measures of credit risk that are not excessively vulnerable to short-term revisions." (Crockett, 2003; The General Manager of the Bank for International Settlements

These responses fall roughly into three categories. Jorion argues that Basel-II is better than having no regulation, while Ferguson refers to Fed evidence of banks being really heterogeneous, and stating that risk models are not all that important anyway, a view echoed by Crockett who argues that Basel-II only specifies minimum capital, and that intelligent implementations and risk measurements have already been incorporated by the Basel Committee. Of these comments, only Ferguson provides any tangible evidence when he refers to the experience of Federal Reserve bank examiners.

It would be much better if more concrete evidence against the procyclicality argument was available, perhaps financial economic research or statistical evidence. Unfortunately, the supervisors have not done so yet, casting some doubt on their criticism of procyclicality.

Indeed, I remain unconvinced by statements such as

> "Overall, it is fair to conclude that there is no evidence to support the assertion that VaR-based risk management systems destabilize the financial system." (Jorion, 2002)

that are not backed up by any hard evidence.

5.2 Stress testing

The potential for procyclicality is downplayed by the Basel Committee (2002) when it states that "To help address potential concerns about the cyclicality of the IRB approaches" banks should perform stress testing. Furthermore, Berkowitz and O'Brien (2002) studies the correlations of daily trading revenues for a group of six US commercial banks, and find it to be 12 percent on average for January 1998 to March 2000, suggesting that on average there is considerable heterogeneity in trading strategies.

This, however, misses the point, the focus is still on the institution level risk, and feedback effects are disregarded. Correlations are an average concept, and say little about dependence in times the crisis. Institution level stress testing does not address the core of the problem of endogenous risk or procyclicality. Ideally, the supervisors should run systemwide stress tests. This has been considered by the CGFS, 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 (heavy tailed marginal distributions) and implement dependence by using correlation matrices. 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 supervisors have been silent on this issue.

6 Conclusion

New research argues that Basel-II might have far reaching and unexpected economic implications. Of these, the most important is the potential of Basel-II to introduce procyclicality and endogenous feedback loops between prices, volatility, and liquidity. In particular, Basel-II may perversely amplify the riskiness of the financial system, by increasing the frequency and depth of financial crisis.

We simply do not know enough about the nature of risk, be it from a theoretical or empirical parts of view, for us to be able to create an effective regulatory mechanism. Given evidence that the Basel-II cure might be worse for the patient than the decease, it is incumbent upon the Basel Committee to properly address those issues. Either the procyclicality argument is proven wrong, or endogenous risk should be explicitly modelled and incorporated in Basel-II.

References

Bagehot, W. (1873), *Lombard Street*, London: H.S. King.

Basak, S. (2002), "Comparative study of portfolio insurance", *Journal of Economic Dynamics and Control* 26(7–8), 1217–1241.

Basak, S. and A. Shapiro (1995), "A general equilibrium model of portfolio insurance", *Review of Financial Studies* 8, 1059–1090.

Basak, S. and A. Shapiro (2001), "Value-at-risk based risk management: Optimal policies and asset prices", *Review of Financial Studies* 14, 371–405.

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.

Berkowitz, J. and J. O`Brien (2002), "How accurate are the value at risk models at commercial banks?", *Journal of Finance* 57 (June), 1093–1111.

Brady Commission (1988), *Report of the presidential task force on market mechanisms.* Technical report, Washington D.C.: Government Printing Office.

Committee on the Global Financial System (1999), *Recommendations for the design of liquid markets,* CGFS recommendation, Bank for International Settlements.

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.

Crockett, A. (2003), *Central banking, financial stability and basel ii.* The General Manager of the Bank for International Settlements, http://www.bis.org/speeches/sp030213.htm.

Daníelsson, J. (2002), "The emperor has no clothes: Limits to risk modelling", *Journal of Banking and Finance* 26(7), 1273–1296.

Daníelsson, J., B.N. Jorgensen and C. G. de Vries (2002), "Incentives for effective risk management", *Journal of Banking and Finance* 26(7), 1407–1425.

Daníelsson, J. and J.-P. Zigrand (2003), "What happens when you regulate risk? Evidence from a simple equilibrium model", *Working paper*, LSE, www.RiskResearch.org.

Embrechts, P., A. McNeil and D. Straumann (2000), "Correlation and dependency in risk management: properties and pitfalls", in: M. Dempster and H. M. HK (eds.), *Risk management: value at risk and beyond*, volume forthcomming, Cambridge University Press.

Engle, R. F. (1982), "Autoregressive conditional heteroskedasticity with estimates of the variance of the United Kingdom inflation", *Econometrica* 50, 987–1007.

Ferguson, R. W. (2002), *Financial engineering and financial stability. Remarks by the Vice Chairman of the Board of Governors of the Federal Reserve System,* http://www.federalreserve.gov/BoardDocs/speeches/2002/.

Gennotte, G. and H. Leland (1990), "Market liquidity, hedging, and crashes", *American Economic Review* 00, 999–1021.

Granger, C. and A. Timmermann (2002), *Efficient market hypothesis and forecasting.*

Grossman, S. and Z. Zhou (1996), "Equilibrium analysis of portfolio insurance", *Journal of Finance* 51(4), 1379–1403.

Hawke, J. D. (2003), *Testimony of comptroller of the currency before the subcommittee on domestic and international monetary policy, trade and technology of the committee on financial services of the united states house of representatives*, 27 February 2003.

Heinemann, F. (2000), "Unique equilibrium in a model of self-fulfilling currency attacks: Comment", *American Economic Review* 90 (March), 316–318.

Heinemann, F. and G. Illing (2002), "Speculative attacks: unique equilibrium and transparency", *Journal of International Economics* 58(2).

Honohan, P. and D. Klingebiel (2002), "The fiscal cost implications of an accomodating approach to banking crises", *Journal of Banking and Finance*, forthcoming.

Jorion, P. (2002), "Fallacies about the effects of market risk management systems", *Financial Stability Review*, 115–127.

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

Lucas, R. E. J. (1978), "Asset pricing in an exchange economy", *Econometrica* 46, 1429–1445.

Morris, S. and H. S. Shin (1998), "Unique equilibrium in a model of self-fulling currency attacks", *American Economic Review* 88, 587–597.

Morris, S. and H. S. Shin (1999), "Risk management with interdependent choice", *Oxford Review of Economic Policy*, Autumn, 52–62, reprinted in the Bank of England, *Financial Stability Review* 7, 141–150, http://www.bankofengland.co.uk/fsr/fsr07art5.pdf.

Roll, R. (1988), "The international crash of October 1987", *Financial Analysts Journal*, 19–35.

Roll, R. (1989), "Price volatility, international market links, and their implications for regulatory policies", *Journal of Financial Services Research*, 211–246.

Shiller, R. (1987), "Investor behavior in the October 1987 stock market crash: Survey evidence", Technical report, *NBER discussion paper* 2446.

Appendix A Statistical risk models

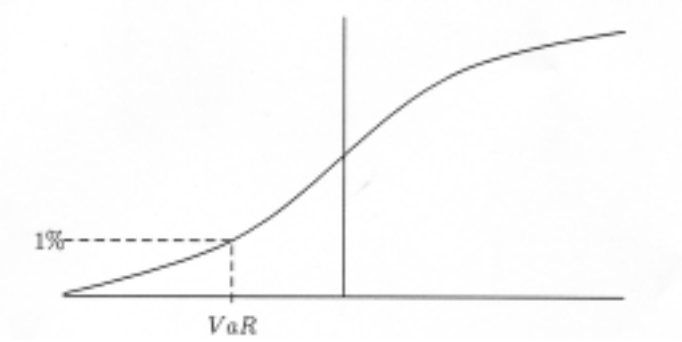
The primary statistical tool for measuring market risk is *value-at-risk* (VaR). The reasons for the popularity of VaR are many, but two are the most important. First, it is specified by regulators (Basel Committee, 1996). Second, of possible risk measures, it has the largest set of desirable properties. In particular, since volatility is a very imperfect measure of risk due to its dependence on normality for interpretation, VaR is perhaps the easiest of the distribution independent risk measures to implement. The former definition of VaR is:

$$p = \int_{-\infty}^{VaR} F(x)dx$$

Where p is a probability level, typically 1 percent $f(x)$ is the pdf of profit and loss. Graphically, this can be shown graphically by Figure A1.

Figure 1

VaR and profit and loss distribution



In general, the pdf of profit and loss is estimated by statistical methods only using historical values of the assets. The Basel regulations require at least one year of daily data in the estimation, and most national supervisors do not allow banks to use more than one year. For details on VaR, especially the pros and cons, see e.g. Daníelsson (2002).

Towards a Macroprudential Framework for Financial Supervision and Regulation?

Claudio Borio*

Abstract*: Over the last decade or so, addressing financial instability has risen to the top of the policy agenda. This essay argues that in order to improve the safeguards against financial instability, it may be desirable to strengthen further the macroprudential orientation of current prudential frameworks, a process that is already under way. The essay defines, compares and contrasts the macro- and microprudential dimensions that inevitably coexist in financial regulatory and supervisory arrangements, examines the nature of financial instability against this background and draws conclusions about the broad outline of desirable policy efforts.*(*JEL* G2)

"Words, like nature, half reveal and half conceal the soul within"

Alfred Lord Tennyson

"When I use a word... it just means what I choose it to mean – neither more, nor less"

Humpty Dumpty

1 Introduction[1]

Financial instability may not necessarily be here to stay. But it has been sufficiently prominent over the last couple of decades to rise, slowly but surely, to the top of the international policy agenda. The sizeable economic costs of financial crises in industrial and emerging market countries could not be ignored.

Banking supervisors were used to a quiet life in the (largely) financially repressed systems that emerged in the postwar period. They have been much busier of late. Bankhaus Herstatt failed in 1974. Few could have imagined then that this would mark the beginning of a long journey in ever closer and wider international cooperation among prudential authorities. Now, some 30 years

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1 This paper is a revised version of an invited lecture at the CESifo Summer Institute Workshop on "Banking regulation and financial stability" that took place in Venice, Italy, on 17–18 July 2002. I would like to thank Philip Lowe, Bengt Mettinger, Hyun Shin, Kostas Tsatsaronis and two anonymous referees for their helpful comments, and Janet Plancherel for the patience and efficiency with which she put the lecture together under heavy time pressure. This essay reflects personal views and not necessarily those of the BIS. Any remaining errors are my sole responsibility.

on, efforts to upgrade bank capital standards are grabbing the headlines worldwide. They have even become an issue in electoral campaigns.

These efforts are part of a broader challenge: strengthening the safeguards against financial instability. The basic question is how best this should be done.

The answer ultimately depends on how we think of financial instability, of its ultimate causes and implications. Events have forced many of us to go back to basics; to question assumptions we once took for granted. The debate has been rich and has furthered our understanding greatly. Even so, having lost some trusted "points of reference" we are still searching for new ones.

This essay will argue that we can get a bit closer to the right answers by exploring the implications of an ungainly word, increasingly used but still looking for a precise meaning. The word is "macroprudential". The thesis is that to improve further the lines of defence against financial instability we should strengthen the macroprudential orientation of the regulatory and supervisory framework.

In fact, the process is well under way. Friedman once said: "We are all Keynesians now".[2] One could equally well say: "We are all (to some extent) macroprudentialists now"- to coin another clumsy word. The shift in perspective has been remarkable over the last few years. And it is likely that it will continue.

We might be moving towards the right answers. But this essay will raise still more questions. The intention is to use the "macroprudential" perspective as a kind of looking glass, to put old issues into a new focus. Once that is done, however, more questions will emerge.

The outline of the essay is the following. Section 2 defines terms and concepts: what is meant by a "macroprudential" perspective? Section 3 will argue that this perspective is useful to understand financial instability. Section 4 moves from diagnosis to remedies, and argues that the macroprudential perspective can also be helpful in identifying broad sets of policy responses. Finally, some conclusions are drawn.

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[2] Quoted in Samuelson (1973).

2 The micro- and macroprudential dimensions defined[3]

2.1 Definitions

Shades of grey are best appreciated when set against their two primitive components, black and white. Likewise, it is especially helpful to *define* the micro- and macroprudential perspectives in such a way as to sharpen the distinction between the two. So defined, by analogy with black and white, the macro- and microprudential souls would normally coexist in the more natural shades of grey of regulatory and supervisory arrangements.

As defined here, the macro and microprudential perspectives differ in terms of *objectives* and the *model* used to describe risk (Table 1).

Table 1

The macro- and microprudential perspectives compared

	Macroprudential	**Microprudential**
Proximate objective	limit financial system-wide distress	limit distress of individual institutions
Ultimate objective	avoid output (GDP) costs	consumer (investor/depositor) protection
Model of risk	(in part) endogenous	exogenous
Correlations and common exposures across institutions	important	irrelevant
Calibration of prudential controls	in terms of system-wide distress; top-down	in terms of risks of individual institutions; bottom-up

The *objective* of a macroprudential approach is to limit the risk of episodes of financial distress with significant losses in terms of the real output for the economy as a whole. That of the microprudential approach is to limit the risk of episodes of financial distress at individual institutions, regardless of their impact on the overall economy.

[3] Previous statements of the distinction between the macro- and microprudential perspectives can be found in Crockett (2000a) and (2001a). Borio et al. (2001) apply the distinction to the analysis of capital standards. Tsatsaronis (2002) provides a more in-depth, complementary analysis of these issues.

So defined, the objective of the macroprudential approach falls squarely within the macroeconomic tradition. That of its microprudential counterpart is best rationalised in terms of consumer (depositor or investor) protection.[4]

To highlight the distinction between the two, it is useful to draw an analogy with a portfolio of securities. For the moment, think of these as the financial institutions in an economy. Assume, further, that there is a (monotonically) increasing relationship between the losses on this portfolio and the costs to the real economy. The macroprudential approach would then care about the tail losses on the portfolio as a whole; its microprudential counterpart would care *equally* about the tail losses on *each* of the component securities.

The implications for the setting of prudential controls are straightforward. The macroprudential approach is top-down. It first sets the relevant threshold of acceptable tail losses for the portfolio as a whole. It then calibrates the prudential controls on the basis of the marginal contribution of each security to the relevant measure of portfolio risk. As portfolio allocation theory teaches us, correlations[5] across securities, and the distinction between systematic and idiosyncratic risk, are of the essence. By contrast, the microprudential approach is bottom-up. It sets prudential controls in relation to the risk of each individual security. The result for the overall portfolio arises *purely* as a consequence of aggregation. Correlations across securities are ignored.[6]

Next, consider the *model* used to describe risk. The macroprudential perspective assumes that risk is in part *endogenous* with respect to the behaviour of the financial system; the microprudential approach assumes that it is *exogenous*.

The analogy can be helpful here too. In finance theory, we are used to thinking that the risk of a portfolio depends on some exogenous risk factors. The macroprudential approach assumes that these risk factors are in part endogenous

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4 This view of prudential policy is formalised in Dewatripont and Tirole (1993).

5 The term "correlation" is used loosely here. For the purpose at hand, tail interdependence is more suitable. When returns cannot be accurately described by multivariate normal distributions, the difference can be important, as correlations are too restrictive. See Embrechts et al (1999).

6 Obviously, this analogy has its limitations. In particular, the monotonic relationship assumes that the marginal contribution of each financial institution to the macro risk of distress (losses) is the same, regardless of its specific characteristics. For instance, there is no distinction between banks and non-banks at this level of abstraction. And the analogy glosses over the distinction between institutions and markets. Clearly, any rigorous theoretical analysis would need to address these issues. For this reason, taking the analysis one step further, Tsatsaronis (2002) prefers to focus on the more basic notion of "intermediation capacity". He sees this as reflecting the ability of financial arrangements to channel funds from savers to investors, overcoming the problems arising from asymmetric information, and to allocate and absorb risk. Borio (2000) argues that the functional distinction between markets and institutions can easily be overstated.

with respect to the characteristics of the portfolio. By contrast, the microprudential approach assumes that risk can be taken as exogenous. In fact, its analysis is squarely in the tradition of partial equilibrium. The focus on the risk profile of individual securities (read institutions) justifies the choice.[7]

Moreover, since the macroprudential approach measures risk in terms of the dispersion of an economy's output, it also recognises that the financial system has first-order effects on it. These effects are ignored in the microprudential perspective.

A microprudentialist would argue that for a financial system to be sound it is necessary and sufficient that each individual institution is sound. A macroprudentialist would take issue with this. To him, it would not be necessary: the output costs of financial stress at individual institutions, or even groups of institutions, banks or otherwise, need not be large enough. More subtly, he would not regard it as sufficient either. This would depend on *how* soundness was pursued. In his view, a macroprudential approach would have a better chance of securing financial stability and, thereby, of making also *individual* institutions safer. The approach could help in the identification of vulnerabilities and in designing appropriate policy responses.

As argued below, this has to do with the nature of financial instability, and hence with the role of risk perceptions and incentives. The endogeneity of risk comes into its own here. At this point, however, let's just pick an illustration that brings out the difference in perspectives most starkly.

By taking risk as exogenous, it would not be possible for a microprudentialist to conceive of situations in which what was rational, even compelling, for an individual institution could result in undesirable aggregate outcomes. A macroprudentialist would find this possibility natural. For example, it could make sense for a financial firm to tighten its risk limits and take a defensive stance in the face of higher risk. But if all did that, each of them could end up worse off. Tightening credit standards and liquidating positions could precipitate further financial stress and asset price declines. Risk would thereby increase.

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[7] Put differently, a microprudential researcher would focus on games against nature. Nature throws the dice and determines the risk characteristics of an economy. The only issue is how this risk is sliced and distributed. Moreover, strictly speaking, he would be concerned only with single-player games. A macroprudential researcher would focus on games among economic agents. The outcome would determine the level of aggregate risk.

2.2 From definitions to actual practices

How do current prudential frameworks compare against this stark macro-micro distinction? It is easy to see that the two souls coexist to varying degrees. Some differences may reflect historical and institutional aspects, including whether prudential powers are located with central banks or separate agencies. Others depend on whether we focus on objectives or on the means through which those objectives are pursued.

Take the *micro* elements first. Prudential standards are generally calibrated with respect to the risks incurred by individual institutions, the hallmark of a microprudential approach. The widespread use of peer group analysis in assessing risk is micro too. The benchmark here is the average performance of institutions, regardless of what this implies in the aggregate. And microprudential is also a certain reluctance to contemplate adjustments in standards or the intensity of supervision that would internalise macroeconomic consequences. Recall, for instance, the differences of opinion between the Federal Reserve and the Office of the Controller of the Currency in the United States during the "headwinds" of the early 1990s. At the time, the Fed was concerned about the implications for overall risk of a tightening of supervisory standards with respect to real estate exposures pursued by the other supervisory agency.

Next, consider the *macro* elements. Prudential authorities for banks often list among their objectives preventing systemic risk, even though the notion is vague enough to accommodate goals that could fall short of a macro approach: not all situations where systemic risk is invoked need involve potentially significant costs for the real economy. Likewise, it is not unusual for the intensity of supervision to be tailored to the size and complexity of institutions, which may match, by design or incidentally, their systemic significance. And the monitoring of risk goes well beyond peer group analysis. It routinely looks at aspects such as concentration of exposures across institutions and vulnerabilities to common shocks, like those associated with asset prices, sectoral, regional or macroeconomic developments.

3 Financial instability: From micro to macro

Which elements predominate is very much in the eye of the beholder. From a policy perspective, however, what matters is the balance between the two. Arguably, there are good reasons why we should strengthen further the macroprudential orientation of the framework.

At least three reasons spring to mind. First, in some important respects, the macroprudential objective actually subsumes the rationale for its micropru-

dential counterpart. Second, as a result of a better balance between market and official discipline, strengthening the macroprudential orientation holds out the promise of better economic performance. Third, and more subtly, the nature of financial instability is such that a strict microprudential approach is less likely to deliver a safe and sound financial system. Take each in turn.

3.1 Reason 1: High costs of financial instability

The output costs of financial instability can be very large and their incidence widely felt. Even acknowledging measurement difficulties, studies indicate that the costs of banking crises can easily run into double digits of GDP.[8] Output and growth opportunities are forgone. Severe financial distress can numb the effectiveness of standard macroeconomic tools, such as monetary and fiscal policies. Among industrial countries, Japan vividly illustrates this point. And the very social fabric of society can come under strain. The experience in a number of emerging market countries is telling.

Put bluntly, if the microprudential objective is rationalised in terms of depositor protection, there is a sense in which its macroprudential counterpart subsumes it. For the macroprudential objective is couched in terms of the size of the losses incurred by economic agents, *regardless of which hat they happen to wear*. In particular, even in those cases where depositor protection schemes may insulate depositors from *direct* losses, they cannot spare them the indirect, and more insidious, pain of widespread financial distress as citizens of a country.

3.2 Reason 2: Balance between market and policy-induced discipline

Since a microprudential approach seeks to limit the failure of *each* institution, regardless of its systemic consequences, it is arguably more likely to result in an overly protective regulatory and supervisory framework. Any failure, no matter how unimportant for the economy, could seriously damage the reputation of supervisors. The risk is that market forces may be stifled excessively. Resources can be misallocated and growth opportunities forgone. If taken too far, and underpinned by overly generous safety net arrangements, a microprudential approach could even undermine the very objective it is supposed to

[8] See, for instance, Hoggarth and Saporta (2001), who measure costs in terms of output forgone, and the references therein.

attain. It is well known that numbed incentives to monitor and limit risk can ultimately generate costly instability - the so-called moral hazard problem.[9]

This does not mean that depositor protection schemes are undesirable. Far from it. Limited schemes can act as effective pre-commitment mechanisms. By limiting the incidence of losses on the more vulnerable segments of society, they can relieve political economy pressures to "bail out" institutions.[10] By the same token, they can facilitate a more discriminating attitude towards the resolution of financial distress and thereby underpin a shift towards a macroprudential orientation. The point is that the pursuit of depositor protection objectives is best done through a combination of a macroprudential orientation and more targeted protection schemes.

3.3 Reason 3: Nature of financial instability

While a commonly held view of systemic risk suggests that financial stability can be secured through a microprudential approach, an analysis of the origin of financial crises with significant macroeconomic costs suggests that a macroprudential perspective is important. This analysis also reveals certain peculiar characteristics of risk perceptions that hold clues about possible policy responses. The distinction between the cross-sectional and time dimension of risk, especially system-wide risk, is crucial here. In addition, incentives play an important role. It is worth elaborating on these points in some detail.

Two views of systemic risk

The commonly held view of systemic risk that limits the tension between the micro- and macroprudential perspectives combines three ingredients.[11] First, and most importantly, it tends to see widespread financial distress as arising

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9 For instance, if ill-designed, a safety net can address one cause of instability, generalised liquidity crises, by generating another, namely slower-moving solvency crises.

10 Note that this rationalisation of deposit insurance schemes is rather different from the one normally found in the literature. It recognises that, in modern economies, it is "runs" by *sophisticated* creditors, typically exempt from insurance, that can precipitate a crisis, especially through the inter bank market. And it sees discretionary emergency liquidity assistance as a better instrument than deposit insurance to deal with liquidity crises, since it does not afford *unconditional* protection in the case of failure to achieve that goal. At the same time, deposit protection schemes can be useful precisely in cases of *insolvency*, by shielding supervisors from public pressure to bail out institutions, thereby lending credibility to the threat of a more discriminating resolution of the insolvency.

11 This view, in fact, is a mixture of various elements stressed by somewhat different strands of thought. It is supposed to capture a general intellectual atmosphere that has permeated much of the thinking on systemic risk.

primarily from the failure of *individual* institutions. The failure then spreads, through a variety of *contagion* mechanisms, to the financial system more generally. Interlinkages through balance sheets and overreactions driven by imperfect information are seen as key channels. Second, it tends to treat risk as endogenous in terms of the *amplification* mechanisms, but not with respect to the *original* shock, which is seen as exogenous. Third, this often goes hand in hand with a rather static view of instability. In other words, for a variety of reasons, the financial system is seen as initially vulnerable; suddenly, a shock occurs, which is then amplified by the endogenous response of market participants. There is no role for the factors underlying the *build-up* of the vulnerability in the first place. Finally, in many models, structurally *illiquid* portfolios are the key source of vulnerability and amplification. Liquid liabilities, and the threat of deposit runs, play a key role.

This view has an impeccable intellectual pedigree. Some of its more formal elements go back at least to the canonical model of systemic risk of Diamond and Dybvig (1983).[12] This view permeates much of the literature on systemic risk that focuses on domino effects, as exemplified in the well known review article by Kaufman (1994). And it has also influenced much of the thinking in the policy community.[13]

There is little doubt that systemic risk *can* arise from processes of this kind. Failures that result from mismanagement at individual institutions are the most obvious examples. In this case, exposures through payment and settlement systems and the inter bank market more generally are key channels of transmission.[14] Possible instances may include, for example, Herstatt, Drexel Burnham Lambert, BCCI and Barings, just to quote a few. In these cases, idiosyncratic factors have the potential to become systemic through the web of contractual, informational and psychological links that keeps the financial system together. By now, we understand these processes reasonably well.

But the significance of such instances pales in comparison with that of the cases where systemic risk arises primarily through *common exposures* to macroeconomic risk factors across institutions. It is this type of financial distress that

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[12] Santos (2000) reviews part of this literature and its relationship to bank regulation and minimum capital requirements in particular. De Bandt and Hartmann (2000) provide a more general survey of systemic risk and Davis (1995) a broader overview of the literature on financial instability.

[13] See, for instance, ECSC (1992).

[14] For the link between systemic risk and the interbank market, see in particular Rochet and Tirole (1996a). For a review of systemic risk in payment and settlement systems, see, for instance, Borio and Van den Bergh (1993) and references therein, as well as the many publications of the Committee on Payment and Settlement Systems on the BIS website. In the same spirit, Furfine (1999) examines the scope for contagion through Fedwire in the United States. See also Rochet and Tirole (1996b).

carries the more significant and longer-lasting real costs. And it is this type that underlies most of the major crises experienced around the globe. By comparison with the canonical model of systemic risk, these processes are still poorly understood.

Financial crises of this type can differ in many respects. The precise configuration of vulnerabilities varies, including whether they are primarily located among private or public sector borrowers, the relative role of domestic and cross-border exposures, and the importance of foreign currency mismatches. The precise triggers and hence timing are essentially unpredictable. And the main forces behind the crises can either be domestic or foreign.

Even so, beyond these differences, behind many such episodes a fairly common, if highly stylised, pattern can be detected. Generally, there is first of all a build-up phase. This is normally characterised by booming economic conditions, benign risk assessments, a weakening of external financing constraints, notably access to credit, and buoyant asset prices (Figure 1).[15] The economy may be perceived as being on a permanently higher expansion path. This configuration promotes and masks the accumulation of real and financial imbalances; the system becomes overstretched. At some point, the process goes into reverse. The unpredictable trigger can reside either in the financial sphere (e.g. an asset price correction) or in the real economy (e.g. a spontaneous unwinding of an investment boom). If the system has failed to build up enough buffers and the contraction goes far enough, a financial crisis can erupt. Ex post, a financial cycle, closely intertwined with the business cycle, is evident.[16]

It is not difficult to detect elements of this kind behind many of the severe financial crises in industrial and emerging market countries since at least the 1980s. These include several of the banking crises in Latin America in the 1980s and early 1990s, the crises in East Asia later in the decade, those in the Nordic countries in the late 1980s-early 1990s and the more prolonged one in Japan. Moreover, even if no major crisis broke out, countries such as the United States, the United Kingdom and Australia also experienced strains in their financial systems in the early 1990s following similar patterns.

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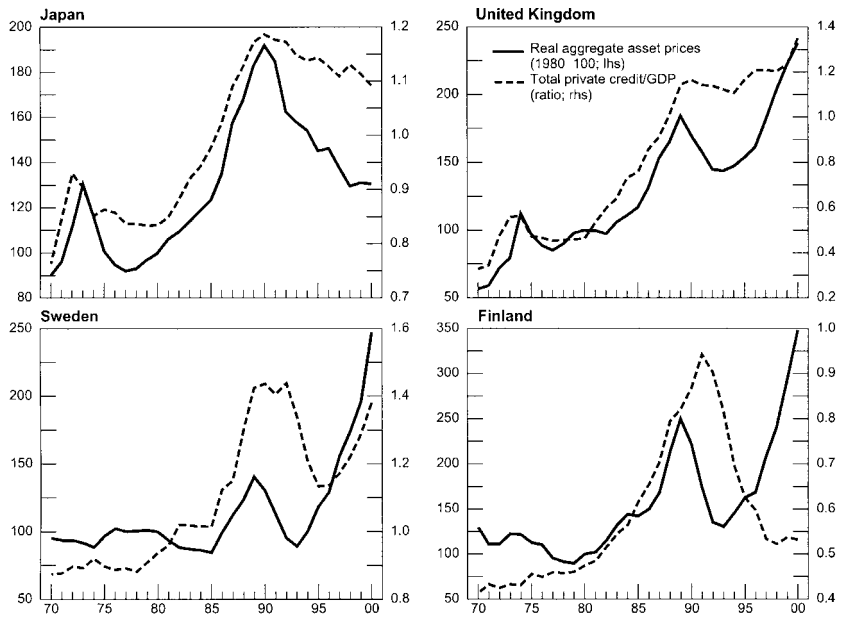
[15] The relationship between credit and asset prices is investigated econometrically in, for instance, Borio et al. (1994) and Hofmann (2001); its theoretical underpinnings have received renewed attention in recent years (e.g. Bernanke at al., 1999, Kiyotaki and Moore, 1997 and, in a different vein, Allen and Gale, 2000). More generally, the role of credit booms in the build-up of financial crises is widely recognised (e.g. Honohan, 1997, Gourinchas et al., 2001 and Eichengreen and Arteta, 2000). Of course, the roles of credit and asset prices in the context of boom-bust financial cycles have a long tradition (e.g. Kindleberger, 1996 and Minsky, 1982) and history (e.g. Goodhart and De Largy, 1999 and Kent and D'Arcy, 2001).

[16] Mechanisms of this sort are also at work in episodes of market stress, which may or may not have serious macroeconomic consequences (e.g. Borio, 2000).

Figure 1

Real aggregate asset prices and credit



Note: The real aggregate asset price index is a weighted geometric mean of real share prices, real residential property prices and real commercial property prices; the weights are based on net wealth data and the deflators used are those of private consumption.

Sources: Private real estate associations (inter alia, Jones Lang LaSalle); national data; BIS estimates and calculations.

By comparison with many canonical models of systemic risk, three key differences stand out. First, it is not possible to understand the crises unless we understand how vulnerabilities *build up over time*. This requires an understanding of the mutually reinforcing *dynamic* interaction between the financial and the real economy, and not just in the unfolding of financial stress but, importantly, as risk builds up. What we need is a proper theory of business fluctuations that merges financial and real factors. The triggering shock is, in fact, the least interesting aspect of the story. The boom sows the seeds of the subsequent bust. To an important extent, risk is *endogenous*. Second, it is not so much contagion from individual failures but *common exposures* to the same risk

factors that explain the crisis.[17] Third, much of the action is on the *asset side* of balance sheets as opposed to the liability side. It is on the asset side that the exposures build up and the underlying changes in valuation originate. The liability side can play a role primarily in the precise unfolding of the crisis, as it can affect the abruptness and virulence with which asset side adjustments are enforced. For instance, the foreign currency external financing constraint is critical for emerging market countries. But it is the deterioration in asset quality that fundamentally drives the process.[18] This is all the more so given the willingness to socialise losses in our time.[19]

The role of risk perceptions

If we look at the genesis of the crises more closely we will find another curious feature. Indicators of *risk perceptions* tend to decline during the upswing and, in some cases, to be lowest close to the peak of the financial cycle. But this is precisely the point where, with hindsight at least, we can tell that risk was greatest. During the upswing, asset prices are buoyant, risk spreads narrow and provisions decline. They clearly behave as if risk fell in booms and rose in

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[17] Note that, for any given set of institutions, common exposures to risk factors arise from two sources. First, directly, from the exposure of these institutions to economic agents outside this set. Second, indirectly, from exposures to each other (the interlocking aspect). In practice, it is arguably the former that has played the main role in widespread crises with macroeconomic consequences. See Elsinger et al. (2002) for an interesting approach that can be used to shed evidence on this question and for some corroborating evidence in the case of the Austrian banking system.

[18] There is a strand of the literature on financial crises in open economies that can be seen as a natural extension of the contrasting paradigms discussed here. Thus, a number of authors have stressed the role of external liabilities and self-fulfilling runs (e.g. Chang and Velasco, 1998 and Sachs and Radelet, 1998) while others have stressed fundamental vulnerabilities. Among the latter, and in contrast to the analysis developed here, ex ante distortions associated with implicit government guarantees have tended to play a key role (e.g. Corsetti et al., 1999). Corsetti (1998) reviews some of the recent literature on this.

[19] A number of academics have recently been developing notions of systemic risk that are closer to the one put forward in this essay. What might be called the emerging "LSE school" stresses the endogeneity of risk (e.g. Danielsson et al., 2001, Danielsson et al., 2002) and the time dimension of risk (Goodhart and Danielsson, 2001). Acharya (2001) focuses on common exposures and the asset side of balance sheets. Hellwig (1995, 1998), has for a long time emphasised the need for a system-wide, general equilibrium approach, but within a static framework and a focus on interest rate risk as the key driver of credit risk too. Work that extends the Diamond and Dybvig-type models to link bank run equilibria to economic fundamentals, not least in the context of differential information, can also be seen as a step in the direction of a more macroprudential notion of systemic risk, as defined here (e.g. Morris and Shin, 1998, Zhu, 2001). And for some time now, a number of authors have noted the importance in deteriorating fundamentals as a cause of financial crises; see e.g. Gorton (1988) and Calomiris and Gorton (1991).

recessions. And yet, there is a sense in which *risk rises in booms*, as imbalances build up, *and materialises in recessions*, as they unwind.[20]

This observation points to a fundamental distinction between the dimensions of risk. We all seem to be better equipped to measure the cross-sectional than the time dimension of risk. And we find it especially difficult to measure how the absolute level of systematic (system-wide) risk evolves over time.[21] It is no coincidence, for instance, that rating agencies pay particular attention to the *relative* riskiness of borrowers or instruments.[22] Nor, indeed, that much of the extisting literature on the effectiveness of market discipline is of a cross-sectional nature.[23] By the same token, one could argue that the Achilles heel of markets may not be so much *indiscriminate* reactions to idiosyncratic problems but rather preventing the build-up of *generalised* overextension. This is why there is much mileage to be gained by focusing not so much on contagion but on common exposures.

The role of incentives

And risk measurement is only part of the story. Another important aspect has to do with *incentives*. The key problem here is the wedge between individual rationality and desirable aggregate outcomes. We are all very familiar with the arguments here. Notions such as "prisoner's dilemma", "coordination failures" and "herding" spring to mind.[24] Just a few specific examples: would it be reasonable to expect a bank manager to trade off a sure loss of market share in a boom against the distant hope of regaining it in a future potential slump? Or to adopt less procyclical measures of risk on the grounds that if others adopted them as well a crisis might be less likely? Or to fail to tighten credit standards or liquidate positions only because, if everyone else did the same, the depth of a recession could be mitigated? Policy responses will need to keep this tension in perspectives very much in mind.

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[20] There are a number of ways in which this statement can be rationalised or made more precise. The most intuitive states that the signs of possible financial imbalances in the upswing lead to a rise in the uncertainty regarding future outcomes. The boom might indeed be sustainable, but "tail losses" are also higher. See Lowe (2002) in particular. More formal rationalisations are also suggested in Borio et al. (2001).

[21] See, initially, Crockett (2000b) or Borio and Crockett (2000) and BIS (2001a). A detailed discussion of this point can be found in Borio et al. (2001). See also Goodhart and Danielsson (2001).

[22] See Cantor (2002).

[23] A careful reading of the well known survey article on market discipline by Flannery (1998) makes this abundantly clear.

[24] Borio et al. (2001) provide a discussion of these issues. See also Goodhart and Danielsson (2001) for an elaboration closely linked to the problems of risk measurement.

Bounded rationality and distorting government intervention?

Thus, a combination of risk perceptions that fall short of a tall order and distorting incentive wedges seem to underlie much of the financial instability that we see. And importantly, it would not seem necessary to rely on either bounded rationality - appealing as this may be to careful observers of human nature - or misguided government intervention to explain the economic processes at work.

Ultimately, it might be possible convincingly to rationalise the observed instability by building rigorous frameworks starting from the inevitably imperfect and hence differential information that characterises all human interactions. Consider just a few examples. Recent research indicates that rational departures of asset values from fundamentals can be sustained given short horizons of agents and differential information (lack of "common knowledge").[25] And those short horizons can be justified on the basis of contractual arrangements that reflect conflicting incentives and differential information between suppliers of funds, on the one hand, and users or managers of those funds, on the other ("principal/agent problems"). The same can be said of the asymmetric nature of booms and busts. For instance, short selling constraints may make positive departures from fundamentals more likely than negative ones,[26] while the natural asymmetries linked to financing constraints and hence balance sheet weakness, together with capital overhangs, could explain the specific characteristics of the busts. And, of course, it is precisely imperfect information that can best explain the presence of such short selling/financing constraints, notably reflecting concerns with counterparty/credit risk, and limits to arbitrage more generally.[27]

For much the same reasons, there is a risk of attaching too high a weight to distorting government intervention as the root cause of financial instability. This is not to deny that, as already noted, the "moral hazard" problem associated with mispriced (explicit or implicit) government guarantees can unwittingly contribute, and often has contributed, to instability. After all, one of the objectives of strengthening the macroprudential orientation of the prudential framework is precisely to reduce the scope of such subsidies. Rather, the point

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[25] See e.g. Allen and Gale (2000), Allen et al. (2003) and Abreu and Brunnermeier (2003). See also Froot et al. (1992) for an example of the implications of short horizons for asset pricing in the context of rational speculation.

[26] See e.g. Carey (1990).

[27] It is well known that asymmetric information (including ex post non-verifiability by a third party) is essential to explain financing frictions of the kind relevant here; see, e.g. Hart and Holmström (1988), Gertler (1988), Hart (1995) and Bernanke et al. (1999) for surveys of various aspects of what has become a rather fragmented field of inquiry. See also Schleifer and Vishny (1997) on the limits of arbitrage more generally.

is that both logically and historically the causes of financial instability *precede* government intervention. Logically, as noted, differential information and distorted incentives are sufficient to generate instability. Indeed, the original notion of moral hazard is linked to this more general imperfect information inherent in economic relationships. And historically, financial instability predates extensive government intervention in the economy.[28] In fact, it was the widespread financial instability of the inter war years that largely prompted the establishment of extensive safety nets and prudential frameworks.[29]

4 From diagnosis to remedies

So much for definitions and diagnosis. But what about policy responses? It is here that question marks find their preferred habitat. Given our state of knowledge, it is at best possible to sketch out broad directions for change rather than to identify concrete proposals.

In that spirit, what follows highlights a few key issues. In keeping with the previous analysis, it considers the cross-sectional and time dimensions of risk in turn, although much of the discussion focuses on the time dimension.

4.1 The cross-sectional dimension

Three specific questions stand out when considering the cross-sectional dimension of risk. What should be the scope of the prudential framework? How should standards be calibrated? What are the implications of size?

A macroprudential approach suggests that the *scope* of the prudential framework should be rather broad. The capacity to intermediate funds and allocate risks, thereby sustaining economic activity, is key (Tsatsaronis, 2002). To varying degrees, all financial institutions perform this function. In fact, markets as well as institutions do so.[30] At the same time, it is still the case that certain institutions, because of their specific function, may be more relevant than others. For instance, the role of "banks" as suppliers of liquidity services

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[28] See Bordo et al. (2001).

[29] One implication of the presence of safety nets is that, by comparison with the historical period when they were less extensive, banking crises may take somewhat longer to emerge, as liquidity constraints would be less binding. This is especially likely where external considerations are less of an issue, as is typically the case in industrial countries. This conjecture seems to be broadly consistent with the evidence in Gorton (1988), who finds that in the pre-Depression era in the United States, crises tended to occur close to the peak of the business cycle, rather than once the downturn was already well under way.

[30] For a discussion of analogies between the two, see, for instance, Borio (2000).

of next to last resort implies that financial distress at these institutions may have larger macro economic costs. These characteristics would need to be taken into account too.

For practical purposes, a macroprudential perspective would thus suggest that in assessing vulnerabilities to financially induced macro stress the gaze should be cast widely. The perspective is also broadly consistent with the shift under way towards greater convergence in prudential standards across financial intermediaries.[31]

As regards *calibration*, at a high level of abstraction the main implication of a macroprudential approach is straightforward. The prudential standards should be calibrated with respect to the marginal contribution of an institution to system-wide macro risk. The approach would make an explicit distinction between the "systematic risk" (common exposure) charge and the "idiosyncratic risk" charge. The latter would be non-zero only to the extent that failure of the institution had macro stress effects, either directly or through knock-on channels.[32]

But how exactly can the decomposition between systematic and idiosyncratic risk be estimated? This is clearly an open question for research. For institutions whose securities are publicly traded, their prices could yield some, albeit noisy, information.[33] For others, balance sheet information, in terms of asset composition or performance, could provide some raw material. But it is too early to tell what the results of such a line of research might be. What we *can* be confident about is that as risk measurement techniques develop, the raw material for inference and aggregation will improve. The New Basel Capital Accord should play a key role in this respect.

The one area where measurement is less of a problem relates to the *size* of institutions. *Other things equal*, larger institutions have greater system-wide significance. As such, from a macroprudential perspective they would be subject to tighter prudential standards.[34] This is indeed consistent with the common practice of at least subjecting them to more frequent and intense supervision. But one could easily imagine going one step further. This could involve,

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31 See, for instance, Borio and Filosa (1994).

32 Interestingly, the weights in the proposed New Capital Accord have been derived from a conceptual model that, for each bank portfolio, assumes a single systematic risk factor, full diversification of the idiosyncratic component of risk and a common correlation across all exposures.

33 See, for instance, De Nicolo and Kwast (2001) for an attempt to estimate the impact of financial consolidation on systematic risk based on stock price information.

34 See also the discussion of the implications of mergers on system-wide risk in Tsatsaronis (2002). BIS (2001b) provides a broader analysis of the impact of financial sector consolidation on systemic risk.

for instance, higher capital requirements for any given level of institution-specific risk.[35] In principle, the strengthening of Pillar 2 under the New Capital Accord could be quite helpful here.

4.2 The time dimension

It is in the time dimension that the macroprudential perspective comes into its own, not least because of the endogeneity of risk. If the perspective is correct, then it stands to reason that cushions should be built up in upswings so as to be relied upon when the rough times arrive.[36] This would strengthen institutions' ability to weather deteriorating economic conditions, when access to external financing becomes more costly and constrained. Moreover, by leaning against the wind, it could reduce the amplitude of the financial cycle, thereby limiting the risk of financial distress in the first place. In other words, this strategy would add a welcome counterweight to the powerful *procyclical*[37] forces in the system.

The question is: how can this best be done? There are many aspects to this problem. What follows focuses only on four of them. First, how ambitious should we realistically be in seeking to improve risk measurement? Second, given the procyclicality in risk assessments, what could be the implications of the more risk-sensitive New Capital Accord? Third, to what extent can longer horizons help in mitigating biases in risk assessment and stabilising the system? Finally, what is the appropriate division of labour between accounting and prudential norms?

Can the measurement of risk through time be improved?

The choice of strategy to ensure that cushions are built up at the right time depends on views about how far it is realistically possible to improve on the measurement of the time dimension of risk. Consider two views, in increasing order of ambition.

The *first view* assumes that it is, in effect, fruitless to try to improve significantly on how risk is measured though time. Judgments about the profile of

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[35] Some supervisory authorities have indeed called for such a treatment on systemic grounds. The Swiss banking supervisory agency is a case in point.

[36] Of course, this should be subject to some absolute minimum, so as to avoid the risk of undue forbearance and limit the scope for "betting-for-survival" behaviour.

[37] Here and in what follows, a variable or type of behaviour is said to be procyclical if its movement is such as to *amplify* financial and business cycles.

macro risk are too hard to make.[38] The poor record of forecasters is seen as evidence of this. At the same time, while it may be hard to tell whether the risk of a downturn is higher or lower, it is much easier to tell whether the current state of the economy is above or below previous average experience. The question then, for instance, is *not* whether the boom is sustainable or not, but, rather, whether the economy *is* in a boom.

On this basis, it is simply prudent to take advantage of the favourable conditions to build up cushions as a form of insurance, without *explicitly* taking a stance on the future evolution of the economy. Moreover, what is true for the economy's output is also true for other variables correlated with financial distress, such as asset prices and credit expansion.

Given the scepticism about the ability to measure changes in risk, this view tends to favour relatively simple rule-based adjustments. Many types of policy would seem to fall under this broad heading. One example is Goodhart and Danielsson's (2001) suggestion of relating various prudential norms to loan or asset price growth**.** Another, quite subtle, example is the loan provisioning rule recently introduced by the Spanish supervisory authorities (so-called "statistical provisions"). In this case, yearly provisioning expenses tend to be based on average loan loss experience over past business cycles.[39] More generally, conservative valuation principles, such as valuing assets at the lower of market or book value, could be seen as performing a similar function.

The main advantage of this family of policy options is their simplicity. In addition, once the rule is accepted, there is no issue of the authorities being seen as "outguessing" markets. This would make the rules easier to implement in comparison with discretionary adjustments in prudential tools based on measures of risk, with the authorities inevitably in the defensive against the manifested consensus of market participants. Finally, concerns with possible mistakes in the use of discretion or a limited "credit culture" among market participants would add to their appeal.

Their main disadvantage is that by *themselves* they would not do much to encourage conscious improvements in risk measurement. As a result, they would also tend to exacerbate incentives to arbitrage them away.[40] Depending on their specific features, they could also be seen as unduly intrusive and blunt. Some of them would clearly not be consistent with the search for a better balance between market and policy-induced discipline.

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38 This is the view expressed, for instance, by Goodhart and Danielsson (2001).

39 See Fernández de Lis et al. (2001) and Borio and Lowe (2001).

40 Of course, this depends on the characteristics of the measures. The Spanish rule for loan provisioning, for instance, seems to have been quite successful so far.

The *second view* argues that it is worth seeking to improve the way we measure risk through time. Statements about changes in risk may well be possible conditional on a richer information set. These could eventually form the basis for judgments about the risk of financially induced macro stress. These judgments in turn could underpin a more articulated policy response, including through discretionary measures. It is worth elaborating on this.

The current efforts to develop indicators of banking crises or, more generally, macroprudential indicators and assessments of financial system vulnerabilities belong to this family of responses. My own reading of the evidence is that we are still a long way from an adequate answer, but that the glass is half full.

Our own research at the BIS tends to confirm this. With Phil Lowe, we have recently begun to explore how far one could predict banking crises in both industrial and emerging market countries on the basis of a very parsimonious approach guided by the stylised features of the financial cycle.[41] We measured the performance of the indicators in terms of the noise-to-signal ratio, following the very useful toolkit applied to currency and banking crises by Kaminsky and Reinhart (1999). We did, however, make a few important modifications. First, we used ex ante information only, as required by policymakers. Second, we focused on cumulative processes, measured in terms of deviations of the key variables from ex ante recursive trends. This was supposed to capture the build-up of vulnerabilities. Third, we looked only at a very limited set of variables: private credit to GDP, real asset prices and investment. Fourth, we calibrated the signal by considering the variables jointly, rather than on a univariate basis. Finally, we allowed for multiple horizons, in the conviction that the precise timing of a crisis is essentially unpredictable.

As a first go, the results were encouraging (Table 2). Over a three-year horizon, close to 60% of the crises could be predicted, and only one in almost 20 observations was incorrectly classified (crisis or non-crisis). Likewise, crying wolf too often, the usual problem, was far less of an issue here. A large part of the improvement resulted from the use of cumulative rather than marginal processes. The credit gap alone, for instance, clearly outperformed exceptionally high growth rates in credit. It could capture around 80% of the crises, with a comparatively low noise-to-signal ratio by the standards of the literature, although at the cost of higher noise by comparison with the multivariate, joint calibration (one in six observations incorrectly classified).

[41] See Borio and Lowe (2002a) for details of the approach. Borio and Lowe (2002b) extend the analysis further.

Table 2

Indicators of banking crises[a)]

Horizon[b)]	Private sector credit				Joint credit (4% points) and real asset price[e)] (40%) gaps[d)]	
	Real credit growth (7%)[c)]		Credit gab[d)] (4% points)			
	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted
One-year	.54	74	.24	79	.13	42
Two-year	.43	87	.21	79	.08	53
Three-year	.39	89	.20	79	.06	55

[a)] Based on a sample of 34 industrial and emerging market countries; annual data 1960-99, including 38 crises. – [b)] A signal is correct if a crisis takes place in any one of the years included in the horizon ahead (always including the current year). Noise is identified as mistaken predictions within the same horizon. – [c)] Percentage annual growth rate. – [d)] A gap is measured as the percentage (point) deviation from an ex ante, recursively calculated Hodrick-Prescott filter. Credit is measured as a ratio to GDP. – [e)] Equity prices only.

Source: Borio and Lowe (2002 a).

We interpret these results as saying that it should be possible to form judgments about the build-up of vulnerabilities with a *reasonable* degree of comfort. After all, our preliminary analysis could be improved in several directions, in terms of both the definition of variables and techniques. Indeed, more recently in a follow-up study, we showed how the inclusion of a real exchange rate gap helps to improve the results in the case of emerging market countries (Borio and Lowe, 2002b).[42] More generally, the literature on measuring indicators of pending financial macro stress is very much in its infancy.[43] And the

[42] Other improvements could be considered, quite apart from refinements in the statistical methodology. For example, our studies to date could not use real estate prices, because the information available for emerging market countries is too limited. Similarly, the definition of "financial stress" could be refined to capture better the type of episodes that are consistent with macro stress. And, following similar principles, further indicators could be developed tailored to types of financial crises other than those considered here.

[43] Rigorous statistical analysis has largely focused on currency, rather than banking crises; see, for instance, IMF (2002a) for a review, as well as Hawkins and Klau (2000). Likewise, banking supervisors have tended to concentrate their efforts on indicators of individual bank, rather than systemic, failure (Van den Bergh and Sahajwala, 2000). More generally, considerable work has been done trying to lay out a broad set of so-called "macroprudential" indicators. See, for instance, IMF (2002b) and references therein.

information available to policymakers to form a judgment is much richer, and likely to improve over time.[44, 45]

The above indicators could give some idea of the *probability* of distress; what about the other key variable, vz the extent of possible losses given distress? Here, macro-stress tests, conceptually analogous to their micro counterparts, could play a role. These would map assumed adverse changes in macro risk factors into losses in the financial system. In recent years, considerable work has been done in this area[46] but, again, much more research is needed to develop acceptable methodologies.

One could then imagine a two-pronged approach. On the one hand, indicators of potential distress could be used to form a judgment about the probability of adverse outcome. These could be complemented by other, perhaps more traditional, measures of macroeconomic risks to the outlook. On the other hand, stress tests could be used to assess the likely damage of an adverse event. The indicators would add "bite" to the stress tests, which could otherwise be discounted too easily. The resulting information could then help to calibrate a prudential response or to adjust micro-based risk measures.

Such a top-down approach to risk measurement would likely reduce the procyclicality of current risk measurement methodologies. Indeed, a review of the methodologies would indicate that these either tend to ignore macroeconomic factors or, to the extent that they do not, they may even incorporate them in a way that could exacerbate procyclical tendencies.

Given space constraints, it is only possible to illustrate the basic point here.[47] Consider three types of methodology: those of rating agencies, banks' internal ratings and full credit risk models.

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[44] Goodhart and Danielsson (2001), while sharing many of the concerns expressed here about the difficulties of measuring risk over time, reaches more pessimistic conclusions. Its evidence, however, is based on the predictability of business cycle fluctuations *on the basis of their duration only*. The point here is that this approach is unnecessarily restrictive. Judgments can be conditioned on a broader information set.

[45] Will the indicators continue to perform satisfactorily in the future? As always, there is no such guarantee. For example, efforts made in recent years to improve the infrastructure of the financial systems might reduce the likelihood of distress for any given threshold level. Moreover, learning from post-liberalisation mistakes could well reduce the incidence of crises. At the same time, the historiography of financial crises suggests that the core regularities on which the indicators are based have been so common in the past that they may prove comparatively robust in the future.

[46] The IMF and national central banks have been quite active in this area.

[47] For a more detailed treatment, see, in particular, Lowe (2002), Borio et al (2001), Allen and Saunders (2003) and references therein. See also Berger and Udell (2003) for possible reasons for, and some evidence of, excessive procyclicality in risk assessments.

By design, *rating agencies*' risk assessments tend to be comparatively less sensitive to the business cycle, although downgrades in particular do bunch up in recessions. One way of rationalising this is that they pay special attention to relative risk. Another is to think of agencies as rating companies based on a standardised macro stress scenario, such as a "typical" recession.[48]

Banks' internal rating methodologies vary considerably across institutions. Available evidence is rather limited, but it generally points to a higher degree of procyclicality. This may result from a tendency to adjust credit risk perceptions assuming the continuation of current conditions and to focus on rather short horizons, more in line with the annual accounting cycle. For the quantification of risk, one year is quite common.[49]

Most quantitative credit risk models do not incorporate macro effects. The degree of procyclicality of the corresponding risk assessments arises from the use of rating agencies' and, above all, market inputs, notably share prices and credit spreads. Moreover, further developments of the models could actually *exacerbate* the procyclical properties. For instance, the models so far ignore the positive correlation between the probability of default and loss-given-default, which is at least in part associated with recessions.[50] As with internal ratings, one-year horizons are commonly used.

The New Basel Capital Accord and procyclicality

This procyclicality in risk assessments has attracted considerable attention recently as a result of the proposed revision to the Capital Accord. In its search for greater risk sensitivity, the new Accord implies that, in contrast to previous arrangements, the minimum capital on a given portfolio will change alongside its perceived riskiness, whether measured by external or banks' own internal ratings. The Accord would then result in a much better measurement of cross-

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48 This is the formalisation found in Carey (2000). Rating agencies' risk assessments are sometimes characterised as "through-the-cycle" and contrasted with the "point-in-time" nature of banks' internal credit rating systems or model-based measures; see in particular, Amato and Furfine (2003) for an empirical examination of the degree of procyclicality in ratings. See also Cantor (2002), who provides a somewhat different characterisation of rating agencies' ratings.

49 Note that, strictly speaking, there is a distinction between the horizon for the *assessment* of risk and that for its *quantification*. The former includes the period ahead considered in the evaluation of the risk, the latter the period used for the risk metric. The distinction is clearest if one considers an instrument that is marked to market. Events that might occur over the residual maturity of the instrument affect its current value and its future variability (the assessment horizon). But the holder might just be interested in potential changes in this value over a possibly shorter horizon over which it plans to hold the instrument. This determines the quantification horizon for risk. These issues are further discussed below.

50 This positive correlation in the time dimension has recently been documented by Altman et al. (2002).

sectional or relative risk, as it was originally designed to do. But it might have unintended consequences with respect to the time dimension of risk.[51]

There is indeed some preliminary empirical evidence to suggest that minimum capital requirements will be more procyclical than under current arrangements. In particular, they could increase considerably in bad times. The size of the effect depends very much on the type of risk assessment methodology used and the option adopted. The available evidence, however, suggests that swings of the order of 30 percent in the course of a normal business cycle may be possible. As indicated by evidence from Mexico gathered by Segoviano and Lowe (2002), these could be greater in case of larger business cycle fluctuations accompanied by financial distress (Figure 2).[52]

Figure 2

Mexican output gap and hypothetical IR capital requirement

[51] See, for instance, Danielsson et al (2001) and ECB (2001). For the provisions of the Accord, see BCBS (2001a) and (2001b). See also BIS (2001a). Note that concerns with the procyclicality of capital standards had already been expressed in relation to the current Accord ((Goodhart, 1995; Blum and Hellwig, 1995). These, however, had little to do with time-varying risk perceptions. They related simply to the fact that higher losses in recessions would make capital requirements more binding. The evidence on whether such minimum requirements have led to "credit crunches" is reviewed in BCBS (1999).

[52] See, in addition, Jordan et al (2002) and Catarineu-Rabell et al (2002). Note that in November 2001 the Basel Committee decided to reduce the steepness of the risk curve linking the capital requirement weights to the probability of default partly with a view to dampening the cyclical variability in minimum requirements. This response deals with a time dimension issue through changes in cross-sectional calibration BCBS (2001b).

Even so, regardless of what happens to the *minimum* requirements, the more important question is whether capital cushions *as a whole* and risk measurement generally will be more procyclical under the new Accord. Here, one can point to a number of factors that could alleviate or even fully offset the additional procyclical influences. Think of these factors as another instance of the famous "Lucas critique": behaviour changes as the regime changes. The previous evidence may be partly misleading. There are at least two reasons for this.[53]

First, the Accord is helping to spread and "hardwire" an historic improvement in risk measurement and management culture. The level of the debate has risen immensely over the last couple of years. And awareness of the potential adverse implications of unduly procyclical risk assessments has risen pari passu, both among market participants and supervisors. More generally, better risk management means that problems can be identified and corrected earlier.

Second, Pillars 2 and 3 can underpin this shift. Greater disclosure means that markets may become less tolerant and more suspicious of risk assessments that move a lot over time and lead to substantial upgrades in good times. And supervisors, if they so wished, could rely on the strengthened supervisory review powers to induce greater prudence in risk assessments and/or an increase in capital cushions above the Pillar 1 minima. As advocated by the Basel Committee, stress-testing the credit exposures can be an invaluable tool here.

The bottom line is that we do not quite know the answer. At the same time, there are reasons for cautious optimism. We will need to watch developments closely. But in doing so, we should never lose sight of the fact that the positive contribution to financial stability of the new Accord goes well beyond its implications for procyclicality.

Longer horizons and the role of maturity

Encouraging *longer horizons* for risk assessment could help to limit procyclicality. In particular, it stands to reason that the longer the horizon over which agents chart the future, the less likely it is that they could continue to anticipate the persistence of current conditions. In jargon, lengthening the assessment horizon is likely to strengthen any mean-reverting tendencies in risk perceptions and hence prudence. We know, for instance, that over longer horizons equity returns mean-revert while over shorter ones they show approximate

[53] See, in particular, the discussion in BIS (2002a) and Greenspan (2002).

random walk behaviour.[54] Recall also the famous paper by Frankel and Froot (1990), which had found similar properties in foreign exchange traders' expectations.[55]

The *maturity* of credit exposures implicit in contracts is important here. The residual maturity determines the time horizon over which events could affect the value of the contract. Longer maturities therefore encourage longer assessment horizons. And they could arguably limit the risk of generalised withdrawal of funds or credit crunches at times of stress. Think, for example, of the risks implied by the short maturity of external debt in the case of emerging market countries. Here again, we see the tension between a micro- and a macroprudential approach. *Other things equal*, from the perspective of an individual institution, the longer the maturity of its exposure, the higher the credit risk faced. But for an economy in the aggregate, it is by no means clear that shorter maturities would reduce overall credit risk. What may make sense from the perspective of an individual institution may also have unintended consequences in the aggregate. The calibration of prudential standards would need to take these effects into account as well.[56]

Longer horizons may also be relevant for *capital* decisions. Conceptually, the risk quantification horizon for capital decisions corresponds to the time required to take remedial action, either by replenishing capital or shedding risk. A macroprudential perspective would explicitly incorporate the fact that, at times of generalised stress, remedial action would necessarily be harder and hence take longer, not least owing to the endogenous increase in risk from attempts to manage exposures. The one-year horizon adopted in current practices may well be too short. In fact, empirical evidence tends to support this conclusion.[57]

The relationship between accounting and prudential norms

These considerations point to the *broader relationship between* accounting valuations, on the one hand, and *prudential norms*, on the other. The impact of accounting on financial stability should not be underestimated. It is widely recognised that differences in valuation methodologies can have first-order effects on measures of net worth and income. They can be as important as the specification of the capital standards that should apply to them.

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54 Fama and French (1988).

55 This issue is explored more thoroughly in Borio et al. (2001).

56 These issues are discussed in Lowe (2002).

57 See Barakova and Carey (2002).

And accounting conventions can have a major impact on firms' internal risk management practices.[58] Deficiencies in accounting practices, for instance, have played a role in many of the financial crises seen over the last two decades. Even so, for a number of objective reasons, valuation issues had, until recently, received less attention.

A number of developments have brought such issues into the limelight. First, the New Basel Accord has forced a reconsideration of the link between expected and unexpected losses, loan provisioning, capital and pricing. Second, the debate on appropriate loan provisioning has come to the fore. There is a fairly broad consensus that more forward-looking provisioning could help to bring accounting valuations closer into line with economic valuations and could eliminate a source of artificial procyclicality. In particular, waiting for default to be highly probable before a provision can be made fails to recognise deteriorations in credit quality short of probable default.[59] But there is no agreement on how best to strengthen the forward-looking element. Finally, and more generally, proposals for fair value accounting have stirred a heated debate.[60]

A key question is whether cushions against risk and uncertainties should be built through "conservative", as opposed to "true and fair", valuations or through other means, such as specific prudential norms like minimum capital requirements. In the past, reliance on conservative valuations has been quite common. More recently, the shift towards "true and fair" valuations has reduced the scope of such mechanisms. Looking forward, one concern with fair value accounting is precisely that greater reliance on market values could have destabilising effects whenever asset price misalignments are at the origin of financial instability. In the process, it might also increase the procyclicality of the financial system.

The issue of the relationship and roles of accounting and prudential norms will have to be addressed. On the one hand, conservative valuations may be a simple and effective means of introducing cushions into the system. On the other hand, it might be argued that a sharper distinction between the roles of accounting and prudential norms would increase transparency and clarify the

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58 Enron's internal risk management manual is quite telling here: "Reported earnings follow the rules and principles of accounting. The results do not always create measures consistent with underlying economics. However, corporate management's performance is generally measured by accounting income, not underlying economics. *Risk management strategies are therefore directed at accounting rather than economic performance*" (italics added). See Crockett (2002) for an elaboration on these issues.

59 The changes incorporated in IAS39 go in this direction.

60 These issues are discussed in Borio et al. (2001), Borio and Lowe (2001), BIS (2002a) and Crockett (2002).

relationship between the different goals and means to attain them. This could help reduce the tension between the two perspectives and also speed up progress towards convergence on agreed accounting principles. Clearly, this is an under-researched area that deserves greater attention.[61]

5 Conclusion

Tennyson once said: "Words, like nature, half reveal and half conceal the soul within". But, one could add, while we *cannot* choose what nature is like, we *can* choose what words mean.

This essay has argued that two sharp, intentionally polarised definitions of the "macroprudential" and "microprudential" perspectives are helpful in bringing out the two souls that inevitably coexist in the current regulatory and supervisory arrangements. And that they are useful in highlighting the complementarities, as well as tensions, between the two approaches to securing financial stability. The key thesis developed is that strengthening further the macroprudential orientation of the framework could promote the achievement of this goal.[62]

Strengthening the macroprudential orientation would, in some respects, bring the framework closer to its origin, when the main concern was the disruption to the economic life of a country brought about by *generalised* financial distress. It would take it somewhat away from the pursuit of narrowly interpreted depositor protection objectives while at the same time helping to achieve them in a more meaningful way. And it holds the promise of bringing realistic objectives into closer alignment with the means to attain them.

If this diagnosis is shared, then there is still plenty of work ahead. The agenda is a full one, both for researchers and policymakers. For researchers, there is quite a lot to be done analytically and empirically to sharpen the macroprudential perspective, to better understand what it can tell us about the dynamics of risk and financial instability, and to help develop the tools to address them. For policymakers, the task is to turn the desirable into the feasible, to distinguish the feasible from the impracticable, and to make progress in implementing the shift. Success will also depend on the ability and willingness of market participants to incorporate more meaningfully the lessons of a macroprudential perspective into their own assessment of risk.

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61 Aspects of these issues are discussed in Borio and Lowe (2001) and Crockett (2002).

62 Recently, Padoa-Schioppa (2002) too has emphasised the importance of the macroprudential dimension.

In some respects, the search for appropriate policy responses to financial instability resembles the state of monetary policy in the early 1970s. Now, as then, both researchers and policymakers are beginning to sharpen their understanding of the "enemy". Now, as then, they are groping for solutions. Now, as then, there is no reason to believe that, eventually, their endeavours will not be successful.

In fact, strengthening the macroprudential orientation of the policy framework will put a premium on closer cooperation between supervisory authorities and central banks.[63] This is true regardless of the specific allocation of supervisory responsibilities. It reflects the processes that generate financial instability and its consequences for the macroeconomy. As argued elsewhere, the relationship between the monetary and financial regimes deserves particular attention.[64] There is still a lot we need to learn about how monetary policy interacts with prudential policies and how best to make the two mutually supportive. We need much more research in this area too. But this, as they say, is another story.

References[65]

Abreu, D. and M. K. Brunnermeier (2003), "Bubbles and crashes", *Econometrica* 71(1), 173–204.

Acharya, V. (2001), *A theory of systemic risk and design of prudential bank regulation*, mimeo.

Allen, F. and D. Gale (2000), "Bubbles and crises", *The Economic Journal* 110, 236–256.

Allen, F., S. Morris and H. Shin (2003), *Beauty contests, bubbles and iterated expectations in asset markets*, mimeo.

Allen, L. and A. Saunders (2003), "A survey of cyclical effects in credit risk measurement models", Paper presented at the BIS Conference on "Changes in risk through time: measurement and policy options", *BIS Working Paper* no. 126, Basel, January.*

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63 For a focused elaboration on this point, see Crockett (2001b).

64 Borio and Crockett (2000) and Borio and Lowe (2002a) and Borio et al. (2003). See also BIS (2001a) and (2002b).

65 References listed with an * are available online at the BIS website (www.bis.org).

Altman, E. I., A. Resti and A. Sironi (2002), "The link between default and recovery rates: effects on the procyclicality of regulatory capital ratios", Paper presented at the BIS Conference on "Changes in risk through time: measurement and policy options", *BIS Working Paper* no. 113, Basel, July.*

Amato, J and C. Furfine (2003), "Are credit ratings procyclical?", *BIS Working Paper*, forthcoming.

Bank for International Settlements (2001a), "Cycles and the financial system", *71st Annual Report*, Chapter VII, June, 123–141.*

Bank for International Settlements (2001b), "Consolidation in the financial sector", *Report by the Group of Ten Working Party on Financial Sector Consolidation*, January.*

Bank for International Settlements (2002a), "The interaction between the financial sector and the real economy", *72nd Annual Report*, Chapter VII, June, 122–140.*

Bank for International Settlements (2002b), "Monetary policy in the advanced industrial economies", *72nd Annual Report*, Chapter IV, June, 59–78.*

Barakova, I and M. Carey (2002), *How quickly do troubled US banks recapitalize? With implications for portfolio VaR credit loss horizons*, mimeo.

Basel Committee on Banking Supervision (2001a), *The New Basel Capital Accord*, Consultative Document, January.*

Basel Committee on Banking Supervision (2001b), *Potential modifications to the Committee's proposals*, 5 November.

Basel Committee on Banking Supervision (1999), "Capital requirements and bank behaviour: the impact of the Basel Accord", *BCBS Working Paper* no. 1, Basel, April.*

Berger, A. N. and G. F. Udell (2003), "The institutional memory hypothesis and the procyclicality of bank lending behaviour", Paper presented at the BIS Conference on "Changes in risk through time: measurement and policy options", *BIS Working Paper* no. 125, Basel, January.*

Bernanke, B. S., M. Gertler and S. Gilchrist (1999), "The financial accelerator in a quantitative business cycle framework", in: J. Taylor and M.Woodford (eds.), *Handbook of Macroeconomics*, Amsterdam.

Blum, J. and M.Hellwig (1995), "The macroeconomic implications of capital adequacy requirements for banks", *European Economic Review* 39, 739–749.

Borio, C. (2000), "Market liquidity and stress: selected issues and policy implications", *BIS Quarterly Review*, Basel, November, 38–48.*

Borio, C. and A. D. Crockett (2000), "In search of anchors for financial and monetary stability", *Greek Economic Review*, 20(2), Autumn, 1–14.

Borio, C., B. English and A. Filardo (2003), "A tale of two perspectives: old or new challenges for monetary policy?", *BIS Working Paper* no. 127, Basel, February.

Borio, C. and R. Filosa (1994), "The changing borders of banking: trends and implications", *BIS Economic Paper* no. 43, Basel, December.

Borio, C., C. Furfine and P. Lowe (2001), "Procyclicality of the financial system and financial stability: issues and policy options" in marrying the macro- and microprudential dimensions of financial stability, *BIS Papers* no. 1, 1–57.*

Borio, C., N. Kennedy and S. Prowse (1994), "Exploring aggregate asset price fluctuations across countries: measurement, determinants and monetary policy implications", *BIS Economic Paper* no. 40, Basel, April.

Borio, C. and P. Lowe (2001), "To provision or not to provision", *BIS Quarterly Review*, June, 36–48.*

Borio, C. and P. Lowe (2002a), "Asset prices, financial and monetary stability: exploring the nexus", Paper presented at the BIS Conference on "Changes in risk through time: measurement and policy options", *BIS Working Paper* no. 114, Basel, July.*

Borio, C. and P. Lowe (2002b), "Assessing the risk of banking crises", *BIS Quarterly Review*, Basel, December, 43–54.*

Borio, C. and P. Van den Bergh (1993), "The nature and management of payment system risks: an international perspective", *BIS Economic Paper* no. 36, February.

Calomiris, C. and G. Gorton (1991), "The origins of banking panics: models, facts and bank regulation", in: R. Hubbard (ed.), *Financial markets and financial crises*, NBER, University of Chicago Press, 109–173.

Cantor, R. (2002), *Through-the-cycle vs point-in-time ratings*, Powerpoint presentation at the BIS Conference on "Changes in risk through time: measurement and policy options", Basel, March.

Carey, M. (1990), *Feeding the fad: The federal land banks, land market efficiency and the farm credit crisis*, Dissertation, University of California, Berkeley.

Carey, M. (2000), "Dimensions of credit risk and their relationship to economic capital requirements", in: F. Mishkin (ed.), *Prudential Supervision: What works and what doesn't*, NBER and UC Press.

Catarineu-Rabell, E., P. Jackson and D. P. Tsomocos (2002), *Procyclicality and the new Basel Accord - banks' choice of loan rating system*, London, May, mimeo.

Chang R. and A. Velasco (1998), "Financial crises in emerging markets: A canonical model", *NBER Working Paper* no. 6606, Boston, MA.

Corsetti, G. (1998), "Interpreting the Asian financial crisis: Open issues in theory and policy", *Asian Development Review* 16 2), 18–63.

Corsetti, G. and P. Pesenti and N. Roubini (1999), "Paper tigers, a model of the Asian crisis", E*uropean Economic Review* 43, 1211–236.

Crockett, A. (2000a), "Marrying the micro- and macroprudential dimensions of financial stability", *BIS Speeches*, 21 September.*

Crockett, A. (2000b), "In search of anchors for financial and monetary stability", *BIS Speeches*, 27 April.*

Crockett, A. (2001a), "Market discipline and financial stability", *BIS Speeches*, 23 May.* Reprinted in Bank of England's Financial Stability Review, Issue 10, Article 6, June, 166–173.

Crockett, A. (2001b), "Monetary policy and financial stability", *BIS Speeches*, 13 February.*

Crockett, A. (2002), "Financial reporting: from shadows to limelight", Keynote speech at the joint BIS/Bocconi University Centennial conference on "*Risk and stability in the financial system: what roles for regulators, management and market discipline?*", Milan, June.*

Danielsson, J., P. Embrechts, C. Goodhart, C. Keating, F. Muennich, O. Renault and H. S. Shin (2001), "An academic response to Basel II", *Special Paper* no. 130, London School of Economics Financial Markets Group.

Danielsson, J., H. S. Shin and J.-P. Zigrand (2002), *The impact of risk regulation on price dynamics*, Financial Markets Group, London School of Economics, mimeo.

Davis, E. P. (1995), *Debt financial fragility and systemic risk*, revised and expanded edition, Oxford: Clarendon Press.

De Bandt, O. and P. Hartmann (2000), "Systemic risk: A survey", *ECB Working Paper* no. 35, Frankfurt.

De Nicolo, G. and M. Kwast (2001), "Systematic risk and financial consolidation: are they related?", Board of Governors of the Federal Reserve System, *Finance and Economics Discussion Series* no. 2001–33, August.

Dewatripont, M. and J. Tirole (1993), *The prudential regulation of banks*, Cambridge, MA: MIT Press.

Diamond, D. W. and P. H. Dybvig (1983), "Bank runs, deposit insurance and liquidity", *Journal of Political Economy* 91(3), 401–419.

Eichengreen, B. and C. Arteta (2000), "Banking crises in emerging markets: presumptions and evidence", *Center for International and Development Economics Research Working Paper*, C00–115, August.

Elsinger, H., A. Lehar and M. Summer (2002), "Risk assessment for banking systems", Paper presented at the CESifo Venice Summer Institute 2002 workshop held in Venice, 13–20 July; *Austrian National Bank Working Paper* no. 79, October.

Embrechts, P., A. McNeil and D. Straumann (1999), *Correlation and dependence in risk management: properties and pitfalls*, ETH, mimeo.

Euro-currency Standing Committee (1992), "Recent developments in international interbank relations", *Promisel Report* no. 2, October.

European Central Bank (2001), *The New Basel Capital Accord: Comments of the European Central Bank*.

Fama, E. and K. French (1988), "Permanent and temporary components of stock prices", *Journal of Political Economy* 96, 246–273.

Fernández de Lis, S. J. Martinez Pagés and S. Saurina (2001), "Credit growth, problem loans and credit risk provisioning in Spain", in marrying the macro- and microprudential dimensions of financial stability, *BIS Papers* no. 1, Basel, March.

Flannery, M. (1998), "Using market information in prudential bank supervision: a review of the US empirical evidence", *Journal of Money, Credit and Banking*, part I, August, 273–305.

Frankel, J. and K. Froot (1990), "Chartists, fundamentalists and trading in the foreign exchange market", *American Economic Review*, 80(2), May, 181–185.

Froot, K. A., D. S. Sharfstein and J. C. Stein (1992), "Herd on the street: informational efficiencies in a market with short-term speculation", *Journal of Finance* 47(4), 1461–1484.

Furfine, C. (1999), "Interbank exposures: quantifying the risk of contagion", *BIS Working Paper* no. 70, June.*

Gertler, M. (1988), "Financial structure and aggregate economic activity", *Journal of Money, Credit and Banking* 20, August, 559–588.

Goodhart, C. A. E. (1995), "Price stability and financial fragility", in: K. Kawamoto, Z. Nakajima and H. Taguchi (eds.), *Financial Stability in a Changing Environment*, Chapter 10, London:Macmillan, 439–510.

Goodhart, C. and J. Danielsson (2001), "The inter-temporal nature of risk", 23rd SUERF Colloquium on "Technology and finance: challenges for financial markets, business strategies and policy makers", Brussels, October.

Goodhart, C. and P. J. R. De Largy (1999); "Financial crises: plus ça change, plus c'est la meme chose", *LSE Financial Markets Group Special Paper* no. 108.

Gorton, G. (1988), "Banking panics and business cycles", *Oxford Economic Papers* 40, 751–781.

Gourinchas, P., R. Valdes and O. Landerretche (2001), "Lending booms: Latin America and the world", *NBER Working Paper* 8249.

Greenspan, A. (2002), "Cyclicality and banking regulation", Remarks given at the conference on bank structure and competition, Federal Reserve Bank of Chicago, May 10.

Hart, O. (1995), *Firms, contracts and financial structure*, Clarendon Lectures in Economics series, Oxford: Oxford University Press.

Hart, O. and B. Holmström (1988), "The theory of contracts", in: T. Bewley (ed.) *Advances in economic theory*, Cambridge: Cambridge University Press.

Hawkins, J. and M. Klau (2000), "Measuring potential vulnerabilities in emerging market economies", *BIS Working Paper* no. 91, October.*

Hellwig, M. (1995), "Systemic aspects of risk management in banking and finance", *Schweizerische Zeitschrift für Volkswirtschaft and Statistik* 131, 723–737.

Hellwig, M. (1998), "Banks, markets and the allocation of risks in an economy", *Journal of Institutional and Theoretical Economics (JITE)* 154.

Hofmann, B. (2001), "The determinants of bank credit to the private sector in industrialised countries", *BIS Working Paper* no. 108, Basel, December.*

Hoggarth, G. and V. Saporta (2001), "Costs of banking system instability: some empirical evidence", *Bank of England Financial Stability Review*, Issue 10, Article 5, June.

Honohan, P. (1997), "Banking system failures in developing and transition economies: diagnosis and prediction", *BIS Working Paper* no. 39, Basel, January.*

International Monetary Fund (2002a), *Global Financial Stability Report*, 13 March.

International Monetary Fund (2002b), "Financial soundness indicators: analytical aspects and country practices", *Occasional Paper* no. 212, 8 April.

Jordan, J., J. Peek and E. Rosengren (2002), "Credit risk modeling and the cyclicality of capital", Paper presented at the BIS Conference on "Changes in risk through time: measurement and policy options", *BIS Working Paper*, Basel, forthcoming.

Kaminsky, G. and C. Reinhart (1999), "The twin crises: the causes of banking and balance-of-payments problems", *American Economic Review* 89(3), 473–500.

Kaufman, G. (1994), "Bank contagion: a review of the theory and evidence", *Journal of Financial Services Research*, April, 123–150.

Kent, C. and P. D'Arcy (2001), "Cyclical prudence - credit cycles in Australia", in marrying the macro- and microprudential dimensions of financial stability, *BIS Papers* no. 1, Basel, March, 58–90.*

Kindleberger, C. (1996), *Manias, Panics and Crashes*, 3rd edition ,Cambridge: Cambridge University Press.

Kiyotaki, N. and J. Moore (1997), "Credit cycles", *Journal of Political Economy* 105(2), 211–248.

Lowe, P. (2002), "Credit risk measurement and procyclicality", Paper presented at the Conference on "Banking supervision at the crossroads" on the occasion of the 50th Anniversary of the Dutch Act on the supervision on credit systems, *BIS Working Paper* no. 116, Basel, August.*

Minsky, H. P. (1982), "Can "it" happen again?", *Essays on Instability and Finance*, Armonk: M E Sharpe.

Morris, S. and H. Shin (1998), "Unique equilibrium in a model of self-fulfilling currency attacks", *American Economic Review* 88, 587–597.

Padoa-Schioppa, T. (2002), "Central banks and financial stability", paper presented at the second biennial ECB conference *The Transformation of the European Financial System*, Frankfurt, 24–25 October.

Rochet, J.-C. and J. Tirole (1996a), "Interbank lending and systemic risk", *Journal of Money, Credit and Banking* 28(4), 733–762.

Rochet, J.-C. and J. Tirole (1996b), "Controlling risk in payment systems", *Journal of Money, Credit and Banking* 28(4), 832–862.

Sachs, J. and S. Radelet (1998), "The East Asian financial crisis: Diagnosis, remedies, prospects", *Brookings Papers on Economic Activity* 1(1), 74.

Samuelson, P. (1973), *Economics*, ninth edition, Tokyo: McGraw-Hill.

Santos, J. A. C. (2000), "Bank capital regulation in contemporary banking theory: A review of the literature", *BIS Working Paper* no. 90, Basel. September.

Segoviano, M. A. and P. Lowe (2002), "Internal ratings, the business cycle and capital requirements: some evidence from an emerging market economy", Paper presented at the Federal Reserve Bank of Boston Conference on "The impact of economic slowdowns on financial institutions and their regulators", *BIS Working Paper* no. 117, Basel, August.*

Shleifer, A. and R. Vishny (1997), "The limits of arbitrage", *Journal of Finance* 52, 33–55.

Tsatsaronis, K. (2002), "Systemic financial risk and macroprudential supervision", Paper presented at the Bocconi University Centennial conference on "Risk and stability in the financial system: what roles for regulators, management and market discipline?", *BIS Papers*, Basel, forthcoming.

Van den Bergh, P. and R. Sahajwala (2000), "Supervisory risk assessment and early warning systems", *Basel Committee on Banking Supervision Working Paper* no. 4, Basel, December.*

Zhu, H. (2001), "Bank runs without self-fulfilling prophecies", *BIS Working Paper* no. 106, Basel, December.*

The Macroeconomic Implications of the New Basel Accord

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***Abstract**: This paper assesses the macroeconomic implications of Basel II in light of recent development in the literature. It argues that although Basel II is likely to strengthen banks' incentives to control their risk-taking, it may reduce credit supply to certain borrowers, such as small- and medium-sized enterprises (SMEs) and firms based in developing countries. Furthermore, Basel II may increase procyclical fluctuation of bank loans while weakening the monetary transmission mechanism during recessions. A widespread adoption of the "through-the-cycle" risk models may mitigate these problems, but not completely eliminate them. This paper also considers whether monetary policy can be used to counter effectively the procyclicality problem inherent in Basel II.* (*JEL* E52, G21, G28)

1 Introduction

In 2007, the existing Basel Capital Accord (Basel I) is to be replaced by the revised Accord (Basel II). Basel II introduces several major changes to capital adequacy regulation for internationally active banks. Due to its significance for the banking industry, the proposed New Basel Accord has attracted considerable attention from researchers, policy makers, and the financial community across the world. The primary objective of this regulatory change is to strengthen banks' incentives to control their risk exposure, by making the capital adequacy regulation more risk-sensitive.

Although Basel II is likely to promote financial stability, several economists have expressed concerns that it may entail some macroeconomic consequences that are not entirely benign. Given the existing evidence that capital adequacy regulation affects bank lending, these issues are clearly germane to a complete assessment of the New Basel Accord. Thus, it is vital to understand its expected macroeconomic impact, and to consider how any undesirable side-effects can be mitigated.

The objective of this paper is to assess the macroeconomic implications of Basel II in light of recent development in the literature. This paper does not

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attempt to provide a comprehensive overview of the existing theoretical and empirical research on capital adequacy regulation, since several already exist.[1] Nor does it aim to review all the policy is sues surrounding Basel II, since this has also been done by others.[2] Instead, this paper focuses on the potential macroeconomic impact of Basel II, and evaluates its significance using existing theory and evidence on the role of financial intermediaries in the aggregate economy.

The rest of this paper is organized as follows. Section 2 briefly discusses the rationale for regulating banks' capital. Section 3 then discusses the shortcomings of the existing capital adequacy regulation (Basel I), and considers how Basel II might enhance banks' incentives to control their risk-taking. Section 4 provides an overview of the theory and evidence on the impact of capital adequacy regulation on the aggregate economy, and Section 5 examines the potential macroeconomic implications of introducing Basel II. Section 6 then considers how the adoption of certain risk models and an effective application of monetary policy could potentially mitigate the macroeconomic side-effects of Basel II.

2 Rationale for capital adequacy regulation

Before discussing the macroeconomic implications of Basel II, it may be worth considering why capital adequacy regulation exists at all. Presently, banks with international operations are regulated by the capital adequacy regulation set out in the 1988 Basel Capital Accord, under which they are required to maintain a minimum of 8 percent capital-to-risk-weighted-asset ratio. The numerator of this regulatory ratio is composed of Tier I and Tier II capital: the former consists of equity capital and disclosed reserves, while the latter may include items similar to equity capital, such as the subordinated debt and capital gains. The risk-adjusted assets, which comprise the denominator of the ratio, include on- and off-balance sheet items weighted appropriately depending on which of the four risk categories (0 percent, 20 percent, 50 percent and 100 percent) that particular asset belongs to. Although the original 1988 Accord only took credit risk into account, the subsequent amendment in 1996 also incorporated market risk.

The primary aim of capital adequacy regulation is to limit the risk-taking by banks. Most industrial countries now have deposit insurance, in order to pre-

[1] For a literature review of theoretical developments in this field, see Santos (2001). For an overview of the empirical literature, see Jackson et al. (1999).

[2] See inter alia Daníelsson et al. (2001).

vent banks runs and to protect small and uninformed depositors.[3] Banks that are subject to a flat insurance premium, however, may have excessive incentives to take risks, since their payoff functions are convex with respect to their net worth. Capital adequacy requirement may mitigate this problem, since the marginal value of deposit insurance option with respect to asset risk falls with declining leverage (Furlong and Keeley, 1989).

In addition, the required capital adequacy ratio can also be used to define the threshold at which the regulator intervenes in the management of the failing bank. Since shareholders' payoff function is convex with respect to the bank's net worth, their incentive to take risks increases as its net worth declines. Although this would hurt the interests of the bank's depositors, they may fail to intervene if they are too small and uninformed about the bank's management. Hence, in order to protect the depositors against shareholder moral hazard, it is optimal to transfer the bank's control rights from its shareholders to the regulator who represent the interests of the bank's depositors, before its capital is depleted (Dewatripont and Tirole, 1994).

3 The New Basel Accord (Basel II)

Although capital adequacy requirement can, in theory, limit risk-taking by banks, some have questioned whether the existing regulation – Basel I – is, in fact, effective. The main criticism against Basel I is that its method of calculating the capital-to-risk-asset ratio does not accurately reflect the riskiness of banks' portfolios, and therefore does not give them adequate incentives to control their risk exposures. Under Basel I, it is the category of borrowers – sovereign, bank, and corporate – that determines into which of the four risk buckets (0 percent, 20 percent, 50 percent, and 100 percent) an asset is categorized. For instance, claims on any OECD sovereigns receive a 0 percent risk-weight, while all loans to the corporate sector are assigned a 100 percent risk-weight. Hence, Basel I does not differentiate banks' borrowers within the same risk bucket according to their riskiness. This creates opportunities for "regulatory capital arbitrage", a process through which banks can switch to high-risk, high-return portfolios without altering their capital-to-asset ratio. At the crudest level, banks can shift their lending from safer to riskier borrowers within the particular risk category without reducing their capital-to-risk asset ratio. Alternatively, banks can use securitization to increase their capital-to-risk asset ratio without reducing their portfolio risks. According to Jackson et al. (1999), the volume of regulatory capital arbitrage is significant and increasing, espe-

[3] Diamond and Dybvig (1983) show that the possibility of bank runs is inherent in the fractional reserve system with uninsured deposits.

cially among the biggest banks. Since regulatory arbitrage allows banks to increase their portfolio risk without altering their capital-to-risk asset, it renders capital adequacy requirement ineffectual in limiting their risk-taking. For the same reason, the reported capital adequacy ratio could be a misleading indicator of the banks' true financial states.

In order to address these problems, the Basel Committee on Banking Supervision is currently revising the regulations set out by the 1988 Accord, with the objective of developing more risk-sensitive standardized internal measurement approaches to capital adequacy. It is expected that the new Accord – Basel II – will be finalized by the Committee in 2003 and implemented worldwide in 2007. Basel II is based upon three pillars: minimum capital requirements (Pillar 1), a supervisory review process (Pillar 2), and effective use of market discipline (Pillar 3).

What are the main changes that Basel II seeks to introduce? One major proposal for reform is to incorporate the borrowers' credit risk in calculating the capital adequacy ratio (Pillar 1). Under Basel II, the risk-weight on loans is determined by both the category of borrowers and the riskiness of a particular borrower. Hence, instead of having a fixed 100 percent risk-weight on all loans to the corporate sector, it is proposed that loans to less risky firms receive 50 percent risk-weight, while those to risky ones are assigned 150 percent risk-weight.

Moreover, Basel II offers banks the choice of adopting either the *new standardized approach*, or the *internal rating based (IRB) approach* to measure credit risk. Under the new standardized approach, the risk-weights will be based on ratings provided by an external credit assessment institution, so that claims on borrowers with sound credit ratings receive lower risk-weights. Under the IRB approach, banks will be allowed to use their own internal models to assess credit risk in their portfolios, subject to strict methodological and disclosure standards. The IRB approach allows greater risk-sensitivity compared to the standardized approach, since it uses a wider range of risk-weights. The supervisors are responsible for ensuring that banks adopting the standardized approach comply with its conditions and requirements, while making sure that each bank using the IRB approach has a sound internal risk assessment process (Pillar 2). Furthermore, banks adopting the IRB approach are expected to fulfil a set of disclosure requirements in order to ensure that market participants have adequate information to discipline errant banks (Pillar 3).

Basel II is meant to strengthen banks' incentives to control their risk exposures relative to Basel I, which relies on a more crude method of risk measurement. The new regulation is also likely to reduce the scope for capital arbitrage. Furthermore, Basel II effectively exploits information about the borrowers'

creditworthiness held internally by banks, by allowing financial institutions that fulfil certain requirements to adopt the IRB approach. Hence, in several respects, Basel II is superior to Basel I.

On the other hand, some economists and policy makers have voiced concerns that although Basel II corrects several major shortcomings of Basel I, it may give rise to new problems of its own. The various issues raised thus far fall into three broad categories. First, several economists have questioned whether Basel II, in fact, promotes financial stability. The risk-sensitive approach to capital adequacy regulation can promote financial stability to the extent that the risk measurements used are reasonably accurate. The risk measurements, however, have several serious limitations. For instance, Morris and Shin (1999) argue that Value-at-Risk (VaR) models do not take into account the endogeneity of risk, so that they produce inaccurate volatility measures. This is because the assumption underlying existing risk management models such as VaR is that the price of an asset falls to a very low level with a certain exogenous probability, whereas in reality, short-run price fluctuations depend on actions taken by market participants. Since such risk models do not take into account the strategic nature of risk, they could render the market participants inadequately provisioned in a crisis situation when all the traders attempt to unwind their positions simultaneously. Thus, if the risk measurements themselves are inaccurate, capital adequacy regulation based on these may fail to promote financial stability.

The second concern is that the new standardized approach may distort firms' incentives in their use of external credit ratings. Credit agencies have expressed concerns that the use of credit ratings in capital adequacy regulation may prompt firms to "shop" for highest ratings in order to reduce their borrowing costs. Such "rating-shopping" may pressure credit agencies to inflate their ratings, so that it may undermine their credibility. Further, others fear that risky firms may forgo ratings all together, if exposures to unrated firms were to receive lower risk-weight (100 percent) than those to low-rated firms (150 percent) as proposed by the Basel Committee. This may reduce the degree of transparency.

The third major policy issue is whether Basel II will have any unintended consequences on the real sector through its impact on bank lending. Since the first two issues have been discussed elsewhere, this paper will not delve into these any further.[4] The following discussion will therefore concentrate on this third issue, and examine the major macroeconomic implications of Basel II.

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[4] See inter alia Danielsson et al. (2001) and Morris and Shin (1999) for a discussion of the limitations of existing risk models. The problem of "rating shopping" is discussed by Cantor (2001) and Griep and De Stefano (2001).

4 How does the capital adequacy regulation affect the aggregate economy?

Before analyzing the impact of Basel II, one might first ask why and how capital adequacy regulation can affect the real sector. Broadly speaking, the current policy debate focuses upon two issues: the impact of capital adequacy requirement on the bank's credit supply, and its effect on the monetary transmission mechanism.

The first concern is that capital adequacy regulation may cause a credit crunch affecting the real sector. If a bank's capital-to-risk asset ratio becomes very low, it must either a) raise more capital, b) curtail its lending, or c) shift its portfolio towards assets with lower risk-weights. As Jackson et al. (1999) point out, banks are likely to choose the most cost-effective way of meeting the capital adequacy requirement. Hence, if the cost of raising new capital is very high – as is often the case for financially weak institutions – banks are likely to reduce their lending in order to fulfil the regulatory requirement. If many banks behave in this fashion at the same time, it would lead to a reduction in the aggregate loan supply. Several empirical papers report evidence for different countries that banks subjected to capital adequacy requirement curtail their lending in response to a negative shock to their regulatory capital.[5]

Such a reduction in bank loans would not affect the real output, as long as firms can quickly find alternative sources of finance. But given the presence of asymmetric information in the financial market, this may not be feasible for some borrowers, so that they are forced to curtail their investment. A fall in loan supply is therefore likely to affect the smaller firms most adversely, since they tend to have little access to financial markets.[6] Hence, if banks cannot raise capital flexibly and some firms are dependent on bank loans, a fall in bank capital or an increase in capital adequacy requirement leads to a reduction in aggregate loan supply and output.[7]

Moreover, the recent literature suggests that capital adequacy regulation may also affect the monetary transmission mechanism. If some firms are "bank-dependent", the responsiveness of loan supply to changes in monetary policy determines the strength of the transmission mechanism. Chami and Cosimano (2001) and Van den Heuvel (2002) argue that capital adequacy regulation

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5 For the American case, see Bernanke and Lown (1991), Furlong (1992), and Peek and Rosengren (1995). Ito and Nagataki Sasaki (1998) and Peek and Rosengren (1997) examine the Japanese case. For the Korean case, see Choi (2000).

6 Sekine (1999), for instance, reports that the capital adequacy ratios of the main banks constrained the investment by smaller non-bond issuing firms during 1993-95 in Japan.

7 See Tanaka (2002) for a formal discussion.

gives rise to a financial accelerator. In both papers, a tight monetary policy reduces banks' capital and constrains their ability to lend, if they are subject to capital adequacy requirement.[8] Hence, tight money reduces banks' loan supply by restricting their ability to lend in the future.

In the presence of a capital adequacy requirement, the strength of the monetary transmission mechanism may depend upon how well banks are capitalized. In a simple static model, Kashyap and Stein (1994) have shown that if the capital adequacy requirement is binding, bank loans may not respond at all to a monetary expansion. In a more general but similarly static framework, Tanaka (2002) shows that the monetary transmission mechanism is weakened if banks are poorly capitalized, or the capital adequacy requirement is very stringent: under these circumstances, they have little scope for expanding their loan supply in response to a monetary expansion. In a dynamic context, Van den Heuvel (2002a) illustrates that the effects are more subtle. Although the loan supply of a poorly capitalized bank may not initially respond to an expansionary monetary policy, it tends to overreact after the first quarter. This is because a lower interest rate increases banks' profits and hence reduces the probability that the capital adequacy requirement will bind in the future. Thus, if banks are initially poorly capitalized, loan supply will not respond to an expansionary monetary policy in the first instance, but its dynamic effect may well be stronger.

5 Macroeconomic implications of the New Basel Accord

Given the existing theory and evidence discussed above, what are the implications of the new Basel Accord for the aggregate economy? The macroeconomic concerns surrounding Basel II can be divided into two specific categories. The first issue is whether Basel II will reduce loan supply to certain sectors of the economy. The second concern is whether it will impact the cyclical behaviour of bank lending and hence affect macroeconomic dynamics.

5.1 Cross-sectional implications

One of the major policy concerns is whether the risk-sensitive approach of Basel II would restrict credit supply to certain types of borrowers. In a consul-

[8] In Van den Heuvel (2002a), a tight monetary policy reduces the net interest rate margin and hence bank profits. Since bank capital consists of retained earnings, lower profits in this quarter imply lower capital in the next quarter, so that a monetary contraction reduces the loan supply. In Chami and Cosimano (2001), a monetary contraction reduces future profitability of loans and banks' shareholder values, so that they have weaker incentives to hold capital.

tative paper published in 2001, the Basel Committee proposed that credit exposures to unrated firms receive a minimum of 100 percent risk-weight under Basel II. This has raised concerns that Basel II may cause a credit crunch affecting unrated firms, most of which are small- and medium-sized enterprises (SMEs). Under Basel II, banks face stronger incentives to shift their lending from unrated firms to companies with sound credit ratings, since claims on the latter will have lower capital requirements. Since unrated SMEs tend to be "bank-dependent" and have little access to market-based finance, a reduction in loan supply is likely to affect their investment and production. Such a concern is especially serious for countries with a "bank-centred" financial system – such as Germany and Japan – where firms tend to rely more on bank loans.

In response to this criticism, the Committee announced in July 2002 that exposures to SMEs – defined as firms with less than 50 million euros in annual sales – will receive a lower capital requirement than exposures to larger firms under the IRB approach. According to its announcement, the reduction in the required amount of capital will depend on the size of the borrower, and should result in an average reduction of approximately 10 percent across the entire set of SME borrowers in the IRB framework for corporate loans. Although this revision is likely to improve the credit availability for small enterprises, it is likely to affect the loan supply to medium-sized firms just above this threshold most adversely.

Basel II may also reduce the credit supply to borrowers based in developing countries. According to the study by Ferri et al. (2001), Basel II will on average lead to a 1 percentage point reduction and a 1.5 percentage point increase in the required capital for lending to an OECD corporation and a corporation in the poorer countries, respectively. Furthermore, Basel II is expected to increase the capital requirements for loans to OECD banks and non-OECD banks by 2 percentage points and 6 percentage points, respectively. Hence, the introduction of Basel II may prompt banks to shift their lending to OECD borrowers; if so, it will reduce the credit supply to borrowers based in developing countries and increase their borrowing costs. Since financial markets in poorer countries tend to be under-developed, such a reduction in loan supply is likely to have a negative effect on real output.

Their empirical analysis also shows that banks and corporations based in developing countries are likely to be downgraded together with their sovereigns, but they are not necessarily upgraded when their sovereigns are upgraded.[9] This has two implications. First, it may become more likely that a sovereign downgrade triggers a capital account crisis, since banks subjected to Basel II

[9] Ferri et al. (1999) also report that the sovereign downgrading during the Asian Crisis was "excessive" in light of the countries' economic fundamentals.

face stronger incentives to withdraw finance from low-rated borrowers. The experience of Asian Crisis shows that a massive withdrawal of bank lending can create serious economic disruptions. Second, firms based in developing countries are likely to experience severe credit crunch during currency crises which tend to trigger sovereign downgrades, but their access to credit may not be restored quickly even as the economy starts recovering. Hence, the use of credit rating under Basel II may exacerbate credit shortage for banks and corporations in emerging markets during a crisis period, delaying the recovery of the affected economies.

It could be argued that discouraging lending to emerging markets and developing countries is beneficial from the point of view of promoting financial stability in the developed economies, since their banks would be less exposed to risk. However, as Griffith-Jones et al. (2002) point out, an international loan portfolio which is diversified across the developed, emerging, and developing regions could have lower overall portfolio risk than one focused exclusively on developed markets. By not taking into account the benefits of international diversification, Basel II could encourage banks to concentrate their portfolio in developed economies, and this in turn could increase their overall portfolio risk. Thus, if one takes into account the benefits of portfolio diversification, it is not clear whether discouraging lending to emerging markets in fact promotes financial stability in developed economies.

5.2 Dynamic implications

Another major concern surrounding Basel II is that it may increase the cyclical volatility of bank loans and output. Since measured credit risk tends to fall during booms and rise during recessions, the risk-weights on assets under Basel II are likely to undergo countercyclical fluctuations, so that banks become more "capital-constrained" during recessions and less so during booms. Raising new capital, on the other hand, tends to be less costly during booms and more expensive during recessions. Hence, banks operating under Basel II have stronger incentives to expand their lending aggressively during economic upswings and cut it sharply during downturns. Such lending behaviour may in turn exacerbate the cyclical volatility of output.

Moreover, Basel II may weaken the short-run effect of a monetary expansion during economic downturns: banks may not be able to expand their loan supply significantly in response to an increase in money supply since measured credit risk tends to be high during recessions.[10] The dynamic effect of a

[10] See Tanaka (2002).

monetary policy shock under Basel II, however, is more uncertain. On the one hand, it is possible that a monetary expansion relaxes banks' capital constraints after a time lag and stimulates the economy, which in turn may improve borrowers' balance sheet conditions and their credit quality. If so, the dynamic response of bank loans to a monetary stimulus would be stronger under Basel II, even though this might come with some delay.[11] On the other hand, it is also possible that the initial failure of the monetary expansion to stimulate banks' loan supply forces some firms to reduce their investments, which could lower firms' net worths and reduce their credit quality next period. This in turn could discourage banks from lending to these firms, so that it is also possible that a monetary expansion fails to stimulate the economy for a sustained period under Basel II. To sum up, the short-run response of loan supply and output to a monetary expansion is likely to be weaker under Basel II, when an economy is in a recession, but the dynamic impact of a monetary policy shock is likely to be more uncertain.

Note that these concerns over the impact of Basel II on output fluctuations and the monetary transmission mechanism stem from the countercyclical fluctuations of the risk-weights, which in turn generate procyclical fluctuations in banks' lending capacity. Hence, there are advantages in keeping the risk-weights on loans relatively stable over business cycles, while ensuring that they reflect the relative risks of different assets. This can, for instance, be achieved if the risk measurement takes into account the impact of business cycles on the borrowers' ability to meet their debt obligations in the first place. Since different risk models produce different risk measurements, which are used to calculate the required capital under Basel II, it becomes extremely important what risk models are adopted by banks and credit agencies.

Broadly speaking, there are two approaches to measuring credit risk. First is the so-called "point-in-time" approach, which exploits the information about the borrower's current equity price and leverage to assess its riskiness, using a model based on option pricing theory.[12] Hence, the measured default probability of a firm increases if its leverage rises, its equity price falls or it becomes more volatile. This approach measures the riskiness of borrowers conditional on the point in cycle, and hence it does not take into account the impact of business cycles on firms' default risk. Accordingly, the measured risk rises during recessions and falls during booms. Borio et al. (2001) document that most internal rating systems used by banks use this "point-in-time" approach, which is based on a one-year horizon for measuring risk.

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[11] See Van den Heuvel (2002b) for further discussion.

[12] Hence, the "point-in-time" approach is also often called the "Merton approach".

An alternative is the "through-the-cycle" approach, which attempts to estimate the borrower's ability to meet its debt obligations against reasonably adverse economic scenarios. Most credit rating agencies – such as Moody's and Standard and Poor's – use this method. Under this approach, the ratings are not conditioned on a point in the cycle; instead, they take into account the impact of *expected* cyclical movements on the borrowers' default risk. In principle, recessions trigger downgrades only if the realized economic downturn or the realized impact of the recession on the default risk of a particular borrower is worse than expected. Hence, credit risk measured using this "through-the-cycle" method is generally more stable over business cycles compared to the "point-in-time" approach.

Thus, risk-weights on banks' assets under Basel II are likely to be much more stable over business cycles if they are based on risk measurements derived from "through-the-cycle" models rather than "point-in-time" models.[13] Hence, a widespread use of "through-the-cycle" approach is likely to moderate any procyclical fluctuations of loan supply caused by Basel II. Similarly, Basel II is less likely to alter the monetary transmission mechanism significantly if banks and credit agencies were to adopt the "through-the-cycle" method, since banks' capital constraints are likely to be more stable over business cycles.

One important policy question, therefore, is whether banks adopting the IRB approach have the appropriate incentives to use "through-the-cycle" risk models. Catarineu-Rabell et al. (2002) argue that given the choice, banks will opt for "point-in-time" approach rather than "through-the-cycle" approach, since the latter will lower their profits. Their conclusion raises serious concerns over the IRB approach of Basel II: left alone, banks may simply choose to rely upon "point-in-time" risk models, even though this would lead to increased cyclical volatility of loan supply in the aggregate. Hence, their analysis indicates that banks adopting the IRB approach may need the extra incentives to use the "through-the-cycle" approach.

Although the "through-the-cycle" approach is likely to limit the undesirable impact of Basel II on macroeconomic dynamics, its imperfections must also be noted. For instance, credit ratings derived from existing "through-the-cycle" models tend to lag rather than lead business cycles, so that the capital adequacy requirement based on external credit ratings is likely to be lax during booms and stringent during recessions.[14] Hence, the procyclicality problem of

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[13] Catarineu-Rabell et al. (2002) show that banks using "point-in-time" approach are likely to be capital constrained in recessions.

[14] For empirical evidence, see inter alia Monfort and Mulder (1999) and Altman and Saunders (2001).

Basel II is unlikely to be eliminated, though perhaps mitigated, by a widespread adoption of "through-the-cycle" approach.

6 Conclusion and policy implications

The existing capital adequacy regulation – the so-called Basel I – has several problems, and the introduction of a more risk-sensitive approach under Basel II is a welcome development which is likely to strengthen banks' incentives to control their risk exposures. On the other hand, the available evidence suggests that capital adequacy regulation affects bank lending and hence real output, so that the impending regulatory change is likely to have macroeconomic consequences as well. In particular, it has been argued that Basel II may reduce the loan supply to certain types of borrowers, such as SMEs and firms based in developing countries. Furthermore, Basel II may also increase the cyclical volatility of output, while weakening the monetary transmission mechanism during recessions, at least in the short-run.

The actual magnitude of the macroeconomic side-effects discussed in this paper would critically depend upon how the risk-weights on assets – used to calculate the capital adequacy ratio – are derived under Basel II. The cross-sectional concerns indicate that special provisions for SMEs and emerging market borrowers may have to be introduced in order to ensure their continued access to bank loans. A widespread use of the "through-the-cycle" approach to risk measurement could mitigate the procyclicality problem, but there are two obstacles. First, banks adopting the IRB approach may not have the appropriate incentives to use "through-the-cycle" risk models. Second, the existing "through-the-cycle" risk models are inevitably imperfect, and the credit ratings tend to lag rather than lead business cycles. If so, a widespread adoption of the "through-the-cycle" approach is unlikely to completely eliminate the procyclicality problem. Hence, policy makers cannot simply rely upon the existing risk models to provide remedies for the macroeconomic side-effects of Basel II.

One way of coping with these macroeconomic side-effects is to give the financial regulators some discretion over the regulatory penalty imposed on banks that violate the capital adequacy requirement. For instance, if the regulator were to adopt "soft" policies towards banks that fail to meet the capital adequacy requirement, they would have weaker incentives to contract their loan supply in response to a fall in their capital.[15] Since the Basel Accord does not

[15] Forbearance may, for instance, take the forms of accounting change in calculating the capital adequacy ratio; failure to intervene in the management of poorly capitalized banks; and propping up the asset market through some forms of government intervention.

specify the sanctions imposed on banks that fail to comply with its requirements, regulators could resort to forbearance in order to alleviate any credit crunch during economic downturns. In principle, regulatory forbearance, if applied judiciously, can be a useful tool for stabilizing banks' loan supply over business cycles. On the other hand, it has the potential to lead to various types of inefficiencies – such as "gambling for resurrection" – as the well-documented case of the American thrift crises demonstrates. Hence, the use of regulatory forbearance as a means of stimulating loan supply during recessions may not be practical.

An alternative possibility is to use monetary policy to offset the cyclical fluctuation of bank loans. As discussed, the initial response of loan supply to an expansionary monetary policy is likely to be weaker under Basel II, when there is a general rise in (measured) credit risk. Thus, if we only care about the short-run effect, the solution would be for central banks to adopt a much more aggressive monetary policy during recessions once Basel II is in place. The problem, however, is that the dynamic response of loan supply to monetary policy under Basel II is less clear. Thus, although the use of monetary policy to offset the cyclical fluctuation of bank loans caused by Basel II is a theoretical possibility, effective implementation may be difficult in practice, until empirical research determines the full impact of Basel II on the monetary transmission mechanism.

One conclusion that emerges from the existing literature, however, is that in the presence of capital adequacy regulation, the effectiveness of monetary policy may vary depending on how well-capitalized the banking sector is, and that the new regulation is likely to alter the monetary transmission mechanism.[16] Hence, if monetary policy is to become an effective tool to counter the procyclicality problem inherent in Basel II, central banks will need to monitor the financial conditions of the banking sector continuously. At the same time, empirical research will need to ascertain the actual impact of the new Basel Accord on the monetary transmission mechanism.

[16] See Tanaka (2002) for a formal discussion.

References

Altman, E. I. and A. Saunders (2001), "An analysis and critique of the BIS proposal on capital adequacy and ratings", *Journal of Banking and Finance* 25, 25–46.

Basel Committee on Banking Supervision (2001a), *Overview of The New Basel Capital Accord*, Consultative document published in January 2001, Bank for International Settlements.

Basel Committee on Banking Supervision (2001b), *The New Basel Capital Accord: an explanatory note*, Consultative document published in January 2001, Bank for International Settlements.

Basel Committee on Banking Supervision (2001c), *The Standardised Approach to Credit Risk*, Consultative document published in January 2001, Bank for International Settlements.

Bernanke, B. S. and A. S. Blinder (1988), "Credit, Money and Aggregate Demand", *American Economic Review* 78 (May), 435–439.

Borio, C., C. Furfine and P. Lowe (2001), "Procyclicality of the financial system and financial stability: issues and policy options", *BIS Papers* No. 1.

Cantor, R. (2001), "Moody's investors service response to the consultative paper issued by the Basel Committee on Banking Supervision: 'A new capital adequacy framework'", *Journal of Banking and Finance* 25, 171–185.

Catarineu-Rabell, E., P. Jackson, D. P. Tsomocos (2002), *Procyclicality and the New Basel Accord – Banks' choice of loan rating system*, available from http://netec.mcc.ac.uk/WoPEc/data/Articles/fipfedbcpy:2002:x:2.html.

Chami, R. and T. F. Cosimano (2001), "Monetary Policy with a Touch of Basel", *IMF Working Paper*, WP/01/151.

Choi, G. (2000), "The Macroeconomic Implications of Regulatory Capital Adequacy Requirements for Korean Banks", *Economic Notes* 29, 111–143.

Dewatripont, M. and J. Tirole (1994), *The Prudential Regulation of Banks*, MIT Press.

Diamond, D. W. and P. H. Dybvig (1983), "Bank runs, deposit insurance and liquidity", *Journal of Political Economy* 91(3), 401–419.

Daníelsson, J., P. Embrechts, C. Goodhart, C. Keeting, F. Muennich, O. Renault and H. S. Shin (2001), "An Academic Response to Basel II", *LSE Financial Markets Group and ESRC Research Centre Special Paper* No. 130.

Ferri, G., L-G. Liu and G. Majnoni (2001), "The role of rating agency assessments in less developed countries: Impact of the proposed Basel guidelines", *Journal of Banking and Finance* 25, 115–148.

Ferri, G., L.-G. Liu and J. E. Stiglitz (1999), "The Procyclical Role of Rating Agencies: Evidence from the East Asian Crisis", *Economic Notes*. 23(3), 335–355.

Furlong, F. T. (1992), "Capital Regulation and Bank Lending", *Federal Reserve Bank of San Francisco Economic Review* (3), 23–33.

Furlong, F. T. and M. C. Keeley (1989), "Capital Regulation and Bank Risk-Taking: A Note", *Journal of Banking and Finance* 13, 883–891.

Griep, C. and M. De Stefano (2001), "Standard & Poor's official response to the Basel Committee's Proposal", *Journal of Banking and Finance* 25, 149–169.

Griffith-Jones, St., M. A. Segoviano, and St. Spratt (2002), *Basel II and Developing Countries: Diversification and Portfolio Effects*, mimeo.

Jackson, P., C. Furfine, H. Groeneveld, D. Hancock, D. Jones, W. Perraudin, L. Radecki and M. Yoneyama (1999), "Capital Requirements and Bank Behaviour: The Impact of the Basle Accord", *Basle Committee on Banking Supervision Working Paper* 1.

Kashyap, A. K. and J. Stein (1994), "Monetary Policy and Bank Lending", in: G. N. Mankiw (ed.), *Monetary Policy*, NBER Studies in Business Cycles 29, University of Chicago Press, 221–256.

Linnel, I. (2001), "A critical review of the new capital adequacy framework paper issued by the Basle Committee on Banking Supervision and its implications for the rating agency industry", *Journal of Banking and Finance* 25, 187–196.

Monfort, B. and C. Mulder (2000), "Using Credit Ratings for Capital Requirements on Lending to Emerging Market Economies: Possible Impact of a New Basel Accord", *IMF Working Paper*, WP/00/69.

Morris, S. and H. S. Shin (1999), "Risk management with interdependent choice", *Financial Stability Review* (Bank of England), 141–150.

Peek, J. and E. S. Rosengren (1997), "The International Transmission of Financial Shocks: The Case of Japan", *American Economic Review* 87(4), 497–505.

Peek, J. and E. Rosengren (1995), "Bank Regulation and the Credit Crunch", *Journal of Banking and Finance* 19, 679–692.

Santos, J. A. C. (2001), "Bank Capital Regulation in Contemporary Banking Theory: A Review of the Literature", *Financial Markets, Institutions and Instruments* 10(2), 41–84.

Sekine, T. (1999), "Firm Investment and Balance-Sheet Problems in Japan", *IMF Working Paper*, WP/99/111.

Tanaka, M. (2002), "How do Bank Capital and Capital Adequacy Regulation Affect the Monetary Transmission Mechanism?", *CESifo Working Paper* 799.

Van den Heuvel, S. J. (2002a), "The Bank Capital Channel of Monetary Policy", mimeo, University of Pennsylvania (Wharton School).

Van den Heuvel, S. J. (2002b), "Does Bank Capital Matter for Monetary Transmission?", *Federal Reserve Bank of New York Economic Policy Review*.

The Workout of Banking Crises: A Macroeconomic Perspective

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***Abstract**: This paper provides a macroeconomic perspective for government interventions in banking crises. Such crises occur when a large number of banks fail to meet capital requirements or are insolvent. Using a macroeconomic model with financial intermediation, our analysis suggests that strict enforcement of capital-adequate rules suffices in prosperous periods. Capital requirements serve as an indicator for crises interventions in critical states which may require interest rate intervention and restructuring of the banking industry. These policies can be reinforced by random bail-outs and temporary financial relief, with a large percentage of the costs being covered by current and future owners of banks.(Keywords: Financial intermediation, macroeconomic risks, banking crises, deposit insurance, banking regulation.*(*JEL* D41, E4, G2)

1 Introduction

The role of governments in banking crises is an unresolved problem which continues to cause issues in banking regulation, cf. Bhattacharya, Boot and Thakor (1998). It seems clear that the elimination of financial instabilities is not possible with regulation. Thus, managing banking crises should be an integral part of both banking regulation and macroeconomic policy. A banking crisis occurs when a large number of banks fail to meet regulatory capital requirements or even are insolvent. The cause of most banking crises can be attributed to negative macroeconomic shocks as well as by contagion and amplification mechanisms that decrease a bank's capital. The crises in Latin America of the 1980s and early 1990s, in East Asia later that decade, and the more prolonged crisis-situation in Japan, for example, were to a large extent caused by negative macroeconomic events, cf. Borio (2002). The devastating effects of banking crises on economies, including budgetary consequences of

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possible government bail-outs, has brought the problem of optimal policy design to the top of international policy agenda.

In this paper, we describe a macroeconomic perspective for policy measures which allow to prevent a banking crisis. Furthermore, we show how governmental authority should handle such a crisis when it occurs nevertheless. From a macroeconomic viewpoint, the fate of a single bank is of little consequence as long as the size of the bank and the externality of its failure are negligible. Rather than considering the behavior of a single bank, the focus should be turned on the whole banking sector. A macroeconomic perspective must account for the feedback effects of banking crises and intervention policies on the future evolution of an economy. Moreover, macroeconomic regulation policies should focus on resolving a system-wide crisis in order to minimize losses in GDP.

There are at least six macroeconomic policy measures in banking crises that should be taken into consideration: strict enforcement of capital-adequacy rules, deposit-rate controls and/or low short-term interest rates set by the central bank, cartelization, restructuring of the banking sector, temporary financial relief, and random bail-outs. Deposit-rate controls and cartelization have similar macroeconomic effects in closed economies and to a certain extent may be seen as equivalent measures. Although a complete comparison of all possible intervention policies is beyond the scope of this paper, the purpose of this research is to provide a suitable framework for the assessment of at least some of the above listed policy measures[1]

The development of our argument is based on a model in which financial intermediation is integrated into a macroeconomic model with overlapping generations, developed in Gersbach and Wenzelburger (2001, 2003). For tractability, we use a relatively simple model of a bank and focus on aggregate solvency problems of a banking system. We assume that the costs of closing many banks including the costs of negative externalities incurred by such closures are prohibitively high. This implies that most banks should and, in fact, will be bailed out as soon as a system-wide financial distress occurs or banks do not fulfill capital requirements. Moreover, we presume that the effects of bail-out policy has little to no effect on the ex-ante behavior of banks. This presumption rests on the assumption that the ex-ante behavior of an individual bank is not grossly distorted, when banks are only bailed out in system-wide crises and that socially undesirable incentive effects can be sufficiently reduced by randomizing bail-outs. While bail-outs always entail moral-hazard problems, we

[1] The design of short-term interest rate policies for open economies requires a broader macroeconomic framework than provided here.

feel that bail-out policies based solely on aggregate measures are less prone to create undesired incentives.[2]

Our model is designed as a fully explicit stochastic difference equation which allows a study of the effects of various policy interventions. A banking crisis in our model is caused by exogenous macroeconomic risks which remain on the balance sheets of banks and from a competitive framework which does not allow for intermediation margins with sufficiently high risk premiums. This leads to a vulnerable banking sector, which, over time, may develop a crisis-situation. A repeated spell of negative macroeconomic shocks can turn a banking system into a fragile state. Although banks can use new funds to cover losses, a banking system which has lost its capital base will collapse with certainty. Therefore, capital-adequacy rules serve as an indicator for critical conditions of the system when crises interventions become necessary. Based on these considerations, we suggest the following three intervention stages:

1. Strict enforcement of capital-adequacy rules in normal states.
2. Interest rate intervention or cartelization and restructuring of the banking industry in critical states, when capital-adequacy rules are violated.
3. Random bail-outs and temporary financial relief in bad states.

Any policy measure which hopes to avoid banking crises must consider not only potential costs such as GDP lesses and shadow costs of taxation but also the effectiveness of the policy and implementation time. At this stage our analysis is not fully developed and thus the hierarchical order is still tentative. There are at least four caveats in our three-stage intervention proposal. First, banking crises are often linked with debt crises, currency crises, and crises in asset markets. Financial instabilities of these types need a broader macroeconomic perspective which may require other priorities. For instance, the appropriate interest rate policy central banks should adopt when banking and currency crises occur simultaneously has yet to be resolved. Second, we do not address the problem of bailing out a heterogeneous banking industry which may already require incomplete bail-outs at the second stage as well as mergers between banks. Third, the reason why contractual arrangements that shift more macroeconomic risks to entrepreneurs or even to depositors are not feasible and socially more desirable is far from obvious. Such arrangements would reduce the probability of banking crises, thus making intervention

[2] Conceptually, random bail-outs may be interpreted as a macroeconomic version of the *constructive-ambiguity principle* according to which a regulator has full discretion to close a bank. Two concepts of constructive ambiguity have been discussed in the literature. In Freixas (1999), the central bank follows a mixed strategy when deciding on the bail-out of a single bank. In Goodfriend and Lacker (1999) and Repullo (1999), the central bank's bail-out policy is non-random but perceived as being random by outside observers.

superfluous. Fourth, while the work-out of banking crises should be the main goal of a government, a large percentage of the costs should be covered by current and future owners of banks.

The theoretical literature on banking is primarily concerned with the microeconomic analysis of individual institutions and incentive problems within a static partial equilibrium framework, where macroeconomic aspects are often set aside. Two aspects have been debated intensively. The first aspect is whether regulatory authorities should set capital requirements for banks. The second one is whether banks which do not fulfill capital requirements or which are in financial distress should be bailed out or closed. A large amount of literature has discussed the first aspect in great depth, thus we will briefly review the second aspect. While bail-outs create well-known moral hazard problems, it has long been recognized that the costs of closing a bank including the costs of negative externalities may be prohibitively high. Mishkin (1995) and others[3] have argued that this explains why bailing-out banks is socially desirable. The decision whether or not to close a particular bank may depend on many indicators, among which are the level of uninsured debt on a bank's balance sheet (Freixas, 1999), the size of a bank (Goodhart and Huang, 1999), or aggregate investment returns (Cordella and Yeyati, 1999).

Models that are able to address intervention policies from a macroeconomic and from a system viewpoint are rare. The macroeconomic importance of capital-adequacy rules was first emphasized by Blum and Hellwig (1995) who showed that strict enforcement of capital-adequacy rules in critical states may cause a socially harmful decline in aggregate bank loans. Erlenmaier and Gersbach (2001) investigate bail-out policies from a macroeconomic perspective and demonstrate that forcing some banks randomly into bankruptcy may improve the refinancing conditions of other banks so that these remain solvent.

The paper is organized as follows. In the next section, we introduce the framework of our model including possible policy measures. In Section 3, we summarize our main insights. In Section 4, we provide a tentative discussion of how an optimal policy mix should be structured and Section 5 concludes with a discussion of open research issues.

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[3] Depending on the evaluation of the different costs, authors come to different conclusions about the desirability of government interventions. While Freixas, Parigi and Rochet (1998), Santomero and Hoffmann (1998), or Cordella and Yeyati (1999) support this view, authors like Humphrey (1986) and Schwartz (1995) advocate a non-interventionist's view. A comprehensive discussion of the issue is found in Goodhart (1995).

2 The framework

2.1 Macroeconomic environment

In order to structure our reasoning we briefly review an overlapping generations model with financial intermediation introduced in Gersbach and Wenzelburger (2001). Time is infinite in the forward direction and divided into discrete periods indexed by *t*. There is one physical good that can be used for consumption or investment. Each generation consists of a continuum of agents with two-period lives, indexed by [0,1]. Each individual of each generation receives an endowment *e* of goods when young and none when old. The endowment may be thought of being obtained from short-term production with inelastically supplied labor. Generations are divided into two classes. A fraction η of the individuals are potential entrepreneurs, the rest $1-\eta$ of the population are consumers. Potential entrepreneurs and consumers differ in the fact that only the former have access to investment technologies.

Consumers are endowed with preferences over consumption in the two periods of their lives with c_t^1, c_t^2 denoting youthful and old-age consumption of a consumer born in period *t*, respectively. For tractability, let $u(c_t^1, c_t^2) = ln(c_t^1) + \delta\, ln(c_t^2)$ be the intertemporal utility function of a consumer, where $\delta(0 < \delta < 1)$ is the discount factor. Each young household saves inelastically the amount $s = \frac{\delta e}{1+\delta}$ and $S = (1-\eta)s$ is the aggregate savings of all households.

Each entrepreneur has access to a production project that converts period-*t* goods into period-*t* + 1 goods. For simplicity, we assume that potential entrepreneurs are risk-neutral and consume only when old. *e* + *I* are the required funds for an investment project. An entrepreneur must borrow *I* units of the goods in order to undertake the investment project. The entrepreneurs are heterogeneous and indexed by a quality parameter *i* which is uniformly distributed on $[0, \eta]$. Banks cannot observe the quality of investment projects and are thus subject to adverse selection problems. We assume that banks have access to sufficiently efficient monitoring to secure either the maximal possible loan and interest repayment of the entrepreneurs or the liquidation value of their projects.[4] If an entrepreneur of type *i* obtains additional resources *I* and decides to invest, his investment returns in the next period amount to

[4] A detailed discussion of the interaction between adverse selection and moral hazard in the underlying financial intermediation model can be found in Gersbach and Uhling (1999).

$$f_i(q, e+I) = (1+i)\, qf(e+I),$$

where f denotes a standard atemporal neoclassical production function. The parameter $q \in \Re_+$ is subject to exogenous stochastic noise governed by an iid process which is uniformly distributed on the compact interval $\left[\underline{q}, \bar{q}\right] \subset \Re_+$.

Entrepreneurs are contract takers and operate under limited liability. Given some loan interest rate r^c and banks monitoring technologies, the expected profit of an investing entrepreneur i is

$$\Pi\ (i, r^c) := \int_{\Re^*} \max\left\{(1+i)\, q f(e+I) - I(1+r^c),\, 0\right\} \mu(dq),$$

where μ denotes the probability distribution of the shocks. The expression for the expected profit $\Pi\ (i, r^c)$ of entrepreneur i can be derived analytically but, in the context of this paper, is of no interest for our argument.

There are $n (n > 1)$ banks, indexed by $j = 1, ..., n$, that are capable of financing entrepreneurs. Banks are owned by the entrepreneurs. The ownership of banks is transferred to the next generation through bequests. Each bank j can sign deposit contracts $D(r_j^d)$, where r_j^d is the deposit interest rate. Loan contracts of bank j are denoted by $C(r_j^c)$, where r_j^c is the loan interest rate and where all banks offer the same loan size I which is fixed once and for all. All deposits and loan contracts last for one period. A risk-neutral entrepreneur with quality parameter $i \in [0, \eta]$ will invest, if

$$\max_{1 \le j \le n} \left\{\Pi\ (i, r_j^c)\right\} \ge e \max_{1 \le j \le n} \left\{1 + r_j^d\right\}.$$

The three different sectors of the economy, consumers, entrepreneurs, and banks are displayed in Fig. 1.

2.2 Banking sector

We distinguish between two possible *intermediation games* that determine the interest rates in each period. In the *first scenario*, banks set deposit and loan rates without any regulator intervention. In the *second scenario*, a regulator stipulates interest rates on deposits, denoted by r^d, and thus applies deposit rate control. In Sec. 2.3, we will outline how other policy measures may be integrated into this framework. The time-line of actions in the economy within a typical period t is as follows.

Figure 1

Sectors of the economy

1. Old entrepreneurs pay back with limited liability. The current deficits or reserves are determined. Excess reserves are distributed among shareholders according to pay-out rules.
2. In the *first scenario*, banks set interest rates on deposits and loans under strict enforcement of capital requirements. In the *second scenario*, either banks' realized profits are too low or they made losses. A regulator will intervene by setting fixed interest rates on deposits. Banks will set interest rates on loans and offer deposit contracts to consumers as well as deposit and credit contracts to entrepreneurs.
3. Consumers and entrepreneurs decide on a preferred contract. Resources are exchanged and banks pay back depositors.
4. Young entrepreneurs produce subject to a macroeconomic shock.

Let d denote the current capital level of the banking system. There are two boundary values for d. Denote by $\overline{d} := \eta I - S > 0$ the value of reserves that would allow all entrepreneurs to invest, since $S + \overline{d} = \eta I$. If $d > \overline{d}$, then banks

have more reserves than needed to finance all entrepreneurs and hence excess resources are available for any pair of deposit and loan interest rates. Similarly, let $\underline{d} := -[S + \eta e]$ denote the maximal deficit level that still allows to balance liabilities in a particular period. If $d = \underline{d}$, then all savings are needed to pay back obligations to the previous generation, thus preventing the financing of new investment projects. $\underline{d} < d$ ensures that there are enough saving entrepreneurs to meet the liabilities of the previous generation and to finance new investment projects. If $d < \underline{d}$, then the banking system cannot fulfill its obligations anymore and as a whole is bankrupt, thus causing the economy to collapse.

An intermediation problem therefore arises only when $d \in [\underline{d}, \bar{d}]$. Assuming that depositors are fully protected through bail-outs of the next generation, a *subgame-perfect equilibrium* of the intermediation game is a tuple

$$\left\{ \{ r_j^{d*} \}_{j=1}^n, \{ r_j^{c*} \}_{j=1}^n \right\}$$

such that entrepreneurs take optimal credit application and saving decisions and no bank has an incentive to offer different deposit or loan interest rates. According to Proposition 1, Gersbach and Wenzelburger (2001), for each $d \in [\underline{d}, \bar{d}]$, a unique subgame-perfect equilibrium exists for both intermediation scenarios. In the first scenario, all banks have the same deposit and loan interest rates in equilibrium which, in addition, coincide and are equal to $r^* = r^*(d)$. The *equilibrium interest rate* $r^*(d)$ is uniquely determined and implicitly defined by

$$\Pi(i^G(d), r^*(d)) = e(1 + r^*(d)), d \in [\underline{d}, \bar{d}],$$

where $i^G(d) \in [0, \eta]$ is such that savings and investments are balanced, i.e.,

$$S + ei^G(d) + d = [\eta - i^G(d)]I, d \in [\underline{d}, \bar{d}] \tag{1}$$

All entrepreneurs $i \in [0, i^G(d)]$ save and all entrepreneurs $i \in [i^G(d)\eta]$ invest.

In the second scenario with a regulator setting $r^d \le r^*(d)$ for the deposit interest rate of all banks, loan interest rates coincide in equilibrium and are equal to $r^{c*} = r^c(d, r^d)$ among all banks. Similarly, the *(equilibrium) loan interest rate* $r^c(d, r^d)$ is uniquely determined and implicitly defined by

$$\Pi(i^G(d), r^c(d, r^d)) = e(1 + r^d), \qquad d \in [\underline{d}, \bar{d}],$$

where $i^G(d)$ is given in (1). Loan interest rates have the following properties:

$$r^c* > r* \text{ if } r^d < r* \text{ and } \frac{\partial r^c(d, r^d}{\partial r^d} < 0.$$

Hence, by setting r^d below $r*$ the regulator can induce positive intermediation margins and thus profits for banks.

An important feature of the subgame-perfect equilibrium is that banks receive no premium on the default risk of firms that is caused by negative macroeconomic shocks. This is a consequence of banks' optimization behavior and the price competition in the banking sector. Much of the analysis in this paper depends on this strong presumption which is responsible for zero intermediation margins. Similar results are likely to be obtained for less extreme cases in which intermediation margins are low. However, the situation will change, if banks can fully internalize downside risks so that macroeconomic risks are reflected in loan pricing. A banking system will then become less vulnerable. Note that the symmetric behavior of banks considerably facilitates the analysis of the banking system as a whole.

2.3 Intervention rules

We shall now discuss two intervention policies. Consider first *strict enforcement of capital-adequacy rules*. A capital-adequacy rule is usually defined as a threshold for the ratio between the reserve level of a bank and its credit volume. Since the banks in our model behave symmetrically, this capital requirement will be formulated for the whole banking system. A *(prospective) capital-adequacy rule* is the requirement that the banking system fulfills

$$\frac{d}{(\eta - i^G(d))\, I} \geq \alpha\,, \tag{2}$$

where $0 \leq \alpha \leq 1$. The capital requirement (2) defines a threshold for the reserve levels of the banking system as a percentage α of the current credit volume $(\eta - i^G(d))\, I$. Setting aside the complications surrounding the equity of a bank, we may set α to 0.08. This captures the spirit of the first Basel Accord. In our case, *strict enforcement of capital-adequacy rules* means that each bank (and thus the banking system) must fulfill the capital requirement (2) in the same period in which new credit and deposit contracts are offered. Otherwise a bank is forced to declare bankruptcy. In principle, banks could comply with the capital-adequacy rule (2) by an immediate reduction of the

loan size I for investment projects.[5] This case is analyzed in Gersbach and Wenzelburger (2003).

A second intervention policy consists of suspending strict enforcement of the capital-adequacy rule and intervening with other measures. Let us discuss a regulator who intervenes by ceiling the deposit rates as soon as reserves have fallen below a critical level and strict enforcement of capital-adequacy rules has been suspended. Such an intervention rule is referred to as *interest-rate intervention* or, equivalently, *cartelization intervention*. Let d_{reg} denote the critical level of reserves at which a regulator anticipates that strict enforcement of capital-adequacy rules is insufficient. An *interest-rate intervention rule* $\psi : \left[\underline{d}, \bar{d}\right] \to \Re_+$ is given by setting

$$r^d = \psi(d) := g(d) r^*(d), \tag{3}$$

where $r^*(d)$ is the equilibrium interest rate and $g : \left[\underline{d}, \bar{d}\right] \to [0,1]$ is some non-decreasing function with

$$g(\underline{d}) := 0 \text{ and } g(d) = 1 \text{ for } d \geq d_{reg}.$$

ψ is designed to model a regulator who intervenes with an otherwise competitive outcome if $d < d_{reg}$. In doing so, $r^c = r^c(d, \psi(d))$ describes the loan interest rate for all values of $d \in \left[\underline{d}, \bar{d}\right]$, whereas $\psi(d) = r^*(d) = r^c(d)$ is equivalent to the competitive outcome without intervention. g may be continuous but could also be defined by setting $g(d) := 0$ for $\in \left[\underline{d}, d_{reg}\right]$.

Note that interest-rate intervention with $r^d = 0$ is equivalent to allowing the banking industry to form a cartel. In such a cartel, banks would coordinate on deposit interest rates and then choose loan interest rates such that aggregate profits are maximized and investments and savings balance. An important feature of the model is that low deposit rates will cause high loan interest rates and thus large intermediation margins. Qualitatively, however, it suffices that intermediation margins increase sufficiently. The fundamental prerequisite for successful interest-rate interventions is a low interest-rate elasticity for deposits which is assumed to be zero throughout this paper.[6]

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5 This assumption is a simplification. Since in our model banks cannot observe the quality of an investment project, satisfying regulatory requirements by reducing loans symmetrically across all entrepreneurs is optimal for banks.

6 The scope of this intervention rule is, of course, limited as soon as banks have to fear large deposit withdrawals.

Two other policy measures for managing a banking crisis can be fitted into our framework in a straightforward manner. The first measure aims to increase a bank's reserves in a particular period by subsidizing the bank. These subsidies could be financed by taxing endowments of consumers and entrepreneurs. The second measure includes the application of random bail-outs in order to cancel out the balance sheets of a randomly selected group of banks. This will decrease deficits and is applied when the banking system has accumulated deficits. To fulfill deposit insurance, depositors of defaulting banks must be compensated with taxes from consumers and entrepreneurs. It should be noted that taxing endowments not only reduces savings of consumers but also equity of entrepreneurs thus creating further feedback effects.

A third policy measure is that of a short-term interest-rate policy from a central bank. However, such an intervention requires a monetary framework which our model lacks. It is an open issue whether central-bank interest-rate policies can replicate effects similar to those of deposit rate controls in real models.

2.4 Evolution of the economy

We are now in a position to set up equations which govern the evolution of the capital of a banking system. Let $d_t \in \left[\underline{d}, \bar{d}\right]$ be the current level of reserves (deficits) at the beginning of an arbitrary period t and assume that the firms have encountered the shock q_t. Then, according to Gersbach and Wenzelburger (2001), repayments of firms are given by

$$P(d_t, q_t, r^d) = \int_{i^G(d_t)}^{\eta} min\left\{(1+i)q_t f(e+I), I(1+r^c(d_t, r^d))\right\} di\,,$$

where $r^c\ (d_t,\ r^d)$ is the equilibrium loan interest rate. Banks raise funds $S + ei^G\ (d_t)$ that have to be repayed with interest at the end of period t. For each q and each $r^d \geq 0$, let the function $G\left(q,\cdot,r^d\right): \left[\underline{d}, \bar{d}\right] :\rightarrow \left[(1+r^d)\underline{d}, \bar{d}\right]$ be defined by

$$G(q, d, r^d) = min\left\{\bar{d}, P(d, q, r^d) - \left[S + ei^G(d)\right](1+r^d)\right\}.$$

Given a policy rule ψ as defined in (3), the new level of reserves d_{t+1} is then determined by

$$d_{t+1} = G(q_t, d_t, \psi(d_t)), \qquad d_t \in \left[\underline{d}, \bar{d}\right], \tag{4}$$

where q_t is the current shock. Equation (4) is a stochastic difference equation which governs the evolution of banks' capital. Since we assume that $\{q_t\}_{t\in\mathrm{N}}$ is an iid process, the sequence of reserves $\{d_t\}_{t\in\mathrm{N}}$ generated by (4) is a Markov process, see Lasota and Mackey (1994). This Markov process is bounded from above and from below. If $d_{t+1} \geq 0$, then all depositors have been repayed and d_{t+1} represents the reserves of banks at the beginning of period t + 1. The minimum operator appearing in the definition of *G* implies that reserve levels above the value $\bar{d}$ will be payed out to the entrepreneurs who are assumed to own the banks. If $\underline{d} < d_{t+1} < 0$, then the banks made losses and d_{t+1} is the amount of liabilities that could not be covered by the entrepreneurs' loan repayments. Hence, banks in period t + 1 must raise enough new funds to pay d_{t+1} back to the depositors born in period *t*. If $d_{t+1} < \underline{d}$, then, as discussed above, banks are bankrupt and the economy collapses.

Finally, if $d \in [\underline{d}, \bar{d}]$ is the reserve level of an arbitrary period, *aggregate income* of the economy is

$$Y(d,q) = e + \int_{i^G(d)}^{\eta} (1+i)qf(e+I)di \,. \tag{5}$$

Since $i^G(d)$ is decreasing in *d*, it is clear that $Y(d, q)$ is increasing in *d*. Hence, high reserve levels of the banking system in our model are good for the economy in the sense that more entrepreneurs can be financed. Of course, one might think of other channels through which higher bank capital might lead to higher aggregate income. However, we do not expect that the policy implications for managing banking crises will fundamentally differ from the case developed here.

3 Intervention from a macroeconomic perspective

3.1 The need for intervention

In this section we argue that a competitive banking system may fail to prevent a system-wide insolvency of the banking sector. This, in turn, may result in a collapse of the economy. An insolvency, such as this one, may occur regardless of whether or not the system is subject to regulatory capital requirements. A collapse is a state of the economy in which banks' obligations to depositors cannot be fulfilled. Using a macroeconomic perspective, we discuss possible intervention policies of a regulating authority capable of preventing a collapse

and aimed at avoiding economic downturns with low aggregate income incurred by such a banking crisis.

It is relatively easy to establish (Gersbach and Wenzelburger, 2001, Lemma 4) that intervention is unnecessary, provided that macroeconomic shocks are sufficiently positive. In such cases, aggregate productivity of firms and hence their repayments are high enough to prevent the banking system from suffering a large-scale default of firms. If macroeconomic shocks are negative, however, banks incur higher losses from firm defaults than their equity interest earnings. In this case, a bank's capital will decrease.

Propositions 3 and 4 in Gersbach and Wenzelburger (2001) show that the economy will collapse with probability one, if aggregate productivity of firms is on average too low. A sufficiently negative shock induces a decline in the repayment capacity of firms and thus results in losses for banks. To cover these losses, banks need new funds on which they must pay interest. However, since intermediation margins are too small and repayments are on average too low, the banking system is unable to recover from losses and will collapse after sufficiently many periods. Interestingly, this collapse will occur with certainty independently of *any* initial reserve level prescribed by a capital-adequacy rule.

One of the main reasons for this inability to recover from losses is that the competitive setup of the banking system does not allow for a (sufficiently high) premium on macroeconomic risks. The interplay between a highly competitive banking industry, the common exposure of banks to the risk of failing debtors, and insufficient repayment capacities makes a banking system vulnerable and thus necessitates intervention beyond capital adequacy. Capital-adequacy rules serve as an indicator for the necessity of crises interventions.

Two forms of banking crises can be distinguished – critical states, when capital in the banking sector is below regulatory capital but still positive, and bad states, when the banking system is insolvent. As discussed above (see also Gersbach and Wenzelburger, 2001), an insolvent banking system does not collapse immediately because banks can use new funds to cover deposit obligations. If new funds cannot cover these losses, a collapse will occur. The state of the economy in which bank losses are equal to funds from new depositors is called consumption trap. In a consumption trap, the accumulated deficit level is maximal and equal to $\underline{d}$. All new funds are needed to cover current liabilities such that no profitable investments can be financed and aggregate income is minimal. From a macroeconomic perspective, the broad objective of crises intervention should therefore be to minimize the risk of situations in which a banking system is left with an insufficient capital base in order to prevent a severe decline in GDP.

3.2 How intervention works

As argued above, the macroeconomic goal of any intervention policy should be to reverse bad and critical states in which banks' capital base and aggregate income are low and to sustain good states with sufficiently high reserve levels in which aggregate income is high. Let us investigate how intervention can achieve this goal by focusing on the two intervention policies introduced in Sec. 2.3: strict enforcement of capital-adequacy rules and deposit rate control which, in the context of this paper, is equivalent to a cartelization of the banking industry.

Reversing bad states requires that the banking system alone or with the help of a regulator can decrease the current deficit such that the region $\left(0,\bar{d}\right]$ is reached within finite time. In technical terms, this means that each trajectory $\{d_t\}_{t\in\mathrm{N}}$ of system (4), which is allowed to start with an arbitrary capital level $d_0 \in \left(\underline{d},\bar{d}\right]$ reaches the interval $\left(0,\bar{d}\right]$ in finite time with probability one. *Preserving good states* requires that either the banking system itself or the regulator is able to sustain the current level of reserves within the range $\left[d_{reg},\bar{d}\right]$. This implies the existence of an intervention rule ψ such that each trajectory $\{d_t\}_{t\in\mathrm{N}}$ of (4), which is allowed to start with any reserve level $d_0 \in \left[d_{reg},\bar{d}\right]$, stays within the interval $\left[d_{reg},\bar{d}\right]$.

Interest-rate intervention

We first discuss interest-rate intervention. In order to prevent collapse, an intervention policy has to ensure that all future deficits remain above $\underline{d}$ with certainty. This is satisfied, if

$$G(d,q,\psi(d)) \geq \underline{d}, \text{ for all } d \in \left[\underline{d},\bar{d}\right], \qquad q \in \left[\underline{q},\bar{q}\right].$$

Proposition 5 in Gersbach and Wenzelburger (2001) shows that there always exist an interest-intervention rule ψ that avoids collapse. However, when regulatory intervention with interest rates aims only at avoiding collapse, the economy is likely to remain with low aggregate incomes, that is, with low GDP levels. This phenomenon is illustrated in Fig. 2[7] which displays a par-

[7] Colored versions of Figures 2-5 can be found on the website http://www.uni-bielefeld.de/ ~boehm.

ticular example for which the economy converges to the consumption trap $\underline{d}$. Here we have set $I = 80$ for the loan size, whereas the parameter $\gamma = 1.03$ corresponds to a *'laissez-faire policy'* aimed at just preventing collapse. Notice that $\underline{d} \approx -8$. The complete parameterization is found in Appendix A.

Interventions must be substantially stronger in order to preserve good states. We consider this much more demanding problem in two steps: first, avoidance of converging to the consumption trap and second reversing bad or critical states. To avoid the consumption trap, intervention rules must prevent the deficits from converging to $\underline{d}$ such that all future deficits stay strictly above $\underline{d}$ with certainty. This aim requires an interest-intervention rule ψ such that

$$G(d, q, \psi(d)) > d$$

at least for deficit levels d close to $\underline{d}$ and sufficiently positive shocks $q > \underline{q}$. Lemma 5 in Gersbach and Wenzelburger (2001) shows that, under certain additional conditions, setting deposit rates $r^d = \psi(d)$ sufficiently small prevents the economy from converging to the consumption trap. The economy may become arbitrarily close to the trap, but deficits can be kept strictly above $\underline{d}$ with certainty.

In order to reverse bad and critical states, any intervention policy not only must be able to prevent the consumption trap but also to reduce the current deficit by creating profits for banks through higher intermediation margins. Thus, we seek an interest-rate intervention rule ψ such that

$$G(d, q, \psi(d)) > d, \qquad d \in (\underline{d}, d_{reg})$$

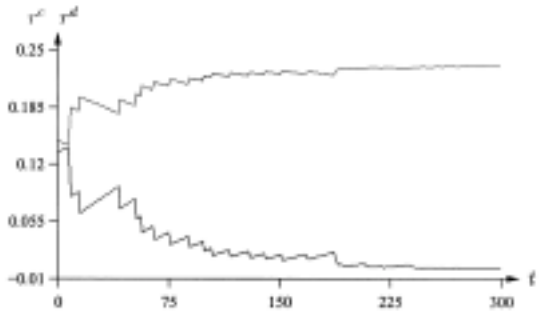
with sufficiently high probability. According to Proposition 7 in Gersbach and Wenzelburger (2001), an interest-intervention rule ψ exists which reverses bad states, provided that repayments of firms are on average high enough.

Necessary conditions for preserving good states require intervention rules which keep reserves within the interval $\left[d_{reg}, \overline{d}\right]$, where d_{reg} denotes the regulatory capital level below which a regulator takes action. This aim requires a policy rule ψ that ensures

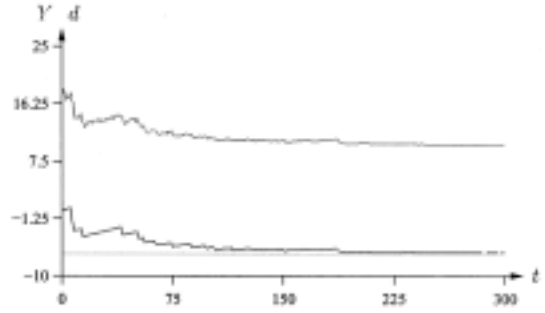
$$G(d, q, \psi(d)) \geq d_{reg}, \text{ for all } d \in \left[d_{reg}, \overline{d}\right], q \geq \underline{q}.$$

Figure 2

Convergence to the consumption trap, $I = 80$, $\gamma = 1.03$



(a) Interest rates

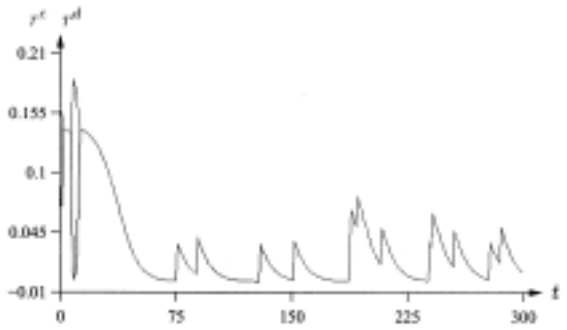


(b) Banks' capital and GDP

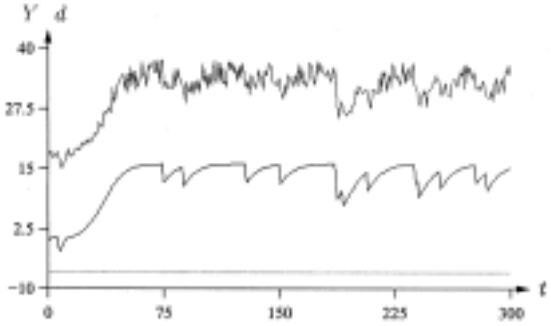
Sufficient conditions for preserving states within $\left[d_{reg}, \overline{d}\right]$ are given in Proposition 8 in Gersbach and Wenzelburger (2001). Fig. 3 provides an example in which bad states are reversed by means of interest-rate intervention with strong reduction of deposit rates, $\gamma = 10$. It is easily in Fig. 3 that the banking system is capable of maintaining a state of economic prosperity without regulation where their reserve levels are relatively high. We show in Gersbach and Wenzelburger (2001) that maintaining states of economic prosperity by using an interest-rate intervention policy requires a greater firm productivity than that required to bring a state of prosperity to an already depressed economy.

Figure 3

Reversing bad and preserving good states, $I = 80$, $\gamma = 10$



(a) Interest rates



(b) Banks' capital and GDP

Strict enforcement of capital-adequacy rules

We now turn to the enforcement of capital-adequacy rules. Obviously, if $d \leq 0$, strict enforcement of capital-adequacy rules will imply an immediate bankruptcy of banks and thus an immediate collapse, because banks are by no means able to meet this requirement. A strict enforcement of capital-adequacy rules is only successful when the bank's reserves are sufficiently high. Below a certain loan size threshold, banks encounter excess deposits even when all entrepreneurs invest. Loan sizes cannot be lowered below this threshold value without causing a substantial decline of banks' reserves in the next period.

Preserving good states may also be achieved by delayed enforcement of capital-adequacy rules, where the regulator allows some additional time within which banks must fulfill the capital-adequacy rule. Ongoing research (Gersbach and Wenzelburger, 2003) investigates conditions under which capital-adequacy rules suffices to prevent the consumption trap. Again, it is intuitively clear that entrepreneurs' repayments must be sufficiently high.

The success of capital requirements seems to depend on economic fundamentals in a much more complicated manner than interest-rate interventions. Strict enforcement of capital-adequacy rules may enhance the average productivity of firms and thus their repayments. However, when macroeconomic shocks cause the capital base of a banking system to fall below a certain threshold, strict enforcement of capital-adequacy rules cannot resolve a banking crisis and its use would be harmful. From a macroeconomic viewpoint, however, capital-adequacy rules serve as an indicator when crises interventions such as interest-rate interventions become necessary.[8]

4 Towards an optimal policy mix

Up to this point our discussion of intervention policies has been concerned with those aimed at protecting an economy from long-lasting periods of low aggregate income. Taking a macroeconomic perspective, we turn our discussion toward a combination of socially desirable policy measures. Although this issue is not treated explicitly in our cited papers, we would like to outline some basic ideas. Clearly, immediate intervention is not needed as long as the banking system's capital is well above a suitably prescribed regulatory level. In such a case, the banking system has a good chance to remain in a proper condition.

Strict enforcement of capital-adequacy rules can still work for a banking system whose reserve levels are close to regulatory capital. However, as pointed out by Blum and Hellwig (1995) and confirmed by our analysis, the regulatory dilemma is that a strict enforcement policy in critical states implies an aggregate reduction of bank credits which may be socially harmful.

If the banking system's capital is below a certain level, there is no chance that capital-adequacy rules can be fulfilled. In such cases, strict enforcement of capital-adequacy rules is insufficient to prevent a banking crisis and for this reason should be temporarily suspended. A strict-enforcement policy would

[8] The proposed revision of the Capital Accord (Basel II) makes capital requirements more risk-sensitive. These capital requirements seem to be more pro-cyclical than the current arrangements and thus may increase the need for crises interventions.

lead to large-scale bankruptcies of banks and thus to large losses in GDP. Therefore, as soon as banks' capital has substantially fallen below regulatory capital, alternative policies that help to increase recapitalization of banks are necessary. As argued above, this can be achieved by ceiling interest rates on deposits or, equivalently, by allowing for a short-term cartelization of the banking industry.[9]

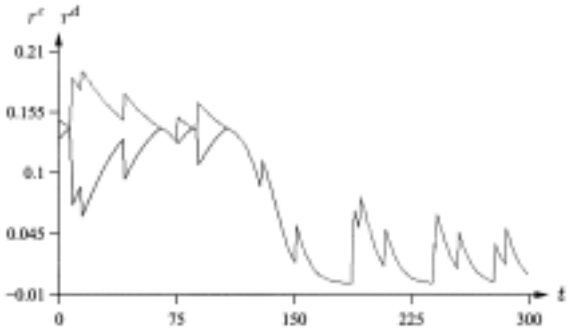
The time required for a banking system to recover from a crisis with interest rate intervention may be quite lengthy. Fig. 4 illustrates this situation and is identical to Fig. 3 with the exception that the interest-rate intervention is less stringent $(\gamma = 1.3)$. A comparison of both panels shows that a weaker intervention policy may delay the recovery of the economy in terms of GDP considerably. This is costly for an economy.

Another issue is that low productivity of firms might require stronger intervention rules. This is witnessed in Fig. 5 which differs from Fig. 3 in that production elasticity is lowered to $a = 0.39$. Despite persistent interest-rate interventions, the GDP level does not recover and remains relatively low.

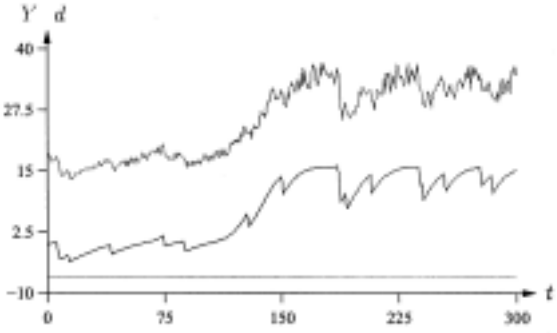
9 Possibly with limitations on dividend pay-out policies of banks.

Figure 4

Delayed reversal of bad states, $I = 80$, $\gamma = 1.3$



(a) Interest rates



(b) Banks' capital and GDP

In order to accelerate the recapitalization of the banking sector, temporary financial relief for banks financed by taxing consumers and entrepreneurs may be appropriate. However, as much costs as possible should be covered by current and future owners of banks.[10] Temporary financial relief as an ultimate measure could be combined with random bail-outs, where a certain fraction of banks are forced into bankruptcy. To avoid contagion and run effects on other banks, a regulator might pledge and ensure that the remaining banks are bailed

[10] For example, a government could grant loans with low interest rates that must be payed back, if the bank survives.

out. As long as the fraction of defaulting banks is small and negative externalities for the economy remain negligible, such random bail-outs have three advantages over a complete bail-out. First, the level of subsidies required to save the banking system decreases. Second, the surviving banks may take over assets of defaulting banks thus receiving new funds for refinancing purposes. Both effects improve the financial position of the surviving institutions. Third, allowing some banks to go bankrupt in crises alleviates negative incentive effects of bail-out policies.

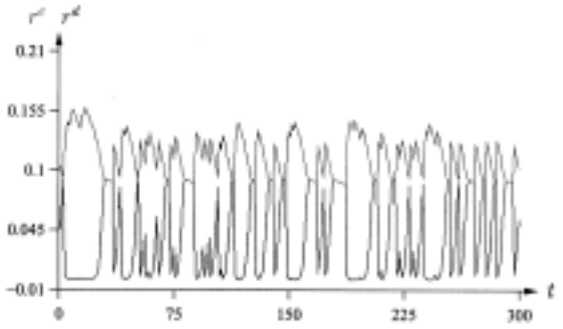
In summary, our policy proposal intends to provide a useful start for policy guidelines for managing banking crises. The analysis of our simple model suggests that crises interventions should start with interest-rate ceiling or cartelization, respectively, when strict enforcement of capital-adequacy becomes too costly. In order to enhance the recapitalization of banks, temporary financial relief accompanied by random bail-outs should be taken into consideration.

5 Further research issues

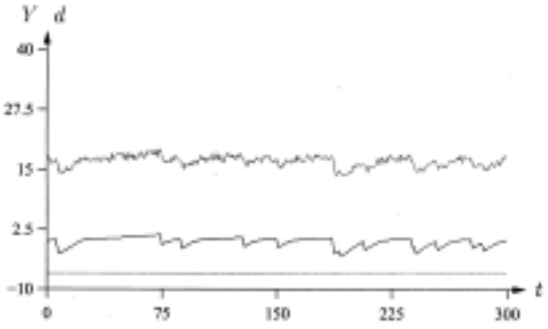
While most of our results may be derived in a more or less straightforward manner, many unresolved issues remain. First, from a theoretical point of view, it remains unclear whether the exposure of a banking system to macroeconomic risks cannot be reduced. On the one hand, loan interest rates could contain a premium for macroeconomic risks that provides an additional buffer against losses. Currently, banks are moving in this direction. On the other hand, removing macroeconomic risks from the balance sheets of banks could be achieved by conditioning deposit and loan contracts on the major risk factors. There is a variety of arguments why such arrangements have not been implemented yet, e.g., see Hellwig (1998) and Gersbach (1999). However, since entrepreneurs and depositors will always bear the risk as well as the costs of a banking crisis, an efficient contractual allocation of macroeconomic risks that shifts more risk to entrepreneurs and depositors might become feasible in the future.

Figure 5

Failure of reversing bad states, $I = 80$, , $\gamma = 10$, $\alpha = 0.39$



(a) Interest rates



(b) Banks' capital and GDP

Second, the scope of this research has essentially been a normative one. An equally important issue is whether a proposed policy measure will indeed be implemented by a regulator or a central bank. An important selection of the literature has investigated the incentives for a regulator to apply closure rules from a more microeconomic perspective. Boot and Thakor (1993) examined closure rules that result in socially optimal bank portfolio choices. They find that a closure policy that is optimal from the regulator's point of view may not be strict enough to be socially optimal as well. The analysis has been extended by Acharya and Dreyfus (1989), Fries, Mella-Barral and Perraudin (1997), and Mailath and Mester (1994). The question of which government agency should make bail-out decisions is investigated in Repullo (1999). He finds that central

banks should be responsible for dealing with small solvency shocks, while a deposit-insurance agency should be in charge of the larger ones. The macroeconomic aspects of these considerations are usually not discussed. As for other matters, stringent intervention rules which force current generations to bear the costs of a banking crisis will be implemented only if politics is concerned about future generations.

Third, a macroeconomic perspective could and should be complemented by an analysis of the contagion risk within a complex network of interbank dealings, as recently developed and exemplified by Elsinger, Lehar and Summer (2002). Contagion can be triggered by negative macroeconomic shocks and thus may increase the necessity for regulatory intervention.

Finally, an adequate treatment of the role of central banks in a banking crisis has yet to be accomplished. It is by no means obvious to what extent mere monetary policies, such as the lowering of short-term interest rates, are capable of resolving a banking crisis. To address this issue as well as banking crises which are caused by liquidity squeezes and international financial distress, one needs a model that takes international capital movements, exchange rates, and feedback effects on the domestic economy into account.

A Parameterization of the model

All simulations of the paper are carried out with the program package MACRODYN, cf. Böhm (2003). We used the following parameterizations:

1. Endowments: $e = 10$, discount factor $\delta = 0.5$, fraction of entrepreneurs $\eta = 0.48$.

2. Shock process: $\{q_t\}_t$ iid, uniformly distributed on $\left[\underline{q}, \bar{q}\right]$ with $\underline{q} = 7.8,\ \bar{q} = 10$.

3. Technology: Cobb-Douglas production function

$$y = f(e+I) := b / a(e+I)^a, \text{ where a = 0.44, b = 0.5.}$$

4. Regulation:

$$r_{reg}(d) = \begin{cases} r^*(d) & \text{if } d \in \left[d_{reg}, \bar{d}\right], \\ g(d)\, r^*\left(d_{reg}\right) & \text{if } d \in \left[\underline{d}, d_{reg}\right], \end{cases}$$

where

$$g(d) := \beta\left(\frac{d-\underline{d}}{d_{reg}-\underline{d}}\right)^{\gamma}, \quad d \in \left[\underline{d}, d_{reg}\right]$$

and

$$\alpha = 0.08, \quad \beta = 1, \text{ and } \gamma > 0 .$$

The parameter α determines d_{reg} and γ describes the adjustment speed of the deposit-rate ceiling. The particular values for the remaining parameters, the loan size *I* and the adjustment speed γ are read off the corresponding captions.

References

Acharya, F. and J.-F. Dreyfus (1989), "Optimal Bank Reorganization Policies and the Pricing of Federal Deposit Insurance", *Journal of Finance* 44, 1313–1333.

Bhattacharya, S., A. Boot and A. V. Thakor (1998), "The Economics of Bank Regulation", *Journal of Money Credit and Banking* 30(4), 745–770.

Blum , J. and M. F. Hellwig (1995), "The Macroeconomic Implications of Capital Adequacy Requirements", *European Economic Review* 39, 733–749.

Böhm, V. (2003), "Macrodyn – The Handbook", *Discussion Paper* 498, Department of Economics, University of Bielefeld.

Boot, A. and A. V. Thakor (1993), "Self-Interested Bank Regulation", *American Economic Review* 83, 206–212.

Borio, C. (2002), "Towards a Macro-Prudential Framework for Financial Supervision and Regulation?", *Working Paper*, Bank for International Settlements.

Cordella, T. and E. L. Yeyati (1999), "Bank Bailouts: Moral Hazard vs. Value Effect", *IMF Working Paper* WP/99/106.

Elsinger H., A. Lehar and M. Summer (2002), "Risk Assessment for Banking Systems", mimeo.

Erlenmaier, U. and H. Gersbach (2001), "The Funds Concentration Effect and Discriminatory Bailout", University of Heidelberg, mimeo, extended version.

Freixas, X. (1999), "Optimal Bail Out Policy, Conditionality and Creative Ambiguity", University of Pompeu Fabra, mimeo.

Freixas, X., B. Parigi and J. Rochet (1998), "Lender of Last Resort: A Theoretical Foundation", Universities of Pompeu Fabra, Toulouse, and Venice, mimeo.

Fries, S., P. Mella-Barral and W. Perraudin (1997): "Optimal Bank Reorganization and the Fair Pricing of Deposit Guarantees"', *Journal of Banking and Finance* 21, 441–468.

Gersbach, H. (1999), "Financial Intermediation and the Creation of Macroeconomic Risks", *Working Paper*, University of Heidelberg.

Gersbach, H. and H. Uhlig (1999), "Debt Contracts as an Equilibrium Phenomenon", *Working Paper*, University of Heidelberg.

Gersbach, H. and J. Wenzelburger (2001), "The Dynamics of Deposit Insurance and the Consumption Trap", *Discussion Paper* 343, University of Heidelberg, and *CESifo Working Paper* 509, Munich.

Gersbach, H. and J. Wenzelburger (2003), "Capital-Adequacy Rules and Interest-Rate Interventions in Banking Crises", mimeo.

Goodfriend, M. and J. Lacker (1999), "Limited Commitment and Central Bank Lending", mimeo.

Goodhart, C. A. E. (1995), *The Central Bank and the Financial System*, Cambridge, Mass.: MIT Press.

Goodhart, C. A. E. and H. Huang (1999), "A Model of the Lender of Last Resort", *IMF Working Paper* WP/99/39.

Hellwig, M. F. (1998), "Banks, Markets, and the Allocation of Risks", *Journal of Institutional and Theoretical Economics* 154, 328–345.

Humphrey, T. (1986), "The Classical Concept of the Lender of Last Resort", in: T. Humphrey (ed.), *Essays on Inflation*, 5th, Richmond Va.: Federal Reserve Bank of Richmond.

Lasota, A. and M. Mackey (1994), "Chaos, Fractals and Noise: Stochastic Aspects of Dynamics", *Applied Mathematical Sciences* 97, New York a.o.: Springer.

Mailath, G. and L. Mester (1994), "A Positive Analysis of Bank Closure", *Journal of Financial Intermediation* 3, 272–299.

Mishkin, F. (1995), "Comments on Systemic Risk", in: G. Kaufmann (ed.), *Banking, Financial Markets, and Systemic Risks*, Research in Financial Services, Private and Public Policy, vol. 7, Hampton: JAI press.

Repulla, R. (1999), "Who should Act as Lender of Last Resort? An Incomplete Contracts Model", Madrid: CEMFI, mimeo.

Santomero, A. and P. Hoffmann (1998), "Problem Bank Resolution", *Discussion Paper*, Financial Institutions Center, Wharton School, University of Pennsylvania, Working Paper.

Schwartz, A. (1995), "Systemic Risk and the Macroeconomy", in: G. Kaufmann (ed.), *Banking, Financial Markets, and Systemic Risk*, Research in Financial Services, Private and Public Policy, vol. 7, Hampton: JAI press.

Regulatory and Supervisory Independence and Financial Stability

Marc Quintyn and Michael W. Taylor*

Abstract: *Despite its importance, the issue of financial sector regulatory and supervisory independence (RSI) has received only marginal attention in literature and practice. However, experience has demonstrated that improper supervisory arrangements have contributed significantly to the deepening of several recent systemic banking crises. In this paper we argue that RSI is important for financial stability for the same reasons that central bank independence (CBI) is important for monetary stability. The paper lays out four key dimensions of RSI-regulatory, supervisory, institutional and budgetary – and discusses ways to achieve them. We also discuss institutional arrangements needed to make independence work in practice. The key issue in this respect is that agency independence and accountability need to go hand in hand. The paper discusses a number of accountability arrangements.* (*JEL* G18, G28, K23, L50)

1 Introduction and summary

This paper argues that bank regulators and supervisors need a comparable degree of independence with respect to their mandate as that now widely enjoyed by central bankers in respect of monetary policy. What we term regulatory and supervisory independence (RSI) – both from the government and the industry – is essential for the achievement and preservation of financial (sector) stability.[1] At the same time, given the crucial role of banking supervision, the paper argues that proper channels of accountability need to be established to complement agency independence and make it work. It also contends that regulatory and supervisory independence complements central bank independence (CBI) to achieve or preserve the twin goals of monetary and financial

* International Monetary Fund.

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1 References to agency "independence" in this paper should always be taken to be references to RSI. The term "independent regulation" has been used elsewhere to describe bank regulation conducted outside the central bank (see Vives, 2000b for instance), but that is not the sense in which we use it here.

stability. The paper also provides practical advice as to how independence and accountability can be achieved.

Although an increasing number of papers are being written about regulatory and supervisory issues, RSI has not been discussed in a systematic way. A survey of the existing literature indicates that scholars either make only a passing mention of it, or take its desirability for granted without much further analysis.[2] The reasons why regulatory independence might be desirable and how it can be achieved have not hitherto received a thorough examination. This paper aims to remedy this deficiency.

Two factors have served to give the need for RSI greater prominence in recent years. First, in almost all of the systemic financial sector crises of the 1990s, weak and ineffective regulations – often because vested interests block the adoption of stronger regulations – weak and dispersed supervision, and political interference in the supervisory process leading to regulatory forbearance have been mentioned as major factors contributing to the weakening of banks in the run-up to the crisis, postponing recognition of the severity of the crisis, and delaying first official and subsequently effective intervention.

A second factor to have highlighted the importance of RSI is the discussion on the most appropriate regulatory and supervisory structure, including the organizational structure of banking supervision within or outside the central bank. The growing tendency to move to unified (or integrated) financial sector supervision often involves removing the banking supervision function from the central bank, where it had previously enjoyed a relatively high degree of independence derived from the central bank's independence with respect to its monetary policy functions. So, there is a concern that removing banking supervision from the central bank will create a less independent function than previously existed, also because discussions about unification have revealed greatly varying levels of independence among regulatory agencies, leading to a debate about the appropriate degree of independence for the new, unified agency.[3] On the other hand, the creation of a supervisory superpower raises fears about too great a degree of power for this institution – in particular if the institution becomes part of the central bank.

To make the concept of RSI operational, the paper sets out four dimensions of independence – regulatory, supervisory, institutional, and budgetary – and suggest ways to achieve them. Because of the key role of the supervisory

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2 The Basel Core Principles for Effective Banking Supervision have certainly drawn attention to the topic. Core Principle 1 explicitly requires that the bank regulatory agency possess "operational independence and adequate resources".

3 Evidently, the arguments in favor of independence apply to the regulators of all subsectors of finance.

function, this function will receive more attention than it typically receives in the literature on agency independence.[4]

Arrangements for agency independence are not sufficient for effective regulation and supervision. Proper accountability measures are fundamental to reap the benefits of agency independence. Rather than regarding independence and accountability as being on a continuum, involving trade-offs between the two objectives, the paper argues that they are complementary. The paper also argues that, in light of the essential function of supervision and its features, accountability is even more important than in other regulatory agencies. We, therefore, provide a set of criteria to ensure accountability.

Institutional arrangements and the prevailing political culture also matter to achieve effective independence. The paper reviews first the arguments in favor of and against housing the supervisory function in the central bank, as well as the arguments used in the recent trend to integrate sector supervisory functions. It is recognized that RSI could benefit from the independence of the central bank, as well as from the fact that several central banks have received regulatory powers in their charters. On the other hand, conflict of interest and the danger of reputational damage are arguments against having supervision in the central bank.

Subsequently, the need for checks and balances in the government system to make agency independence work is emphasized. The fewer checks and balances there are the easier and less costly it is for the authorities to override or undermine agency independence.

The paper is structured as follows. Section 2 sets the stage by providing a few obvious examples where the degree of independence and accountability appears to have been inadequate. Section 3 reviews the case for regulatory independence. Section 4 presents four dimensions of independence in the typical case of financial sector regulation and supervision. Section 5 discusses the issue of political control and accountability and formulates a number of ways to establish accountability. Section 6 reviews institutional arrangements to make independence work. The main conclusions are presented in Section 7. The appendix (available at www.cesifo-economic-studies.de) presents an overview of selected independence and accountability arrangements in a sample of countries.

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[4] The literature on agency independence often only refers to “regulators” either because the regulatory function is the dominant function, or in its dual function of regulator and supervisor. With respect to the financial sector it is important to keep in mind the distinction between both functions. As Quinn (1998) argued, both jobs might be performed by one and the same person, but they perform different tasks – respectively rule-setting and rule-implementation and enforcing. The reader should bear in mind that when this paper uses the word “regulators”, it is only for the sake of conciseness.

2 Experiences with lack of independence

The case for RSI can be supported by the actual experience of a number of countries where inadequate independence arrangements have contributed to financial instability.[5] Protection of weak regulations by politicians and forbearance as a result of political pressures (preventing the regulators from taking action against institutions that they were aware needed to be intervened) are the two most common types of undermining the integrity of the supervisory function.

Korea prior to the 1997 crisis provides one example of the effects that a lack of independence can have on banking supervision. Commercial banks were under the direct authority of the monetary board (the governing body of the Bank of Korea) and the Office of Banking Supervision. Specialized banks and nonbank financial institutions were under the direct authority of the Ministry of Finance and Economy. The ministry's supervision of the nonbanks was generally recognized as being weak and, moreover, created conditions for regulatory arbitrage and excessive risk-taking, especially among commercial banks' trust businesses and merchant banks, which was a contributing factor to the 1997 crisis. In addition, the supervisors had the authority to waive requirements, which led to widespread forbearance and which made enforcement nontransparent (Lindgren and others, 1999). In the wake of the crisis, Korea has reformed it supervisory system to provide it with more autonomy and to eliminate the regulatory and supervisory gaps.

Hartcher (1998) notes that in Japan, the lack of independence of the financial supervision function within the Ministry of Finance (MOF) is also widely believed to have contributed to the emergence of financial sector weaknesses. Although there was probably little direct political pressure on the MOF to exercise forbearance, the system lacked transparency and was known for widespread implicit government guarantees of banking sector liabilities. Following a decline in the ministry's reputation as a supervisor in the late 1990s, the Japanese government decided to create a new Financial Supervisory Agency, which would oversee banking, insurance, and the securities markets and would be more independent and transparent than the MOF had been. The Japanese Financial Services Agency is responsible to the prime minister's office instead of the Minister of Finance, to remove the potential conflicts of interest inherent

[5] The case for RSI can centainly also be supported by cases where proper arrangements prevented problems form developing. However, given the confidential nature of the supervisory function, it is easier to provide examples of *inadequate* arrangements that led to banking problems, than to provide examples of cases where *adequate* arrangements forestalled problems, and many such cases certainly exist. Or, as Goodhart (1998) noted "Supervisory failures have to become public, but supervisory successes in averting crises have to remain secret, at least for a time" (p. 54).

in the ministry's role as both regulator and promoter of the financial services sector. However, to the extent that the intention was to create a more transparent and decisive agency, the results to date have been disappointing. Perhaps one factor contributing to these problems may have been a lack of attention to the external conditions required for effective agency independence.[6]

Political interference in financial sector supervision is perhaps at its most pronounced in decisions to intervene a bank or to provide it with government funds for recapitalization. In Indonesia during the Habibie presidency, the Financial Sector Action Committee (FSAC), comprising a number of ministers of economics and chaired by the coordinating minister, made a number of intrusive interventions into the activities of the Indonesian Bank Restructuring Agency (IBRA). For example, FSAC intervened to reject shareholder settlements that had been negotiated by IBRA management and to demand that the bank recapitalization scheme favor the indigenous business community over banks that were "Chinese" (Enoch and others, 2001). These political interventions served to undermine the credibility of the bank restructuring effort, and particularly the requirement of uniformity of treatment. Just like day-to-day supervision, the credibility of bank restructuring is significantly enhanced if it is under the direction of an agency with a strong, independent and accountable board.

In her account of the Venezuelan banking crisis of 1994, De Krivoy (2000) lists ineffective regulation, weak and dispersed supervision, and political interference as major factors contributing to the weakening of the banks in the run-up to the crisis. Among the wealth of lessons that she draws from this deep crisis, she strongly argues that lawmakers should "make bank supervisors strong and independent, and give them enough political support to allow them to perform their duties".

6 Part of the confusion arises from the existence of a minister for financial services whose position is not recognized in the legislation, but who steers the agency and acts between the agency and the prime minister.

3 The case for agency independence

The economics literature identifies two broad theories of regulation: public interest and the capture theory.[7] Public interest regulation posits that regulation exists to correct various types of market failure, whether arising from monopoly, externalities, or from asymmetric information. Implicit in this theory is the supposition that there is a disinterested state bureaucracy that uses administrative techniques (rule-making, enforcement) to maximize social welfare (Taylor, 2001). The capture theory, by contrast, suggests that whatever the original motivation for regulation and, no matter how strenuously the regulated may have initially resisted its introduction, eventually the regulators will be captured and will serve the interests of the regulated. Stigler (1971 and 1988) argues that producers can manipulate the regulatory process so as to create unnecessary but plausible regulations that raise entry and exit costs. In this model, there are two parties to regulation – the politicians and the regulators. Both can be offered suitable rewards for pro-industry regulation: politicians aim to maximize campaign contributions; regulators aim to maximize some other utility function, which could be salaries (including the offer of jobs in the industry) or a quiet life arising from an industry that provides cooperation, information, and expertise. The costs of regulation are widely borne among consumers, whereas its benefits are concentrated in relatively few producers. The result of regulation is thus a loss of consumer welfare.

The public interest theory of regulation points to the need for independent regulatory agencies: within the objectives set for them by legislators, regulatory agencies should pursue the social welfare as a matter primarily of technical expertise. A vast literature is available (see Quintyn and Taylor, 2002, for some references) arguing that regulatory independence accompanied by solid accountability in general leads to more effective regulation and more competitive, healthier and better structured sectors than when regulation and supervision is left to the line ministries without clear mandates for consumer welfare. However, what distinguishes the financial sector from all other regulatory agencies is the former's unique role in achieving financial stability, now gen-

[7] A third analysis may now be added, the "grabbing hand" of Shleifer and Vishny (Shleifer and Vishy, 1998). Their analysis posits that politicians and regulators do not maximize social welfare but aim to maximize their ability to extract rents from economic activity. This approach differs from traditional capture theory because the machinery of the state is itself being used for the purpose of rent extraction at the expense of *both* consumers *and* producers. While we do not consider the Shleifer and Vishny model further here, we note that it provides an argument in favor of strong accountability arrangements for regulators.

erally considered a public good.[8] Preserving financial stability not only justifies more public regulation but also *a more prominent role for supervision* than in any other sector, where supervision is mainly compliance-driven. This key role of the supervisory function (off-site analysis, on-site inspections, and several additional types of monitoring and/or intervention when financial institutions enter the "trouble zone") strengthens the case for autonomy to preserve the agency's integrity.

In contrast with the public interest theory, the "capture" theory indicates that regulatory independence is a flawed concept, since regulation never serves the objective of maximizing social welfare. While it clearly points to the loss of consumer welfare that arises from regulatory agencies that identify the public interest with the interest of the industries they regulate, it also suggests that this identification is inescapable given the incentives facing regulators. While it is outside the scope of this paper to comment on the extensive literature on regulatory capture, it is nonetheless possible to make some general observations. On a theoretical level, the capture theory assumes that it is possible to identify a single utility function for a regulatory agency – that it aims to maximize the size of the bureau, or bureaucrats' salaries or some other measurable function. However, as has been pointed out elsewhere in the literature, public agencies rarely have a readily identifiable utility function in the same way as a profit-maximizing firm.[9] Secondly, at the empirical level, the capture theory has met with mixed success, and a large part of its explanatory force seems to be derived from the specific institutional framework in the United States. This observation implies that the incentives facing regulators are set by the broader institutional structure in which they must operate. We cannot therefore conclude that the capture theory points inevitably to the conclusion that regulators must always and everywhere operate to favor producer interests over those of consumers. Instead, it suggests the need for a careful consideration of the incentives created by specific institutional arrangements, and the present paper can be thought of as a contribution to that task.

The other strand of economics literature that bolsters the case for regulatory independence is by analogy with CBI. Quintyn and Taylor (2002, p. 4) argue that the growing recognition that financial and monetary stability are two sides

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[8] See, among others, Crockett (1997), White (1996), and Goodhart (1998). The latter disaggregates this special role of banks into several areas (a) their pivotal position in the financial system, especially in clearing and payments systems; (b) the potential systemic dangers stemming from bank runs; (c) the nature of bank contracts; and (d) adverse selection and moral hazard associated with the lender-of-last-resort role and other safety net arrangements that apply to banks. Each of these aspects are building blocks of financial stability.

[9] The point was recognized long ago by the Austrian economists, for example by von Mises (1944). A good deal of unnecessary ink has been spilled through a failure to keep this important distinction in mind.

of the same coin when it comes to macroeconomic stability, implies the case for RSI can be developed along the same lines as for CBI. The theoretical basis for RSI rests on the same arguments as for CBI – derived from the time inconsistency literature (Kydland and Prescott, 1977). In both cases it can be shown that politicians face short-term horizons that may induce them to substitute higher longer-term costs for lower short-term costs. In the case of monetary policy it is higher inflation later versus higher growth now. In the case of supervision it could be forbearance now versus higher bank resolution costs later.[10] [11]

In addition, monetary and financial stability interact very closely. Thus, it can be argued that the independence of the two agencies in charge of monetary and financial stability would have a mutually reinforcing effect.[12] The unique position of financial sector regulators and supervisors and the central bank with respect to the public good function of financial stability distinguishes these two

[10] Bank liquidations are politically unpopular since they can result in genuine hardship for depositors and other creditors, many of who will also be voters. Vote-maximizing politicians with shorter time horizons than supervisors may be concerned about the short-term costs of bank closure, whether fiscal, in terms of lost votes, or in terms of lost campaign contributions and will be sensitive to demands of these groups, particularly if they are politically well-organized. Politicians may be tempted, as a result, to put pressure on supervisors to organize a bailout, or exercise forbearance to avoid short-term costs. But short-term forbearance may be the cause of higher longer-term resolution costs. Another way of looking at the issue is that, because of the intertemporal nature of financial contracts, the implications for the government budget of delayed resolution of problems banks are not obvious to the politicians. Hence, there is a need for qualified, well-informed, and independent supervisors. Accordingly, politicians face the same incentives in relation to failing banks as they do in relation to the goal of price stability. This would imply that any preannounced rule-based policy for financial sector resolution set out by a government department would not be believed by rational agents, who include bank owners and managers. The latter may be tempted to undertake high-risk activities in the belief that the authorities' reaction function in practice will differ from the preannounced rules.

[11] An important objection to this analogy is the argument that the incentives faced by regulators differ from those faced by conservative central bankers. This is, in essence, the critique of regulatory forbearance developed by Kane (1990). In this account, regulatory forbearance arises from the self-interested actions of regulators rather than those of politicians; the incentive structure faced by regulators encourages them to "sweep problems under the carpet" at least until the regulator has left office. Kane's analysis has much in common with the capture theory considered above, and the objections to the two theses are basically the same. While both analyses are important in drawing attention to the need to consider regulators' incentive structures, remuneration arrangements, and accountability measures, many would argue that they take an unduly cynical view of the motivation of most regulators whose observed behavior does not correspond to that predicted by this model. Moreover, to the extent that Kane has built his model on the observed behavior of regulators during one particular episode – the S&L problem in the United States – alternative analyses of the same episode place greater emphasis on political interference than on the self-interested behavior of regulators in triggering the crisis. More generally, politically-induced forbearance is more likely to occur than regulator-induced forbearance.

[12] Increasingly, central banks are taking an active interest in financial stability from a macro stability point of view and these efforts are complemented by the supervisors who take an interest from the micro stability point of view. See Brealey and others, 2001 for an overview.

agencies from other regulatory agencies in that their function is broader than that of other sector-specific regulators.

There is one important difference between RSI and CBI – and by extension, between RSI and the general debate about agency independence. As Lastra and Wood (1999) note, RSI would give supervisors to some extent "the coercive power of the state against private citizens" when they are involved in revoking bank licenses. This power has no equivalent in the powers given to independent central banks. Recognition of the far-reaching nature of these powers should not be used as an argument against granting independence, but, as is argued later, as an argument for well-established accountability arrangements to prevent abuse from this power.

4 Independence – its four dimensions

To make the notion of independence operational, we identify four dimensions of independence – regulatory, supervisory, institutional, and budgetary. The regulatory and supervisory dimensions form the core, while institutional and budgetary independence are essential to support the execution of the core functions. The overriding finding of the survey in appendix (available at www.cesifo-economic-studies.de) is that regulatory and supervisory agencies come in very different shapes and sizes. Areas of authority and arrangements for independence differ widely, basically indicating that local legal and institutional traditions have played the largest part in shaping regulatory and supervisory functions in each and every country.[13] In a minority of countries, the regulatory and supervisory functions are (still) an integral part of a ministry (usually MOF), lacking any independence as defined in this paper. Finally, recently reformed supervisory authorities (following mergers of sectoral supervisory agencies) have a higher degree of independence than their predecessors, with Japan being the exception.

4.1 Regulatory independence

Regulatory independence refers to the ability of the agency to have an appropriate degree of autonomy in setting (technical) rules and regulations for the sectors under its supervision, within the confines of the law. In addition to the

[13] For instance, although transition economies have recently reformed oversight systems, differences in legal traditions (going back to earlier in the twentieth century) dictate differences in legal powers: in Hungary the regulators have no regulatory powers, while in Poland and Czech Republic they do have regulatory powers. Additional overviews of aspects of institutional arrangements can be found in Barth, Caprio, and Levine (2001) and Healey (2001).

main arguments that justify regulatory independence in general – fast action when needed, stability, and expert input in the process – two sector-specific arguments should be emphasized.

The first argument concerns the imperatives posed by internationalization. Given the importance, complexity, and growing internationalization of the financial sector, regulators need to be in position to adapt prudential rules and regulations quickly and flexibly to international best practices, in response to changing conditions and dangers in the international marketplace.[14] The second is an ownership argument. It can be expected that supervisors will identify themselves better with the task of rule-implementation and enforcement, if they have been closely involved in the rule-setting process as well.

Regulatory agencies that need to go through an often lengthy and slow political process to adjust technical rules and regulations face at least two dangers. First, precious time might be lost (typically up to 1 year and sometimes longer) before new rules or regulations are adopted. Second, involvement of the political process may bear the risk that rules and regulations, which are technical in nature and increasingly based on international best practices, become contaminated with political considerations, depending on the strength of checks and balances in the system.[15]

An often-cited danger of regulatory independence is that the over-zealous regulators over-regulate the market without taking into account the costs of regulation. In an extreme case the high cost of regulation may deter foreign investors and put the country at a disadvantage. While this is a danger, it is not unique to independent regulators. Governments can also over-regulate sectors. The other disadvantage is regulatory capture by the industry. Proper transparency in the rule-making process, combined with mechanisms for consultation with all parties involved, is needed to reduce this danger.

4.2 How to establish regulatory independence

Establishing regulatory independence faces hurdles in many jurisdictions because it touches upon fundamental issues embedded in the constitution and

[14] Calomiris and Litan (2000, pp. 290) strongly emphasize the need for supervisors and regulators to respond quickly to changing international conditions and trends, thereby implicitly arguing for a proper degree of autonomy. See also Hayward (2002) for similar arguments.

[15] Many examples can be cited where the rule setting process has been prone to political interference, with severe consequences in terms of financial instability. For example, in some countries the authorities have lowered loan classification standards and provisioning rules for loans to economic sectors that face temporary or structural problems. Exposure rules to large borrowers are often relaxed to allow specific industries or companies to survive, or even worse, to protect politically connected borrowers.

legal traditions. To focus the discussion on the desirable degree of regulatory autonomy, it is useful to look first at the different types of legal frameworks that exist, and secondly at the categories of regulations that govern financial sector operations:

- Legal systems and traditions around the world can broadly be brought back to two types. At one extreme, primary and secondary legislation is highly detailed so that there is no need for additional (technical) rules and regulations. The laws, in particular the secondary legislation, cover all the details. The constitution typically only grants the legislative branch the power to draft and enact legislation. At the other extreme, primary and secondary legislation only establish a broad legal framework, leaving room for technical rules and regulations to detail the specifics and the implementation. In such systems there is typically – but not always – more room at the agency level to issue these rules and regulations.
- Financial sector regulations can be divided into three main categories: *economic* regulations, encompassing controls over pricing, profits, entry, and exit; *prudential* regulations, involving controls over the type of products or production process chosen by the supervised firms; and finally, *information* regulations, governing the information that needs to be provided by the supervised to the public at large and the supervisors.

Regulatory independence is mainly concerned with prudential regulations because they cover rules on the stability of the business and its activities (legally required minimum amount of capital, and fit and proper requirements for senior management), as well as specific rules that follow from the special nature of financial intermediation (risk-based capital ratios, limits on off-balance sheet activities, definition of limits on exposure to a single borrower, limits on connected lending, foreign exposure limits, loan classification rules, and loan provisioning rules). These are the fundamental rules that guide the supervisory process and have a large impact on the soundness of the banking system. A high degree of autonomy in setting these regulations is an essential requirement to ensure that the sector adapts to, and complies with, international best standards and practices. Economic and information regulations on the other hand, should not be the subject of too many amendments over time and could therefore be handled in higher-level legislation. For instance, licensing requirements should be clearly spelled out and be consistent with international best practices. The same is true for criteria to withdraw licenses. Information regulations, once they comply with best international standards and practices, should also not be in need of frequent changes.

While a high degree of regulatory independence is fairly easy to be established in the second type of legal frameworks mentioned above, it is much harder

under the first regime. It would require that supervisory agencies acquire some of the legal powers typically reserved for the government level. In several countries where the constitution was recently rewritten (mostly transition economies) the central banks, as part of the independence they received, were also granted regulatory powers over a well-defined domain. [16] A similar clause would be desirable to achieve the objectives proposed in this paper in those cases where supervisors are not housed in the central bank.

4.3 Country experiences

The appendix (at www.cesifo-economic-studies.de).indicates the following trends:

- In a large number of countries, supervisors – located inside or outside the central bank – had autonomy in setting rules and regulations. In most of the cases, this autonomy is specified in terms of "prudential regulation", or "regulations that govern the business of banking". It is not always clear whether such rules and regulations need prior approval from the government or a minister.
- In a not insignificant number of (important) countries supervisors have no power to issue binding legislation. This is the case in, for instance, Austria, Germany, Hungary, and Italy – countries that belong to the tradition where primary and secondary legislation is highly detailed – but also South Africa and Korea.
- Several supervisory authorities in the above countries issue "guidelines", "policy statements", or "circulars" to the financial institutions to overcome the lack of regulatory autonomy. However, even though these initiatives fill a void, they have no legally binding powers and could therefore lead to confusion and protracted disputes with the industry.
- Recently unified supervisors (in Australia, Japan, and the United Kingdom) have been granted regulatory autonomy.
- In some countries the assessment of compliance with the BCP (as part of the Joint World Bank – IMF the Financial Sector Assessment Program (FSAP)) indicate that the regulatory powers of government and supervisors

[16] In those countries where supervision is located in the central bank (e.g. Czech Republic, Kazakhstan, and Poland), supervisors benefit from the central bank's special constitutional position in terms of regulatory powers.

are not clearly delineated, which may lead to regulatory gaps or conflicting regulations.[17]

4.4 Supervisory independence

Financial sector supervision is much more crucial than supervision in the other sectors of the economy because of the public good aspect of financial intermediation. On-site inspections, off-site monitoring, sanctioning, and enforcement of the sanctions – including revoking licenses – are the supervisors' main tools to ensure the stability of the system. Safeguarding the integrity of the supervisory function is, therefore, a key element in ensuring the soundness of the financial system. Following Lastra (1996), we divide the supervisory function into four areas: licensing, supervision *sensu stricto*, sanctioning, and crisis management. Crisis management is beyond the scope of this paper because it involves other government agencies and a specific approach.

Supervisory independence is probably more difficult to establish and guarantee than the other dimensions of independence. To preserve its effectiveness, the supervisory function is typically highly invisible and it is exactly this invisibility that makes it vulnerable to political and industry interference. Such interference can take many forms and can indeed be very subtle. Government interference, very often leading to forbearance takes place in many countries. In isolated cases, it may lead to the prolongation of the life of insolvent institutions (and, therefore, leads to unfair competition and higher costs for the taxpayer at a later stage); while in more extreme cases it may eventually threaten the stability of the sector.

4.5 How to establish supervisory independence

At least four types of actions could be taken to increase or safeguard the integrity of the supervisory function, including the sanctioning:

- *Legal protection for supervisors while executing their job*. In many countries, supervisors can be sued personally for their actions, which is bound to paralyze their performance. Supervisors are afraid of imposing sanctions or enforcing them, for fear of being sued personally by the supervised institution. In cases of banking crises, when quick and drastic measures are needed (such as bank closures), the entire process can stall and the crisis spread

[17] IMF (2001) discusses the case of Finland, where lawyers in the government and in the supervisory agency have different opinions about the scope of the supervisory agency's legal powers.

further, if supervisors lack the legal protection to take such measures. This issue was explicitly mentioned in the case of the Philippines. Proper legal protection of supervisors should be established in the law.[18]

- *A rules-based system of sanctions and interventions.* A rules-based system has the advantage of being more transparent and also of being amenable to judicial review than the exercise of discretion; it thus reduces the scope for decisions to be influenced by factors other than an objective assessment of the technical merits of the case. An example of a rules-based approach is the use of prompt corrective actions (PCAs) in the regulatory framework.[19] PCAs were introduced in the United States following the S&L crisis (1991) and are now being introduced or considered in several other countries. While in the United States PCAs were primarily designed to insulate the regulatory process from self-interested actions by the regulators themselves,[20] the existence of such objective parameters in the law may protect supervisors who work in good faith in several countries where political intervention is part of the culture, or where state-owned banks play a dominant role in the financial system. Admittedly, there is a trade-off between the drawbacks of taking away some of the supervisors' discretion and the gains in terms of protection and independence.

- *Appropriate salary levels for the supervisors and clear career streams.* In many (mainly developing) countries salary levels of supervisors are low. This has two effects. First it opens the way to bribery. Second, it makes it impossible for the agency to attract the best supervisors – or to keep them once they are in the agency. So the quality of the supervisory function suffers and less-qualified staff is most likely to be more open to influencing by outsiders than high-quality staff.

- *Judicial review should be well-defined and prompt.* The law should be specific about the process of appeals by institutions that have been sanctioned by supervisors. The number of steps should be limited to keep the process transparent and manageable. Ideally, the law should also specify time limits for appeals and the judicial review should be on administrative procedures, not on the substance. Allowing excessive appeals to the court system has several disadvantages. First it allows institutions to prolong their existence under unsound conditions that may affect the health of the entire system; second, it undermines the integrity of the supervisory function and the reputation of the supervisor by allowing nonexperts to intervene in the pro-

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[18] See Delston (1999) for an overview of country practices as well as recommendations as to how to include proper stipulations in the law.

[19] See also Goodhart and others (1998, pp.54–55) for similar arguments.

[20] See, among others, Vives (2000a) and Boot and Thakor (1993).

cess if review is also on the substance; third, it distracts the attention of the supervisor from other issues because of the possibility of getting mired in long periods of controversy; and fourth, the risk of industry (or political) capture becomes higher if financial institutions can intimidate the regulator/supervisor through the court or political system. The agency may become more willing to soften regulations or interventions to avoid similar controversies in the future. To avoid undue interference of nonexpert courts, a specialist tribunal could be established as has been done in some countries.

Ideally, the process of licensing institutions and withdrawing licenses should be left to the supervisory agency. Indeed, "Licensing is the key first step in the supervisory process" (Lastra, 1996). Because supervisors are in charge of supervising the institutions during their lifetime, they should also have the final word as to who can enter the system and who should exit from the system and thus how to shape the sector (in terms of size and numbers). Practice varies greatly among countries. A typical situation that may lead to problems is one where the government (MOF or council of ministers) has the final say over the licensing of individual banks, with supervisors ending up in a situation with too many banks – and, even worse, too many small and unsound banks – to supervise with too small a staff.

When it comes to exit procedures, there is an additional argument: the supervisors' power is much more persuasive if they can threaten to remove the license. If that power is in the hands of another government agency or the minister himself, the threat can be empty.[21] However, both processes – granting and revoking licenses – should be highly transparent.

The case of mergers (and by extension acquiring significant stakes) needs special attention because mergers in general are part of the responsibility of the national competition authority (if there is one) and sometimes the central bank

[21] We thank Peter Hayward for bringing this critical point to our attention. However, Boot and Thakor (1993) argue that based on the bad experience during the S&L crisis (the Kane criticism), supervision and intervention should be separated into two institutions. In our view, the arguments put forward in this paper are stronger than the Kane criticism, which needs to be put in perspective. Therefore, the case for separation of those two activities seems weaker than the case for keeping them together under the umbrella of one supervisory agency.

also plays a part in the decision.[22] The optimal division of labor in the case of merger approval should involve the supervisory agency because of its expert knowledge of the financial sector, and the competition authority, both on equal footing with each other. Such an arrangement would be consistent with the independence of the supervisory agency.

4.6 Country experiences

In the appendix (at www.cesifo-economic-studies.de)., supervisory independence is reflected in two criteria: the authority to grant licenses and withdraw them and the legal protection supervisors enjoy. The role of courts in the exit process is not presented in the appendix, but some observations are derived from the work presented in Barth et al. (2001). Other, useful yardsticks for supervisory independence such as actual enforcement of supervisory actions should be further developed.

- In general, licensing practice ranges from the government or the MOF having sole responsibility, to arrangements where a consultation process among agencies prevails, to countries where the supervisors have total independence. Typically, governments want to reserve for themselves more rights in the exit process than in the entrance one.
- Legal protection for supervisors when executing their jobs is, as a rule, ensured in OECD countries. In many other countries no such protection is provided in the law, at least not explicitly.
- Practices with respect to appeal procedures against key decisions of supervisors vary greatly around the globe. A minority of countries does not allow any appeals, or have not clearly stipulated them in the law. Most countries do provide for appeal, but practices with respect to whom to appeal to (judiciary, government) vary, as well as the nature of the appeal (on administrative procedures or on the substance).

[22] Merger control responsibility in the financial sector varies from country to country. In several European countries, like the United Kingdom, Switzerland, the Scandinavian countries, and France, responsibility for approval is shared between the competition authority and the supervisory authority. In practice, the central bank or the supervisory agency carries a lot of weight in the decision (Vives, 2000b). In Italy, the central bank approves bank mergers and the competition authority has only a consultative role. In the United States, bank mergers must receive approval of the regulator (Federal Reserve, FDIC, or OCC-depending on the case) but the Department of Justice can (and actually does) challenge mergers that threaten to reduce competition substantially.

4.7 Institutional independence

Institutional independence refers to the status of the agency as an institution separate from the executive and legislative branches of government. An agency that forms part of the executive branch typically lacks independence.

4.8 How to establish institutional independence

The following are three critical elements of institutional independence:

- *The terms of appointment and dismissal of its senior personnel.* Independence is best served if there are clear rules on hiring and firing, which should depend on regulators' competence and probity, not on the decisions they reach. Under such rules regulators would enjoy security of tenure, enabling them to speak and take action without fear of dismissal by the government of the day. Ideally two government bodies – that is government and parliament – should be involved in the appointment process.
- *The agency's governance structure.* Multimember commissions help ensure consistency and continuity of decision-making over time and are less likely to be influenced by the views of any one individual. However, no representatives of specific ministries should be members.
- *The openness and transparency of decision making.* Inevitably many decisions involve commercially sensitive material that would be difficult to disclose. But the presumption should be in favor of openness in the decision-making process, making it possible for both the public and the industry to scrutinize regulatory decisions, minimizing the risk of political interference.

4.9 Country experiences

The appendix (at www.cesifo-economic-studies.de).reflects appointment and dismissal procedures and some aspects of the governance structure. Openness and transparency of decision making are not discussed in this appendix because of the vastness of the topic.[23]

- In countries where supervision is housed in the central bank, the governor of the central bank bears in most cases the ultimate responsibility over supervisory actions. The head of the supervisory department is usually ap-

[23] The assessments of observance of the IMF's Code on Transparency in Monetary and Financial Policies (MFP) provide an onset of inventory for this aspect.

pointed by and accountable to the central bank board, or directly to the governor, and in a few cases directly accountable to the government (South Africa).

- Appointment and dismissal arrangements for governors or for heads of supervision (in case of separate institutions) differ widely among countries. The responsibility is either in the hands of the head of state, the prime minister, the minister of finance, or the cabinet.
- Recently reformed agencies, including agencies that are now in charge of "unified" supervision tend to have more, and more clearly defined, institutional independence, with Japan as the exception.

4.10 Budgetary independence

Budgetary independence refers to the role of the executive/legislature in the determination of the size and use of the agency's budget, including staffing of the agency and salary levels. Supervisors who can independently decide over the sources, size, and use of their budget in function of their mission are better equipped to withstand political interference (pressure through the budget), to respond more quickly to newly emerging needs in the area of supervision and to ensure that competent staff is hired.

Supervisory agencies that are funded through a ministry that exercises oversight of their operations, or directly from the budget, may be open to political interference of different sorts. Their budget can simply be too small to attract highly qualified supervisors and pay market-related salaries; or their budget might be cut at times of fiscal austerity – and those times often coincide with mounting problems in the banking system, needing greater supervisory attention. Funding through the government can also be (ab) used by the latter to organize other types of interference in the supervisory process. Cases can be imagined where the government threatens to withhold funding (or squeeze it) if the supervisors are deemed to be too strict on politically connected financial institutions.

4.11 How to establish budgetary independence

If, for whatever reason, there is a consensus that funding needs to come from the government budget, the supervisory budget should be proposed and justified by the agency, based on objective criteria related to developments in the markets and the supervisory activity.

An alternative is to fund the agencies through a levy on the regulated industry, or a combination of such levies and government funds. Fee-based financing has several advantages such as avoidance of political interference, and more freedom for the agency to set its budget in line with its (objective) needs. But unless the levy is properly structured it may produce a sense of budgetary dependence on the industry that could undermine the agency's autonomy in other ways. To avoid industry capture and ensure that the fees are reasonable, in some countries, their level is determined jointly by the supervisory agency and the government. Other accountability measures can be envisaged to ensure that the independent supervisor does not abuse its rights.

One of the downsides of fee-based funding of the supervisory agency is the conflict that may arise when, in times of economic downturn or financial crisis, more intense supervision and monitoring requires more resources from the industry, which in those times may face problems raising these resources (because of lower profits or because the size of the sector is shrinking). In the worst case, such a situation may force a lay-off of supervisors exactly at times that they are needed the most. Allowing the agency to build up reserve funds for these periods seems the best solution.

Supervisory agencies that are part of the central bank structure are either funded through the central bank budget, or from industry-fees. As part of the central bank budget, these supervisory agencies enjoy the same financial autonomy as the central bank. In theory this sounds like the ideal solution. However, situations can be envisioned whereby a power struggle within the central bank has a negative impact on the budget and the staffing of the supervisory agency.

4.12 Country experiences

Budgetary independence is guaranteed more when supervisors are housed in the central bank, although there is not a lot of information available on the allocation process of funds within the central bank. Many supervisory agencies are funded through fees from the industry. Sometimes these fees go directly to the agency, in other cases they go (partially or totally) to the agency either through the central bank budget or the government budget. Finally, in a number of cases, supervisory agencies are funded directly from the government budget.

5 Political control, governance, and accountability

Agency independence cannot bring the benefits and achieve the goals that it is supposed to deliver if it is not accompanied by properly structured accountability arrangements. More specifically, accountability needs to ensure that independent regulators (a) communicate with other political institutions and functions; (b) avoid the trap of industry capture or self-interest; (c) do not create new institutional rigidities; (d) avoid the tendency of over-regulation that may lead to additional costs for the industry; (e) do not slow down structural adjustment in the sector; and (f) evolve as competition emerges and develops.

5.1 Accountability

One of the recurring concerns about the concept of independent regulatory agencies is that it appears to involve the delegation of power without the mechanisms to hold unelected officials responsible for its exercise.[24] If the delegation of authority is conceptualized as the creation of a contract – whether explicit or implicit – between the political authorities and the regulatory agency, there arises a conventional principal-agent problem of ensuring agreed upon contractual performance. This problem will exist to an even greater extent in financial sector regulation than in monetary policy. Given the comparatively greater range of contingencies that can occur in regulation and the difficulty of precisely specifying objectives, any contract for a regulatory agency is bound to be radically incomplete. This conceptual framework then runs the risk of impaling agency independence on the horns of a dilemma: either the agency determines whether it has performed according to the contract ("independence") or another body or institution makes that determination ("accountability"). The dilemma is that if the agency itself makes the determination, then it becomes in effect an "unelected fourth branch of government" which cannot be properly held to account for its performance. If another body or agency makes that determination, the regulator cannot be genuinely independent.

The above view has led many scholars and analysts to present the relationship between independence and accountability in terms of a "trade-off". Nonetheless, our view is that it is misguided to present the relationship between independence and accountability in terms of a trade-off. We argue that the two concepts need instead to be seen as complementary. Accountability is needed

[24] For overviews of the different strands in the political control literature, see for instance Epstein and O'Halloran (1999), Laffont and Tirole (1990), Majone (1993), and Steunenberg (1996).

to make independence work. The higher the degree of independence, the greater the need for proper accountability arrangements.

The way out of this apparent dilemma is to accept that contracting – incentive alignment – is only one way of resolving the principal-agent problem. The alternative to resolve the problem is monitoring.[25] Monitoring of agency behavior can be performed by a range of other bodies, both governmental and non-governmental, including the private sector. To the extent that a regulatory agency is subject to monitoring, it is required to provide an account of its decisions or actions, to explain and justify them, and, where necessary, to take responsibility and adopt remedial actions. In this sense there need not be a trade-off between accountability and independence. The key is to establish a framework within which such scrutiny, explanation and justification can take place according to clearly established rules.

Put another way, formal independence needs to be translated into the ability to act and to exercise influence, and accountability complements independence by enabling an agency to construct a coalition of support for its activities. The "monitoring" approach to accountability is consistent with the "dialogue model" of interaction between political authorities and independent regulatory agencies discussed in Majone (1993). This model – based on observed behavior – supports the view that independent regulators do their best to be informed about the intentions, wishes, and opinions of the political leadership and to anticipate their reactions to new policy proposals.

The following propositions indicate that a system of public monitoring of agency performance enables accountability to support and complement independence, rather than contrast it:

- A properly structured system of accountability lays down clearly defined rules for subjecting the decisions and actions of the agency to review, and thus reduces the scope for ad hoc or discretionary interventions. For example, an obligation to give periodic reports to the legislature protects senior management from being subjected to more frequent and deliberately vexatious questioning. Well-designed accountability arrangements thus reduce the scope for ad hoc interventions in agency decisions and can thus help to buttress its independence.
- Accountability permits the agency to explain its objectives to a broader public. This is essential to build understanding of the way it performs its duties. Even an independent agency can only be fully effective if it enjoys broadly based support for the discharge of its mandate. Many decisions may

[25] Arguments for using monitoring to address the principal-agent problem can be found in, among others, Williamson (1985), Ayres and Braithwaite (1992), Majone (1993) and Dixit (1996).

be too technical for informed public debate, but as a minimum the general public needs to understand the purpose for which the agency exists and the principles underlying its approach to specific tasks, including the trade-offs and dilemmas it has to confront.

- Similarly, accountability arrangements provide a public forum in which different stakeholder groups can make representations about agency policies. By creating opportunities for transparent and structured public influence, the incentives for private influence are reduced. The latter is by far the most corrosive of agency independence.
- Finally, accountability can help transform public understanding into reputation. A strong public reputation for competency, probity and integrity can help translate a formal grant of independence into the ability to take decisions in the face of strong opposition from vested interests. An agency with a strong reputation is more likely to be trusted by the public and thus given the "benefit of the doubt" in controversial cases.

5.2 Accountability arrangements

The need for adequate accountability arrangements is even more critical for financial sector supervisory agencies than for regulators in other sectors (and perhaps even more than for the central bank[26]) because, as discussed before, supervisors have considerable powers in two respects: they affect the outcome for financial firms and they can have a significant impact on consumer welfare. At the same time, the search for adequate arrangements is more difficult because (a) the need for accountability needs to be balanced with another requirement of the supervisory function, confidentiality. The presence of the latter, as an inherent part of the supervisory function, complicates the search for proper accountability and transparency arrangements significantly; and (b) unlike the central bank's objectives (price stability, annual inflation targets), the supervisors' objectives are less measurable (financial stability, consumer protection).[27]

Given this list of diverse and complex issues, political accountability can only be achieved by a combination of control instruments (Amtenbrink, 1999).

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[26] The growing literature on the institutional structure of regulation needed for financial markets in the European Union has thus far not given much attention to whether the independence and accountability arrangements for the European Central Bank (ECB) would also be appropriate for a pan-European financial regulator. For an exception see Lastra (2001). Given the criticisms the ECB has attracted in recent years for what is perceived as a lack of accountability, this important topic requires further consideration.

[27] See on this topic, Goodhart (2001).

While the search for the optimal mix is still continuing, the following nine components seem essential:

5.3 Legal basis

The agency needs to have a clear legal basis, describing its powers and functions, and preferably set out in statute. A clear legal basis will preempt the potential for disputes between the agency and other government agencies or the court system. Country examples reveal instances where the enabling legislation (banking law and/or law establishing the supervisory agency) is vague about the regulatory powers of the supervisory agencies.

5.4 Objectives

The agency needs to have clear objectives that describe its basic purposes. These can be preserving stability of the financial system and soundness of individual institutions; protection of depositors or of customers in general. Wilson (1989) emphasizes that successful organizations tend to have a well-defined mission. As such, this finding is important in the debate on the best location of the supervisory agency (inside or outside the central bank). Indeed, potential conflict of interest may blur the mission of both institutions and reduce their accountability and effectiveness. In several countries, supervisory authorities have issued a "mission statement" clearly outlining the agency's specific objectives. This public document protects the agency against claims by the politicians as well as the supervised institutions that the mandate has not been followed and, as such, is a crucial element of accountability. Nonetheless, the earlier observation that objectives of supervisory agencies are much less measurable than those of other agencies like central banks, complicates the matter.

5.5 Relationship with the executive branch

The agency's relationship with the executive needs to be clearly defined. For example the range of issues on which, and the form in which, the agency must inform or consult the government or seek ministerial approval should be spelled out.

5.6 Relationship with the legislative branch

The regulatory agency discharges functions that have been delegated to it by parliament, often of a quasi-legislative nature. The procedures by which the agency can be held to account by parliament for the use of those powers should be carefully defined.

5.7 Relationship with the judiciary branch

The agency should be subject to judicial review with respect to the manner in which it exercises its powers.[28] The existence of an appeals mechanism helps ensure that regulatory and supervisory decisions are made consistently and are well reasoned. Without a formal appeals mechanism, those affected by regulatory decisions may resort to informal means, especially by seeking to influence regulators by subjecting them to political pressure.

5.8 Appointment, reappointment, and dismissal procedures

Officials of the regulatory agency must have security of tenure. By the same token, the ability to dismiss officials is also a key element of accountability. The law should stipulate who can appoint and dismiss senior officials and under what conditions. For supervisory agencies located in the central bank, the way the supervisory agency (department) relates to the management of bank needs proper attention. In many cases the governor of the central bank bears final responsibility for supervisory actions; in other cases the head of the supervisory agency does. Procedures for appointment, dismissal, and accountability of the head of the supervisory department need to be clearly defined.

5.9 Override mechanisms

While rule-based procedures are generally preferable to discretionary ones, there may be circumstances in which the independence of the agency has to be overridden (e.g., as the result of financial crisis). The nature of these override mechanisms and the circumstances in which they can be triggered need to be defined.

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[28] It can be argued that judicial review is different from accountability as defined here. Judicial review ensures that regulators work within the legal framework defined for their actions and, as such, has a broader meaning.

5.10 Transparency

A regulatory agency needs to be open in its decision-taking procedures to the maximum extent permitted by the need to preserve commercial confidentiality. Transparency in the supervisory process serves several purposes: (a) it limits self-interest on the part the supervisors (the Kane-criticism) and the danger for regulatory capture. As such, disclosure of supervisory findings (and actions) is a way of letting market participants assess the effectiveness of supervision; (b) it discourages political interference in the supervisory process; and (c) it is also instrumental in increasing the commitment of bank managers, directors, and owners to prudent behavior and risk control of the banking business.[29]

5.11 Budgetary accountability

The regulatory agency must be held to account for the way that it manages its finances. This may be either ex ante (in the form of the budgetary appropriations process) or ex post (in the form of a review of the accounts.)

5.12 Country practices

Accountability differs widely, both in arrangements and strength. In several cases the laws are not very specific. For separate agencies, practices vary in terms of appointment procedures, but more often than not it is not clear to whom the president of the agency is accountable. When supervision is housed in the central bank, most often the president of the latter bears ultimate responsibility, but it is not always clear to whom, and to what extent, the head of supervision can be held accountable.

6 Independence and institutional arrangements

Granting independence and ensuring proper accountability is a necessary but not sufficient condition for its effectiveness. This section briefly analyzes arrangements and conditions needed to ensure that independence actually works. It first discusses the impact of institutional arrangements on RSI – inside or

[29] See also Halme (2001). Halme also discusses the need for, and difference between ex ante and ex post disclosure practices. She notes that supervisory agencies with well-established disclosure procedures (such as the Financial Sector Authority in the United Kingdom) typically have ex post disclosure requirements. Ex ante disclosure requirements are recognized to be more problematic since such disclosure can create additional ambiguity.

outside the central bank, and impact of unification of supervisory functions. Subsequently we lay out preconditions in the broader political framework.

6.1 Inside or outside the central bank?

It could be argued that the simplest way to secure an appropriate degree of independence for financial services regulation is for the function to be located in the central bank. Given that CBI has increasingly found recognition in the past two decades, one could argue that supervisors could "piggyback" and enjoy (or build up) the same degree of autonomy and prestige. The case for combining banking supervision with the monetary policy function has been extensively examined.[30] The following paragraphs briefly review the main arguments from the point of view of RSI.

The chief argument for combining both functions is that banks are the instruments through which monetary policy is transmitted to the wider economy and therefore the central bank should be concerned with their soundness as a precondition for an effective monetary policy. In addition, since the central bank also acts as a lender of last resort it should have access to information about the financial condition of the institutions that might potentially apply to it for emergency liquidity assistance. The more recently advanced argument that central banks are concerned with macrostability and supervisors with microstability of the sector, points out that both functions are two sides of the same coin, justifying close cooperation and coordination.[31]

There are also a number of powerful arguments in favor of a separation of both functions, stemming from the potential for conflict of interest in a multi-objective institution. A central bank might be tempted to operate a lax monetary policy if it is concerned about the financial health of banks it is also responsible for supervising. By keeping monetary conditions loose, the central bank may avoid the failure of banks for which it might be blamed, but at the expense of higher inflation in the longer run.

Conflict of interest and reputational damage are closely linked. The failure of individual banks can attract blame to the bank supervisors and thus undermine the credibility of the central bank if it is also the bank supervisor. Thus, it is argued, it is better for the central bank's relationship with routine banking

[30] An overview of the arguments is provided in, among others, Tuya and Zamalloa (1994) and Goodhart and Schoenmaker (1998). Hawkesby (2001) sheds some additional light on the discussion, adding cost-benefit elements and country-specific factors.

[31] However, cooperation and coordination can also be achieved when both functions are housed in separate agencies.

supervision to be at a relatively arms-length distance to avoid such reputational contagion. The argument in favor of an arms-length relationship also holds from the supervisors' point of view. Their reputation can be damaged if central bank actions tend to prolong the life of an institution when supervisors have come to the conclusion that it needs to be liquidated. Supervisors may perform better in a single-objective institution because chances are smaller that their reputation and, therefore, their career paths are damaged by conflicting actions by other officials of the central bank (Vives, 2000a).

Whether issues like conflict of interest or reputational damage might arise or not, would largely depend on the specific institutional settings. For instance supervisors could be subject to oversight by a central bank board which, through its composition, could be biased toward monetary policy considerations and, therefore, overrule or alter the supervisory decision-making process. Thus, it should not be taken for granted that supervisors located in the (independent) central bank de facto enjoy the same degree of autonomy as the monetary policy function.

The arguments for separation and combination of functions are thus finely balanced, but two considerations would appear to tip the weight of argument in favor of combining both functions in transition and developing economies. These central banks often have very strong guarantees of independence from political pressure, in some cases being established as independent entities under the constitution. In many countries the governor of the central bank enjoys a high degree of security of tenure, with the central bank, itself, having its own dedicated funding sources. Moreover often the central bank has – as an exception from the legal tradition – been given the power to issue legally binding regulations in specified areas.

A subsidiary reason for combining both functions in transition and developing economies is that the central bank is usually better placed to attract and retain staff with the right level of skills and expertise than are other government agencies, owing to its budgetary autonomy and prestige. This means that central banks are often much better placed to develop the human resources necessary for high quality regulation than are government departments (or newly established agencies).

6.2 The implications of unification of supervisory functions

Does the above argumentation change in light of the recent tendency to bring sectoral supervisors under the same roof? If banking supervision is located in the central bank, then one option might be for the central bank to assume regulation and supervision over the other sectors as well. The benefits of this

approach are that it ensures that these functions will also be performed with the same independence as banking supervision and that regulatory capacity building will be facilitated by the central bank's prestige and access to human resources. Combining all financial regulation within the central bank would permit significant scale economies to be realized by using its information technology, data collection, and human resource functions.

However, relatively few countries in the world have adopted this approach,[32] perhaps reflecting a number of serious drawbacks about this type of regulatory structure.[33] In the first place, it involves the central bank taking on responsibility for a wide range of financial activities about which its staff can be expected to have no special expertise. Second, the extension of the central bank's regulatory responsibilities to nonbank financial institutions may appear to be an implicit extension of its guarantee of financial assistance beyond banks. Third, and most importantly, granting the central bank such extensive regulatory responsibilities may result in it being perceived as excessively powerful. Such a powerful central bank raises issues of accountability.

A possible alternative to centralizing all regulatory and supervisory functions in the central bank would be to create an integrated financial regulatory authority, as a separate regulatory agency responsible for banking, securities, pension fund, and insurance regulation. In terms of RSI, evidence emerging from FSAP work indicates that sectoral regulators and supervisors have highly different levels of independence, typically stemming from their historical backgrounds (Das and Quintyn, 2002),.[34] Integrating the supervisory functions provides the authorities with an opportunity to redefine the institutional features and give a high level of independence to the successor institution, as has indeed happened in a set of countries (see appendix at www.cesifo-economic-studies.de).

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32 The main examples are Singapore and the Netherlands Antilles (Courtis, 2001).

33 For a more extensive discussion of advantages and drawbacks, see Abrams and Taylor (2000), Goodhart (2000), and Taylor and Fleming (1999).

34 The institutional arrangements underpinning regulatory agencies indeed vary greatly from country to country and across types of agencies (banking, securities, insurance, and pension funds). In countries with a well-rooted financial system (mainly OECD countries), typically bank supervisors and regulators have a higher degree of independence from the political authorities than agencies supervising other sectors. For instance, insurance supervisors were traditionally established as a department within a ministry (finance or economy) and their supervisory functions were limited. The growing importance of the insurance sector as a part of large financial conglomerates is changing this situation. The supervisory and regulatory structure for the securities sector also varies widely across countries.

6.3 Independence, accountability and political checks and balances

Establishing or preserving the integrity of the regulatory and supervisory function depends to a large extent also on the prevailing (political) culture. In a number of western countries agency independence is greatly buttressed by the transparency of political processes, the presence of numerous checks and balances in the political system, the role of the media, and the absence of a close government-business nexus. However, in many other economies – transition and others – these elements of the environment in which regulatory agencies operate are (still) lacking, and hence even greater attention must be given to the institutional arrangements to ensure independence.

The analogy with recent findings in the area of central bank independence is very useful at this point. Recent reviews of the effectiveness of central bank independence have come to the view that legal provisions that grant independence to the central bank, even if accompanied by solid accountability arrangements, do not always yield the expected results in terms of policy effectiveness.[35]

Granting independence to a central bank is shown to be only credible and effective (in terms of reducing inflation) in legislative systems with at least two heterogeneous decision-making bodies. In a system with extensive checks and balances, once independence has been granted to an agency, it cannot be removed by a simple majority rule. So, in a system with at least two veto players with different preferences, the costs of withdrawing independence (or interfering in the policymaking process) are great, and higher than in a system with few (or no) checks and balances. Prestige of the institution or its governor alone – however important – is often insufficient to guarantee independence. Previous literature on CBI – and on regulatory independence in general – largely neglected the existence of such costs, or considered them exogenous. Good political governance is crucial to the sustainability and effectiveness of decision making by independent agencies.

A parallel with financial regulatory agencies can be easily established. Although no empirical evidence is as yet available on the relationship between political checks and balances and the effectiveness of regulatory independence, Keefer (1999) offers an interesting overview of the linkages based on intuitive reasoning. The presence of checks and balances in the system seems, on balance, to have a positive effect on the effectiveness of the independent agency – provided proper accountability mechanisms are in place. For instance, the presence of checks and balances tends to better insulate the supervisors in their

[35] Moser (1999) and Keefer and Stasavage (2001).

function and it may drive up the incentives to have good and more prudent regulations. The fewer checks and balances there are, the more incentives there are for the government to override, at no cost, supervisory actions (or pre-empt them) in the case of a troubled bank, and keep that bank open. Government-induced forbearance is likely to be a more common phenomenon in a political system with few(er) checks and balances. Similarly, relaxing key prudential rules, for instance to favor specific economic sectors, are less costly when checks and balances are underdeveloped.

Given that it takes time for good political governance to take root, the message for countries with political systems that lack checks and balances is that the commitment to RSI should be based on the conviction that adherence to best international standards and practices is becoming a necessity in today's globalized system. If regulations in a country diverge too much from international best practices, as embodied for instance in the Basel Core Principles for Effective Banking Supervision, or if supervisory practices are too weak or burdened by government interference, investors – both domestic and foreign – might turn their backs on these countries. It is encouraging in this context that Goodhart (1998, p.104–106) remarks that work by the International Financial Institutions has already had a beneficial impact on lasting improvements on the regulatory side in developing and emerging economies. To have a similar impact on the actual supervisory practice will be more difficult, however.

7 Conclusions

Despite its importance, the issue of independence for financial sector regulatory and supervisory authorities has only received marginal attention in the literature and in practice. This paper attempts to fill this void. The paper argues that a fair degree of RSI – complemented by appropriate accountability – is an essential building block of financial stability. Lack of proper independence from political influence has been mentioned as an important contributing factor in all recent systemic banking crises. The paper also makes the case that RSI and CBI reinforce each other in achieving monetary and financial stability.

The case for RSI in the financial sector is based on analogies with two areas where agency independence has already been largely debated and established – the regulation of public utilities and CBI. With respect to the first, empirical work suggests that regulatory independence leads to better results in terms of more effective regulation, along with improved market behavior and competition than when leaving the regulatory process to the political arena. Second, the paper draws on the arguments now well established in relation to CBI and

argues that the independence of regulatory agencies matters from the point of view of financial stability for many of the same reasons that the independence of central banks makes a difference for monetary stability.

To make the concept of RSI operational, the paper sets out four dimensions of independence-regulatory, supervisory, institutional, and financial. While all four dimensions are important for the effectiveness of the regulatory and supervisory function, we emphasize that (a) autonomy in terms of setting prudential rules and regulations is a crucial requirement from all points of view; and (b) compared to other regulatory agencies, supervisory independence is highly desirable in light of the specific public good function that financial stability fulfills.

Recognizing that the key to effective regulation and supervision is not absolute independence, the paper contends that adequate accountability arrangements should complement independence. Although worldwide evidence suggests that independent agencies do not behave as an uncontrolled "fourth branch of government", unbalanced independence may open the door to other potential traps. Accountability is also essential to build the public understanding, support and trust that it necessary to translate an agency's formal grant of independence into the ability to carry through its agenda in the face of strong vested interests. This makes accountability the single most important factor to make independence work.

Experience indicates that arrangements for agency independence, by and of themselves, are necessary but not sufficient conditions for effective regulation and supervision. Institutional arrangements also matter. The paper reviews first the arguments in favor of and against housing the supervisory function in the central bank, as well as the recent tendency to integrate sector supervisory functions. It is recognized that RSI could benefit from the established CBI and from the fact that several central banks have received regulatory powers in their charters. On the other hand, conflict of interest and the danger of reputational damage are arguments against having supervision in the central bank. Moreover, placing an integrated supervisory agency in the central bank may make the latter too powerful and perhaps lead to too many conflicting objectives for one institution which would undermine its effectiveness. Finally, the paper stresses the importance of checks and balances in the government system as a precondition for effective independence. The fewer checks and balances there are, the easier and less costly it is for the authorities to override or undermine agency independence.

References

Abrams, R. K and M. W. Taylor (2000), "Issues in the Unification of Financial Sector Supervision", *IMF Working Paper* 00/213.

Ayres, I. and J. Braithwaite (1992), *Responsive Regulation: Transcending the Deregulation Debate*, Oxford: Oxford University Press.

Amtenbrink, F. (1999), *The Democratic Accountability of Central Banks: A Comparative Study of the ECB*, Oxford and Portland.

Barth, J., G. Caprio and R. Levine (2001), "The Regulation and Supervision of Banks around the World: A New Database", in: R. Litan and R. Herring (eds.), *Brookings-Wharton Papers on Financial Services*, Washington: Brookings Institution Press, 183–250.

Basel Committee on Banking Supervision (1997), "Core Principles for Effective Banking Supervision", *Basel Committee on Banking Supervision* 30, September, Basel, Bank for International Settlements.

Boot, A. W. A. and A. V. Thakor (1993), "Self-Interested Bank Regulation", *American Economic Review* 83(2), 206–212.

Brealey, R., A. Clark, Ch. Goodhart, J. Healey, G. Hoggarth, D. T. Llewellyn, Ch. Shu, P. Sinclair and F. Soussa (2001), *Financial Stability and Central Banks. A Global Perspective*, Central Bank Governors' Symposium Series, London: Routledge.

Calomiris, Ch. and R. Litan (2000), "Financial Regulation in a Global Marketplace", in: R. Litan and A. Santomero (eds.), *Brookings-Wharton Papers on Financial Services*, Washington: Brookings Institution Press, 283–340.

Courtis, N., ed. (2001), *How countries Supervise Their Banks, Insurers, and Securities Markets 2002*, London: Central Banking Publications.

Crockett, A. (1997), *Why is Financial Stability a Goal of Public Policy*, Federal Reserve Bank of Kansas City, Fourth Quarter.

Cukierman, A., St. B. Webb and B. Neyapti (1992), "Measuring The Independence of Central Banks and its Effect on Policy Outcomes", *World Bank Economic Review* (International) 6, 353–398.

Das, U. and M. Quintyn (2002), "Financial Crisis Prevention and Crisis Management – The Role of Regulatory Governance", in: R. Litan, M. Pomerleano and V. Sundararajan (eds.), *Financial Sector Governance. The Roles of the Public and Private Sectors*, Washington: Brookings Institution Press, 163–208.

De Krivoy, R. (2000), *Collapse. The Venezuelan Banking Crisis of 1994*, Washington D.C., The Group of Thirty.

Delston, R. (1999), *Statutory Protections for Banking Supervisors*, The World Bank, Financial Sector Group.

Dixit, A. K. (1996), *The Making of Economic Policy: a Transaction-cost politics perspective*, Cambridge: MIT Press.

Enoch, Ch., B. Baldwin, O. Frécaut and A. Kovanen (2001), "Indonesia: Anatomy of a Banking Crisis. Two Years of Living Dangerously 1997–99", *IMF Working Paper* WP/01/52.

Epstein, D. and S. O'Halloran (1999), *Delegating Powers: A Transaction Cost Politics Approach to Policy Making Under Separate Powers, New York*, Cambridge: University Press.

Goodhart, Ch. (1998), *The Emerging Framework of Financial Regulation*, a collection of papers compiled by the Financial Markets Group of the London School of Economics, London: Central Banking Publications Ltd.

Goodhart, Ch. (2000), *The Organizational Structure of Banking Supervision*, paper presented at the Conference "Financial Supervision of Banks and Specialized Banks in the EU", European University Institute, December.

Goodhart, Ch. (2001), "Regulating the Regulators – Accountability and Control", in: E. Ferran and C.A.E. Goodhart (ed.), *Regulating Financial Services and Markets in the 21st Century*, Oxford UK: Hart Publishing, 133–212.

Goodhart, Ch., P. Hartmann, D. Llewellyn, L. Rojas-Suarez and St. Weisbrod (1998), *Financial Regulation. Why, how and where now?*, London and New York: Routledge.

Goodhart, Ch. and D. Schoenmaker (1998), "Institutional Separation Between Supervisory and Monetary Agencies", reprinted in: C.A.E., Goodhart (ed.), *The Emerging Framework of Financial Regulation*, London: Central Banking Publications, 133–212.

Grilli, V., D. Masciandaro and G. Tabellini (1991), "Political and Monetary Institutions and Public Financial Policies in the Industrial Countries", *Economic Policy* 13, 342–392.

Halme, L. (2000), "Bank Corporate Governance and Financial Stability", in: L. Halme, Ch. Hawkesby, J. Healey, I. Saapar and F. Soussa (eds.), *Financial Stability and Central Bank. Selected Issues for Financial Safety Nets and Market Discipline*, London: Bank of England, Centre for Central Banking Studies, 32–70.

Hartcher, P. (1998), *The Ministry: How Japan's Most Powerful Institution Endangers World Markets*, Harvard: Business School Press.

Hayward, P. (2002), *The Financial Sector – The Responsibilities of the Public Agencies*, in: Ch. Enoch, D. Marston and M. Taylor (eds.), *Building Strong Banks Through Surveillance and Resolution*, Washington: IMF.

Hawkesby, Ch. (2001), "Central Banks and Supervisors: The Question of Institutional Structure and Responsibilities", in: L. Halme, Ch. Hawkesby, J. Healey, I. Saapar and F. Soussa (eds.), *Financial Stability and Central Bank. Selected Issues for Financial Safety Nets and Market Discipline*, London: Bank of England, Centre for Central Banking Studies, 95–128.

Healey, J. (2001), "Financial Stability and the Central Bank: international evidence", in: R. Brealey, R. and others (eds.), *Financial Stability and Central Banks. A Global Perspective*, London: Central Bank Governors' Symposium Series, London: Routledge, 19–78.

International Monetary Fund (1998), *Toward a Framework for Financial Stability*, Washington.

International Monetary Fund (1999), *Code of Good Practices on Transparency of Monetary and Financial Policies*, September, Washington.

International Monetary Fund (2001), *Finland: Financial System Stability Assessment*, Country Report No 01/214.

Jacobs, S. (1999), *The Second Generation of Regulatory-Reforms*, paper delivered at the IMF Conference on Second Generation Reforms, available at the IMF website.

Kane, E. (1990), "Principal-Agent Problems in S&L Salvage", *Journal of Financ* 45 (July), 755–764.

Keefer, P. (1999), *Politics and the Determinants of Banking Crises: The Effects of Political Checks and Balances on the Dynamics of Financial Sector Distress*, World Bank Development Research Group, paper presented at the meeting of the Western Economics Association, July.

Keefer, P. and D. Stasavage (2001), "Bureaucratic Delegation and Political Institutions: When Are Independent Central Banks Irrelevant?", *World Bank Discussion Paper* No. 2356.

Kydland, F. and E. Prescott (1977), "Rules Rather than Discretion: The Inconsistency of Optimal Plans", *Journal of Political Economy* 85(3), 473–491.

Laffont, J.-J. and David Martimort (1999), "Separation of Regulators Against Collusive Behavior", *RAND Journal of Economics*, 30(2), 232–262.

Laffont, J.-J. and J. Tirole (1990), "The Politics of Government Decision Making: Regulatory Institutions", *Journal of Law, Economics and Organization* 6(1), 1–31.

Lannoo, K. (2000), *Challenges o the Structure of Financial Supervision in the EU*, Paper presented to the 22nd SUERF Colloquium, Vienna.

Lastra, R. M. (1996), *Central Banking and Banking Regulation*, London: LSE, Financial Markets Group, 392.

Lastra, R. M. and G. Wood (1999), "Constitutional Approach to Central Bank Independence", *Central Banking* X(3), 34–39.

Lastra R. M. (2001), *The Governance Structure for Financial Regulation in Europe*, Paper presented at the London Financial Regulation Seminar on the Institutional Organisation of Banking Supervision, December.

Lindgren, C.-J., T. J. T. Baliño, Ch. Enoch, A.-M. Gulde, M. Quintyn and L. Teo (1999), "Financial Sector Crisis and Restructuring. Lessons from Asia", *IMF Occasional Paper* 188, Washington D.C., International Monetary Fund.

Majone, G. (1993), "Controlling Regulatory Bureaucracies: Lessons from the American Experience", *EUI Working Paper* SPS 93/3.

Marquardt, J. (1987), "Financial Market Supervision: Some Conceptual Issues", *BIS Economic Papers* 10, May, Bank for International Settlements, Basel.

McCubbins, M. D., R. G. Noll and B. R. Weingast (1987), "Administrative Procedures as Instruments of Political Control", *Journal of Law, Economics and Organization* 3(2), 243–277.

Moser, P. (1999), "Checks and Balances and the Supply of Central Bank Independence", *European Economic Review* 43, 1569–1593.

OECD, Regulating Governance (2000), *Improving the Institutional Basis For Sectoral Regulation, Meeting of the Regulatory Management and Reform Working Party*, OECD Headquarters, 4–5.

Quinn, B. (1998), "Rules v Discretion: the case for banking supervision in the light of the debate on monetary policy", in: C. A. E. Goodhart (ed.), *The Emerging Framework of Financial Regulation*, Central Banking Publications, London, 119–132.

Quintyn, M. and M. Taylor (2002), "Regulatory and Supervisory Independence and Financial Stability", *IMF Working Paper* WP/02/46.

Rogoff, K. (1985), "Optimal Degree of Commitment to an Intermediate Monetary Target: Inflation Gains Versus Stabilization Costs", *Quarterly Journal of Economics* 100 (November), 1169–1189.

Shleifer, A. and R. Vishny (1998), *The Grabbing Hand*, Cambridge: Harvard University Press.

Steunenberg, B. (1996), "Agent Discretion, Regulatory Policy Making, and Different Institutional Arrangements", *Public Choice* 46, 275–287.

Stigler, G. (1971), "The Theory of Economic Regulation", *Bell Journal of Economics and Management Science* 6(2), 114–141.

Stigler, G. 1988, *Chicago Studies in Political Economy*, Chicago: University of Chicago Press.

Taylor, M. and A. Fleming (1999), "Integrated Financial Supervision: Lessons of Northern European Experience", *World Bank Policy Research Paper* 2223 (November), Washington D.C, World Bank.

Taylor, M. (2001), "Building Supervisory and Regulatory Capacity in the Transition Economies", in: Y. Kalyuzhnova and M. Taylor (eds.), *Transition Economies: Banking, Finance and Institutions*, London: Palgrave.

Tuya, J. and L. Zammaloa (1994), "Issues in Placing Banking Supervision in the Central Bank", in: T. Balino and C. Cottarelli (eds.), *Frameworks for Monetary Stability. Policy Issues and Country Experiences*, Washington: International Monetary Fund, 663–690.

Vives, X. (2000a), *Central Banks and Supervision (with an application to financial architecture in EMU)*, paper presented at the Conference "Financial Supervision of Banks and Specialized Banks in the EU", European University Institute, December.

Vives, X. (2000b), *Banking Supervision in the European Monetary Union*, paper presented at the Conference "Financial Supervision of Banks and Specialized Banks in the EU", European University Institute, December.

von Mises, L. (1944), *Bureaucracy*, New Haven: Yale University Press.

White, L. J. (1996), "On the International Harmonization of Bank Regulation", *Oxford Review of Economic Policy*, 10(4).

Williamson, O. E. (1985), *The Economic Institutions of Capitalism: firms, markets, relational contracting*, New York: Free Press.

Wilson, J. Q. (1989), *Bureaucracy: What Government Agencies Do and Why They Do It*, New York: Basic Books.

Wood, D. and R. Waterman (1991), "The Dynamics of Political Control of the Bureaucracy", *American Political Science Review* 85(3), 801–828.

Appendix I

Overview of Features of Autonomy of Banking Supervisors in Selected Countries

	Name of Institute and Sectoral Responsibilities	Regulatory Power	Budgetary Autonomy	Appointment of President and Accountability	Power to Grant and Withdrow Licenses and Specific Issues Related to Degree of Autonomy	Legal Protection of Supervisors
A. Countries where banking supervisions is part of the central bank						
Czech Republic	Banking Supervision Department, Czech National Bank (CNB) Commercial banks, foreign banks branches and persons other than banks licensed under separate Acts.	CNB has the legal authority to specify prudential regulations within the confines of the banking law.	Budget allocation made from the CNB.	Bank governor and vice governors (the Board) are appointed by the president. The head of banking supervision is appointed by the Board of Directors and is accountable to the Board.	The CNB needs to request the opinion of the minister of finance prior to granting or revoking a license.	Yes. The State shall be liable for damages caused by improper official actions or rulings.
The Gambia	Banking and Financial Institutions Supervision Department, Central Bank of the Gambia (CBG). Commercial banks, insurance companies and nonfinancial institutions (microfinance).	The Board of the CBG has the power to make by-laws and issue directives to regulate the conduct of the Bank's business. With the approval of the minister the CBG can make regulations for the purpose to giving effect to the CB Act.	Operating income of the CBG.	Head of department is appointed by the Board of the CBG. The Board is accountable to the Department of State for finance and economic affairs.	CBG has the authority to grant and withdraw licenses.	Yes. It is yet to be provided for in the law.
Ghana	Banking Supervision Department (BSD), Bank of Ghana (BOG). Commercial, development, merchant and rural banks.	BSD functions include revisions of the banking legislation, drafting of prudential guidelines on the interpretation and applications of the banking laws.	Bank of Ghana Budget.	The governor is appointed by the government of Ghana on the recommendation of the minister of finance. The governor is the Chairman of the Board and accountable to the board. The Board appoints the Head of the Banking Supervision Department.	Licenses are issued and revoked by the BOG subject to the approval of the Secretary (an officer designated by the Board).	Yes. No employee of the Bank of Ghana or other public officer shall be subject to any action, claim or liability in respect of any act done in good faith in pursuance of any duty or power conferred or imposed upon him by law.
India	Board of Financial Supervision (BFS) and its Department of Banking Supervision, an autonomous unit within the Reserve Bank of India, Commercial banks, long-term credit institutions and nonbanking finance companies. National Bank for Agriculture and Rural Development (NABARD) is responsible for supervision of public sector and regional rural banks.	RBI has the power to issue regulations in all areas of supervision.	Allocation made from consolidated budget of Reserve Bank.	The BFS is constituted of members of the board of RBI. Governors and Board are appointed by the central government. Board is accountable to the central government.	RBI has the power to issue and revoke licenses for commercial banks. NABARD has the power to issue and revoke licenses for rural banks.	Yes. No suit or legal proceeding against the Central Government, RBI or any officer for anything in good faith done or intended to be done under the Banking Regulation Act.
Italy	The Bank Supervisory Department, Bank of Italy, Commercial banks and financial institutions.	The minister of the treasury issues ordinances on supervisory measures. The Bank of Italy may propose prudential measures.	Budget allocation made from consolidated budget of the Bank of Italy.	The governor of the bank is appointed with a resolution of the Bank of Italy's Executive Board in agreement with the president and prime minister. The governor is accountable to the administrative courts.	Bank of Italy has the power to grant and withdraw licenses.	Yes.

	Name of Institute and Sectoral Responsibilities	Regulatory Power	Budgetary Autonomy	Appointment of President and Accountability	Power to Grant and Withdrow Licenses and Specific Issues Related to Degree of Autonomy	Legal Protection of Supervisors
Kazakhstan	Banking Supervision Department, National Bank of the Republic of Kazakhstan (NBK). Banks	NBK is empowered to issue resolutions and decrees in all the key aspects of prudential supervision, including capital adequacy, asset quality, liquidity management, and foreign exchange exposure.	NBK's budget.	The Chairman of the NBK is appointed by the President upon approval by the Parliament. The Head of the Banking Supervision Department is appointed by the Chairman of the NBK.	NBK has the power to issue and revoke licenses. However, bank shareholders have the ability to obtain court orders overturning decisions of the NBK.	No.
Malaysia	Bank Supervision and Bank Regulation Departments of Bank Negara Malaysia (BNM) Commercial banks, finance companies, merchant banks, discount houses and money brokers.	BNM's Board of Directors can issue binding regulations.	Central bank's budget. BNM enjoys autonomy.	Governor appointed by the King, accountable to the board of directors.	MOF grants and revokes licenses on the recommendation of the BNM.	No.
The Netherlands	Banking Supervision Department, the Nederlandsche Bank (DNB), Commercial banks.	Within the confines of the law on supervision, the DNB has the power to issue prudential regulations. Banks are consulted when drafting regulations. In some cases, coordination with the MOF is required.	Supervisory budget comes from fees levied on the supervised institutions.	The president of the DNB is appointed by royal decree. The president is accountable to the relevant committees of parliament.	DNB issues and revokes licenses.	No.
Poland	General Inspectorate of Banking Supervision (GINB) executive agency of the Commission for Banking Supervision (CBS), separate entity in the National Bank of Poland (NBP). Commercial banks, cooperative banks, and reprehensive offices of foreign banks.	The GNBI has the power to issue prudential regulations for the banking system.	Operating budget of the NBP.	Chair of CBS is the president of the NBP who is appointed by the lower chamber of parliament at the request of the president. In agreement with the minister of finance, the president of the NBP appoints the general inspector who becomes a member of the commission and leads the GINB. General inspector is accountable to the CBS and to the NBP.	The CBS, in agreement with the minister of finance, issues and revokes licenses.	Yes.
The Philippines	Supervision and Examination Sector, Central Bank of the Philippines (BSP). Banks, finance companies and nonbank financial institutions.	The Monetary Board can issue prudential rules of conduct.	The supervisory function is funded from the BSP's general budget as approved by the Monetary Board. This budget includes examination fees from supervisory institutions.	Governor and Monetary Board are appointed by the president. The governor is accountable to the Board.	The BSP's Monetary Board issues and revokes licenses.	Yes. For actions taken by employees of the Insurance Corporation in good faith.
Saudi Arabia	Banking Supervision Department of Saudi Arabian Monetary Agency (SAMA), Commercial banks and exchange dealers.	SAMA with the approval of the MOF and national economy has the power to issue prudential rules.	Central bank's operating income.	Governor is appointed by Royal Decree. Board of Directors is appointed by the government. All are accountable to the minister of finance.	SAMA issues recommendations to the MOF and national economy to issue and revoke licenses.	Yes.

	Name of Institute and Sectoral Responsibilities	Regulatory Power	Budgetary Autonomy	Appointment of President and Accountability	Power to Grant and Withdrow Licenses and Specific Issues Related to Degree of Autonomy	Legal Protection of Supervisors
South Africa	Bank Supervision Department (BSD), South African Reserve Bank (SARB). Banks and mutual funds.	The minister of finance is formally responsible for the issue of regulations, and a number of key operational decisions (i.e., remedial actions) require his approval.	Own budget approved by the governor, appropriated from the general funds of the SARB.	Governor is appointed by the president. The registrar of banks is the head of the BSD and is appointed by the SARB subject to approval by the MOF. Registrar is accountable to the central bank governor (operationally) and to the minister of finance.	The SARB is solely responsible for licensing banks. In certain cases, specified in the law, he has the power to withdraw licenses. In other cases, the approval of the ministry is required.	Yes. No liability shall attach to the Bank or its employees for bona fide performance of any function or duty under the Banks Act.
B. Countries where supervision is a separate agency						
Australia	Australian Prudential Regulation Authority (APRA). Authorized deposit taking institutions (ADIs) including nonoperating holding companies of ADIs (NOHC).	APRA has power to issue prudential standards for ADIs and NOHCs.	The source of funding is an industry levy paid into consolidated revenue.	CEO and Board members are appointed by the treasurer and are accountable to the commonwealth parliament.	APRA grants and revokes licenses.	Yes. The APRA and Banking Act have similar provisions for anything done or omitted to be done in good faith and without negligence in connection with powers or performance of functions or in compliance with obligations under act.
Austria	Financial Market Authority. Commercial banks, capital markets, pensions, insurance.	The FMA has the power to issue ordinances in supervisory matters.	The FMA receives ten percent of its budget from the federal government, the remainder from fees from the industry.	Executive Board consists of two members, one appointed by the MOF, one by the central bank. A Supervisory Board oversees management.	The FMA needs to consult with the central bank in matters of licensing and supervisory action, including withdrawing licenses.	Yes.
Belgium	Commission for Banking and Finance (CBF), Commercial banks and capital market operators.	The Banking Law empowers the CBF to issue prudential regulations.	CBF's budget is funded by fees on financial market operations and charges on registered credit institutions and investment firms. However, its size is determined by the MOF.	President is appointed by the government. He presents the annual report to the parliamentary commission for financial matters (this is a practice introduced by the CBF president, but not stipulated in the law).	CBF has full autonomy in granting and withdrawing licenses.	Yes.
Bolivia	Superintendency of Banks and Financial Entities (SBEF). Financial institutions.	The SBEF is empowered to draft and implement prudential regulations.	All financial entities pay an annual fee according to their total assets.	Superintendent is appointed by the President of the Republic. The superintendent is accountable to the minister of finance.	Licensing authority is the SBEF.	Yes.
Canada	Office of the Superintendent of Financial Institutions (OSFI), Banking, insurance, nonbank deposit taking institutions.	OSFI derives its power largely from the OSFI Act (1997). Within the constraints of that Act, OSFI issues guidelines, policy statements, and bulletins to provide additional guidance to supervised institutions.	Asset or premium based assessments and supplementary user pay assessments.	The superintendent reports directly to the minister of finance. The minister of finance officially heads the OSFI and, thus, carries ultimate responsibility. The superintendent is given a degree of operational independence; however, s/he maybe removed from the office for just cause by the Governor-in-Council.	The minister of finance is responsible for granting and revoking licenses. The OSFI is considered as an independent authority in supervisory matters, but the ministry of finance is heavily involved at the policy level. It may reverse actions of the OSFI, including the taking control over institutions.	Yes. For actions taken in good faith.

	Name of Institute and Sectoral Responsibilities	Regulatory Power	Budgetary Autonomy	Appointment of President and Accountability	Power to Grant and Withdrow Licenses and Specific Issues Related to Degree of Autonomy	Legal Protection of Supervisors
Chile	Superintendency of Banks and Financial Institutions (SBIF) Banco del Estado, banks, financial institutions and companies issuing or operating credit cards or similar systems.	The Central Bank of Chile has the authority to issue prudential regulations. The SBIF carries out inspection and supervision.	Superintendency is funded from fees from supervised entities	Superintendent is appointed by President of the Republic. SBIF is subject to control of the Republic's Comptroller Office with respect to all aspects related to the examination of its accounts.	SBIF issues and revokes licenses.	Yes.
Colombia	Banking Superintendence of Colombia (SBC). Credit institutions, financial services, and other financial companies.	SBC has the power to issue rules and regulations and take corrective action.	Fee paid by supervised institutions.	The SBC and members of its advisory council are directly appointed by the President of the Republic.	Licensing authority is the SBC.	
France	Banque de France (BdF), Banking Regulation Committee (CRBF), Banking Commission. The Credit Institutions and Investment Service Provider's Committee (CECEI). All credit institutions and investment firms.	Regulatory power lies with a committee consisting of representatives from Banque de France, ministry of finance, supreme court and banking industry (CRBF and CECEI). Updating the regulatory framework is de facto driven by the Secretariat of Banking Commission.	Funding comes from the Banque de France. Until 1993, the Secretariat of the Banking Commission was a department of the BdF. Now it is a separate administrative entity. Since BdF is budgetary independent, Banking Commission is too.	Head of Secretariat is appointed by minister of finance. He is accountable to the minister, but in practice to the governor of the BdF, who is the chairman of the Banking Commission.	The CECEI issues and revokes licenses.	Yes.
Germany	Bundesaufsichtsamt fuer das Kreditwesen (BfC) Commercial banks. The Bundesbank has some supervisory powers from a market-stability point of view.	The Law sets out a detailed framework. The BfC publishes "interpretations" and "guidelines" which can be seen as having a regulatory power, but they are not binding.	BfC is an independent federal agency under the auspices of the MOF. BfC has no own budget. Banks pay fees to the government and these fees form 90 percent of the government budgetary allocation for BfC.	BfC reports to the MOF, but must keep close contact with the Bundesbank.	BfC is the licensing authority. The institutional setup between BfC and the Deutsche Bundesbank is currently under discussion.	Yes. The employs of the Central Bank are federal civil servants and the regulations generally applicable to federal civil servants apply to them. Liability for acts of a civil servant rests with the state or public body which employs him.
Hungary	Hungarian Financial Supervisory Authority (HFSA) National Bank of Hungary (NBH). All organizations engaged in financial services, supplementary financial services, clearing house activities, investment and fund management activities, commodity exchange transactions, insurance and private pension funds.	The HFSA has no regulatory powers, but can issue recommendations and guidelines. Even though these recommendations are legally not binding, they "make the application of the law more predictable."	The HFSA is funded by fees from the supervised entities. The level of the fees is determined by law. The HFSA is autonomous as far as staffing and salary levels are concerned.	The president of the HFSA is appointed by parliament based on the proposal by the prime minister. He is accountable to the parliament and the government.	The authority of the HFSA in granting and withdrawing licenses is complete for nonbank financial institutions. For banks, the HFSA has to request the opinion of the NBH in case of licensing, and for withdrawing a license, of the NBH and the MOF.	Yes.
Japan	Financial Services Agency (FSA) Banks, securities companies, insurance companies and other private sector financial institutions.	The law empowers the FSA to issue regulations.	Budget allocation is made from the government's budget.	The head of the agency is the commissioner, appointed by the prime minister with the consent of the Diet. The commissioner is accountable to the cabinet office. The FSA is considered an external organ of the cabinet office.	FSA is the licensing authority.	Yes.

	Name of Institute and Sectoral Responsibilities	Regulatory Power	Budgetary Autonomy	Appointment of President and Accountability	Power to Grant and Withdrow Licenses and Specific Issues Related to Degree of Autonomy	Legal Protection of Supervisors
Korea	Financial Supervisory Commission (FSC) and it's the Financial Supervisory Service (FSS). Banks and other financial institutions.	All legislation relating to the financial sector is drafted and submitted by the ministry of finance and economy but must be done in consultation with the FSC.	Operating funds come from contributions from the Bank of Korea (BOK), the government, and fees by financial entities under FSS supervision, and fees for services rendered by the FSS in respect of issuance of marketable securities. Annual fees of financial institutions are based on their total liabilities.	The FSC consists of up to nine members appointed by the President of Korea. The Chairman of the FSC is the Governor of the FSS and accountable to the government. The FSC is placed under the Office of the Prime Minister; however the FSC performs its duties independently of any government organization.	FSC has the authority to issue and revoke licenses to financial institutions. FSC is also in charge of financial sector restructuring.	No.
Latvia	Finance and Capital Market Commission (FCMC). Commercial banks, all capital market participants, insurers, pension funds	The FCMC can issue binding rules and regulations and directives governing the activities of all supervised entities.	The budget is financed through fees from supervised entities. The fees are specified by the FCMC Council and may not exceed a level set by law.	The FCMC is governed by the Council. Its chairperson is appointed by parliament.	The FCMC has the power to issue and revoke licenses.	Yes.
Sweden	Swedish Financial Supervisory Authority (FSA). Banks, mortgage, finance, and insurance companies.	Banking law and various other laws give the FSA the power to issue prudential rules and regulations.	FSA's funding is from government budget appropriations. The Government levies charges on the supervised entities. The ministry of finance approves the FSA's budget.	Board is appointed by the ministry of finance. The director general is also the chairman of Board and accountable to the ministry of finance.	FSA has full autonomy to grant licenses and withdraw licenses.	Yes.
Switzerland	Federal Banking Commission (FBC). Banks, securities dealers, and investment fund business.	The FBC issues the decisions necessary to enforce the present law and supervises compliance with legal requirements. The FBC is very active in issuing "Circulars" to all market participants in connection with the application of specific legal regulations or reporting requirements. Legal powers are limited.	The expenses and revenues of the FBC are governed by the regulations issued for the budgets of the federal government. Emoluments fixed by the Federal Council cover the expenses. The FBC has limited discretion in setting the remuneration of its staff compared to Federal employees.	Federal Council appoints the Commission's Chairman. The FBC reports annually to the Federal Council, via the Federal Department of Finance.	The FBC has the power to grant and withdraw licenses, The decisions of the FBC can be appealed to the Federal Court.	Not explicit. The members of the Bank authorities as well as the officials and employees of the National Bank shall be subject to federal legislation concerning the responsibility under civil penal law of the federal authorities and officials.
United Kingdom	Financial Services Authority (FSA). Banks and investment business.	The FSA is empowered to make regulations within its field of competence. The FSA enjoys broad discretion in the exercise of these powers, although they must be exercised consistently with its statutory objectives.	FSA has its own budget, which it consults on with the industry. FSA levies fees. FSA is a "private company limited by guarantee" FSA has autonomy in staffing.	Chairman and Board of FSA are appointed by and dismissible by the treasury (appointment is for no fixed term). Parliament conducts "confirmation" hearings, although not on a statutory basis. The Chairman is directly responsible to parliament for banking supervision.	FSA is empowered to grant or revoke licenses to conduct financial services business. Its decisions may be appealed to a specialist tribunal.	Yes.
United States	Federal Deposit Insurance Corporation (FDIC) State banks nonmembers, industrial banks, savings	Federal regulatory agencies can issue prudential regulations within the confines established by the law.	FDIC is an independent agency created by congress. Funding comes from premium that it charges on insur-	Chairman and members of the Board of Directors, appointed by president, and confirmed by the senate. The	The FDIC does not grant charters (licenses) and cannot remove them, but it must approve all banks for deposit	Yes. For acts of an employee of the government exercising due care in the execution of a statute or regulation

	Name of Institute and Sectoral Responsibilities	Regulatory Power	Budgetary Autonomy	Appointment of President and Accountability	Power to Grant and Withdrow Licenses and Specific Issues Related to Degree of Autonomy	Legal Protection of Supervisors
	banks, foreign bank branches state and federally licensed.		ance. FDIC has full autonomy in terms of staffing, salaries, and other budgetary matters.	heads of the OCC and OTS serve on FDIC Board.	insurance and can remove insurance coverage without approval of other agencies, the U.S. Treasury, or the White House.	or based upon the exercise or perform a discretionary function or duty.
C. Countries with other types of institutional arrangements						
Finland	The Financial Supervision Authority (FSA), operating in connection with the Bank of Finland and the ministry of finance. Banks, brokerage firms, stock and derivatives exchanges, and management companies for mutual funds.	FSA issues regulations to the supervised entities concerning the observance of the applicable regulations, and issues guidelines that are necessary for purposes of supervision. Regulatory autonomy is limited, however.	Operating costs are covered by supervision fees and specific fees paid by supervised entities.	The President of the Republic appoints the director general of the FSA on recommendation of member of the Parliamentary Supervisory Council (PSC). The FSA is accountable to the PSC only with respect to administrative matters.	The MOF has the responsibility for licensing and revocation of a credit institution's license.	Yes.
Thailand	Ministry of finance and Bank of Thailand. Banks, mortgage, insurance and finance companies.	The minister of finance is the regulatory authority. The Supervision Department and Financial Institution Policy Department do the actual on- and off-site supervision and formulate the regulatory framework and policies concerning financial institutions.	Government budget.	The governor and deputy governor are appointed by the crown upon recommendation of the cabinet. Accountable to the minister.	Licensing authority is the ministry of finance.	Yes.
Note on EMU countries: EMU Article 25.1. The ECB may offer advice to and be consulted by the Council, the Commission, and the competent authorities of the member states on the scope and implementation of legislation relating to prudential supervision of credit institutions and the stability of the financial system.						

Sources: National central bank laws, laws on supervisory agencies, and laws on financial institutions; Banking Supervision Regulatory Database and Central Bank Legislation Database, IMF; Bank Regulation and Supervision Database, World Bank Group; and Courtis (2001).

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