
Central banks and financial stability

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Many central banks have seen a recent increase in their autonomy in monetary policy, and also a transfer of supervisory and regulatory responsibilities to other bodies. But the maintenance of financial stability is, and remains, a core function for all central banks. This paper presents details of 37 central banks' functions and powers as they stood in March 2000. It goes on to discuss financial crises and the morbidity of banks, the trade-off between competition and safety in the financial system, the international dimension to financial crises, the many links between financial stability policy and monetary policy, and the nature of the work of those charged with safeguarding financial stability.⁽¹⁾

1 Introduction

Each year the Governors of many central banks are invited to the Bank of England for a symposium. The subject this year was financial stability. This article is based on *Financial Stability and Central Banks*, a written report⁽²⁾ presented to the 2000 Central Bank Governors' Symposium, held at the Bank on 2 June 2000.⁽³⁾

Among other things, the report analyses the results of a survey of central banks, outlining the scope and diversity of their financial stability activities; this is discussed in Section 2 of this article. Section 3 focuses on banking crises and the morbidity of banks, Section 4 looks at the trade-off between competition and safety for banks, and Section 5 considers international capital movements and financial crises in the open economy. Section 6 returns to the topic of the central bank's role in financial stability, with a discussion of the links between financial stability policy and monetary policy. Section 7 offers some observations about the different nature of the tasks confronting central bankers operating in these two areas. Section 8 presents conclusions.

2 Financial stability functions in central banks

The report to the Central Bank Governors' Symposium included an analysis of the results of a survey of 37 central banks,⁽⁴⁾ covering responsibilities and various aspects of financial stability activities, as well as the institutional structure of regulation and supervision. The main focus of this survey is upon the *powers* and *formal functions* of the central banks, as they were in March 2000.

It is worth stressing that the survey presents answers from central banks only, and not from any other bodies that may be charged with financial regulatory responsibilities.

The sample consists of 13 industrial, 16 developing and 8 transition countries. Every country is in some sense in development and transition, and none lacks industrial activity. The criteria for grouping were that transition countries had recently emerged from a prolonged period of communist government, while all the developing countries, unlike their industrial counterparts, had GDP per head of below US\$10,000 in 1998.

Tables A, B and C summarise the responses to the questionnaire. The thick vertical line in each table splits countries whose central banks exercise regulatory and supervisory functions (to the left of the line) from those that do not (to the right). A summary of the key findings is as follows. All respondents have payments systems responsibilities. All but four central banks provide emergency liquidity assistance to depositories, and also to the market. The exceptions are Argentina, Bulgaria and Estonia, which operate currency boards and do not, generally, act as lenders of last resort, and Peru, whose role is restricted to monetary regulation, specifically excluding rescues. Euro-zone central banks' emergency liquidity provision is now coordinated by the European Central Bank. The position is more complex for emergency liquidity assistance to non-depositories. In six industrial and two developing countries, central banks may provide some form of such assistance, at least in principle, suggesting some potential widening of their role as lender of last resort role.

(1) The author thanks Bill Allen, Charles Bean, Alex Bowen, Alec Chrystal, Gill Hammond, Juliette Healey, Gabriel Sterne, Paul Tucker, and an unnamed referee for very helpful comments on a previous draft.
(2) A revised and extended version of the report, entitled *Financial Stability and Central Banks*, is to be published by Routledge in 2001.
(3) The report contained six papers, each devoted to a different aspect of the subject, written by Richard Brealey, Juliette Healey, Glenn Hoggarth and Farouk Soussa, David Llewellyn, Peter Sinclair, and Peter Sinclair and Shu Chang. Richard Brealey, Alastair Clark, Charles Goodhart, David Llewellyn and Peter Sinclair gave verbal presentations to the Symposium.
(4) Prepared by Juliette Healey of the CCBS.

Table A
Industrial economies: degree of central bank involvement in financial stability ‘functions’

Financial stability function	Description	Singapore	Netherlands	Ireland	Hong Kong
Payments system services	Some or all of: currency distribution and provision of settlement balances, electronic payments, check clearing and general oversight of payments system	✓	✓	✓	✓
Safety net provision/crises resolution					
Emergency liquidity assistance to the market (a)	Provision of liquidity to the money markets during a crisis	✓	✓ (a)	✓ (a)	✓
Emergency liquidity assistance to depositories	Direct lending to individual illiquid depositories	✓ (b)	✓	✓	✓
Emergency solvency assistance to depositories	Direct lending to individual insolvent depositories	✗	✗	✗	✗
Emergency liquidity assistance to non-depositories	Direct lending to individual illiquid non-depository institutions	✗	✗	✗	✗
Emergency solvency assistance to non-depositories	Direct lending to individual insolvent non-depository institutions	✗	✗	✗	✗
Honest brokering	Facilitating or organising private sector solutions to problem situations	✓	✓	✓	✓
Resolution	Conducts, authorises or supervises sales of assets and other transactions in resolving failed institutions	✓	✓	✗	✗
Legal	Resolves conflicting legal claims among creditors to failed institutions	✗	✗	✗	✗
Deposit insurance	Insures deposits or other household financial assets	✗	✓ (c)	✗	✗
Regulation and supervision					
Bank regulation	Writes capital and other general prudential regulations that banks (and other deposit-taking institutions) must adhere to	✓	✓	✓	✓
Bank supervision	Examines banks to ensure compliance with regulations	✓	✓	✓	✓
Bank business code of conduct	Writes, or monitors banks’ compliance with, business codes of conduct	✓	✓	✓	✓
Non-bank financial regulation	Writes capital and other general prudential regulations that non-banks must adhere to	✓	✓ (d)	✓ (e)	✗
Non-bank financial supervision	Examines non-banks (although not necessarily all) to ensure compliance with regulation	✓	✓ (d)	✓ (e)	✗
Non-bank business code of conduct	Writes, or monitors non-banks’ compliance with, business codes of conduct	✓	✓ (d)	✓ (e)	✗
Chartering and closure	Provides authority by which a banking entity is created and closed	✓	✓	✓	✓
Accounting standards	Establishes/participates in establishing uniform accounting conventions	✓	✓	✗	✗

(a) For euro-zone countries, in the context of euro-system coordination.

(b) The MAS will assess the situation should it arise. Systemic risk is not an unconditional call on emergency liquidity assistance.

(c) The deposit insurance scheme has been set up by the banking sector. The central bank is responsible for implementation.

(d) De Nederlandsche Bank is also responsible for investment institutions and exchange offices, but not the insurance or securities sectors.

(e) Excluding the insurance sector.

(f) The Reserve Bank is the banking supervisory agency, though in 1996 moved to a system whereby the Reserve Bank does not conduct on site inspections as a matter of course but has the power to require independent reports on a bank. Directors of institutions are primarily responsible for ensuring compliance with regulation and are required to provide regular attestations on compliance.

(g) Most likely to be carried out by the supervisory authority or the deposit insurance agency but the central bank might assist, particularly in systemic circumstances.

(h) The Bank of Korea may require the supervisory agency to examine banking institutions and to accept the participation of central bank staff on joint bank examinations.

(i) In principle, emergency liquidity support is available to any institution supervised by the Finansinspektionen ‘APRA’ provided the institution is solvent and failure to make its payments poses a threat to the stability of the financial system, and there is a need to act expeditiously.

New Zealand	Finland	Denmark	Sweden	Canada	South Korea	Australia	Norway	United Kingdom
✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓ (a)	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓
x	x	x	x	x	x	x	x	x
✓	x	✓	✓ (i)	x	✓	✓ (i)	✓	x
x	x	x	x	x	x	x	x	x
✓	✓ (g)	✓	✓ (g)	✓ (g)	✓	✓ (g)	✓ (g)	x (g)
✓	x	✓	x	x	x	x	x	?
x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x
✓	x	x	x	x	x	x	x	x
x (f)	x	x	x	x	x (h)	x	x	x
x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x
✓	x	x	x	x	x	x	x	x
✓	x	x	x	x	x	x	x	x

Table B
Developing economies: degree of central bank involvement in financial stability 'functions'

Financial stability function	Malaysia	Malta	India	Sri Lanka	Uganda	Malawi
Payment systems services (a)	✓	✓	✓	✓	✓	✓
Safety net provision/crisis resolution						
Emergency liquidity assistance to the market	✓	✓(b)	✓	✓	✓	✓
Emergency liquidity assistance to depositories	✓	✓(b)	✓	✓	✓	✓
Emergency solvency assistance to depositories	✗	✗	✗	✗	✗	✗
Emergency liquidity assistance to non-depositories	✗	✓	✓(d)	✗	✗	✗
Emergency solvency assistance to non-depositories	✗	✗	✗	✗	✗	✗
Honest brokering	✓	✗	✗	✓	✓	✗
Resolution	✓	✓	✗	✓	✓	✓
Legal	✗	✗	✗	✓	✓	✓
Deposit insurance	✗	✗	✓	✓	✓	✗
Regulation and supervision						
Bank regulation	✓	✓	✓	✓	✓	✓
Bank supervision	✓	✓	✓	✓	✓	✓
Bank business code of conduct	✓	✓	✓	✗	✗	✗
Non-bank financial regulation	✓	✓(c)	✓(e)	✓(e)	✓	✓
Non-bank financial supervision	✓	✓(c)	✓(e)	✓(e)	✓	✓
Non-bank business code of conduct	✓	✓(c)	✓(e)	✗	✗	✗
Chartering and closure	✓	✓	✓	✓	✓	✓
Accounting standards	✓	✗	✓	✓	✓	✗

(a) For descriptions, refer to Table A.

(b) Subject to the prior approval of the Minister of Finance.

(c) Excluding investment services, insurance companies and offshore banks.

(d) Primary dealers in domestic money markets.

(e) Development finance companies and non-bank financial companies.

(f) Argentina operates a currency board, which prohibits the lender of last resort function except in extreme circumstances and within the terms set out in the convertibility law.

(g) Including non-bank deposit-taking institutions.

(h) Including consortium management companies.

(i) Including certain financial co-operatives.

(j) The Banco de Mexico regulates and supervises financial market activities only. Capital and other prudential regulation and supervision is carried out by other supervisory agencies.

(k) As part of the crisis management process set out in the general law on banks, if necessary, to cover the 100% central bank guarantee on demand deposits.

(l) Prudential regulation and supervision is carried out by the SBFI. However, the Banco Central de Chile can determine limits for the asset liabilities risks exposures.

(m) The Banco Central de Chile determines the portfolio limits for the pension fund administrators.

(n) According to the central bank law, credits to commercial banks are only for monetary regulation. The central bank should not be involved in bailout programmes.

Argentina	Brazil	South Africa	Thailand	Zimbabwe	Cyprus	Indonesia	Mexico	Chile	Peru
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✗ (f)	✓	✓	✓	✓	✓	✓	✓	✓	✗(n)
✗ (f)	✓	✓	✓	✓	✓	? ✗	✓	✓	✗(n)
✗	✗	✗	✗	✗	✗	✗	✗	✓(k)	✗
✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
✓	✓	✓	✓	✓	✓	✓	?	✗	✗
✓	✓	✓	✗	✓	✓	✗	✗	✗	✗
✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
✗	✗	✗	✓	✗	✗	✓	✗	✓	✗
✓(g)	✓(h)	✓(i)	✓	✓	✓	✓	✗(j)	✗ (l)	✗
✓(g)	✓(h)	✓(i)	✓	✓	✓	✓	✗(j)	✗	✗
✗	✓(h)	✗	✓	✓	✗	✓	✗	✗	✗
✗	✗	✗	✗	✗	✗	✗	✗(j)	✗(m)	✗
✗	✗	✗	✗	✗	✗	✗	✗(j)	✗	✗
✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
✓	✓	✓	✗	✓	✓	✓	✗	✗	✗
✓	✓	✓	✗	✗	✗	✓	✗	✗	✗

Table C
Transition economies: degree of central bank involvement in financial stability ‘functions’

	Bulgaria (a)	Estonia (a)	Czech Republic	Poland	Slovenia	Latvia	Russia	Hungary
Financial stability function	✓	✓	✓	✓	✓	✓	✓	✓
Payments system services								
Safety net provision/crisis resolution								
Emergency liquidity assistance to the market	✓	✓	✓	✓	✓	✓	✓	✓
Emergency liquidity assistance to depositors	×	×	✓	✓	✓	✓	✓	✓
Emergency solvency assistance to depositors	×	×	✓	✓	✓	✓	✓	✓
Emergency liquidity assistance to non-depositors	×	×	×	×	×	×	×	×
Emergency solvency assistance to non-depositors	×	×	×	×	×	×	×	×
Honest brokering	×	×	×	×	×	×	×	×
Resolution	×	×	×	×	×	×	×	×
Legal	×	✓(b)	×	×	×	×	✓	×
Deposit insurance	×	×	×	×	×	×	×	×
Regulation and supervision								
Bank regulation								
Writes capital and other general prudential regulations that banks (and other deposit-taking institutions) must adhere to	✓	✓	✓	✓	✓	✓	✓(c)	×
Examines banks to ensure compliance with regulation	✓	✓	✓	✓	✓	✓	✓(c)	×
Writes, or monitors banks' compliance with, business codes of conduct	✓	✓	×	×	✓	×	✓	×
Non-bank financial regulation	×	×	×	×	×	×	×	×
Writes capital and other general prudential regulations that non-banks must adhere to	×	×	×	×	×	×	×	×
Examines non-banks (although not necessarily all) to ensure compliance with regulation	×	×	×	×	×	×	×	×
Writes, or monitors non-banks' compliance with, business codes of conduct	×	×	×	×	×	×	×	×
Non-bank business code of conduct	✓	✓	✓	✓	✓	✓	✓	✓(e)
Chartering and closure								
Provides authority by which a banking entity is created and closed	✓	✓	✓	✓	✓	✓	✓	✓
Accounting standards								
Establishes/participates in establishing uniform accounting conventions	✓	✓	✓	✓	✓	✓	✓	×

(a) Bulgaria and Estonia currently operate currency boards, which prohibits the lender of last resort function except in only the most extreme circumstances.

(b) Limited role, primarily stipulated in the Act on Banks 1992.

(c) Including non-bank credit institutions.

(d) Limited to legal regulations specified in the Central Bank Act and National Bank of Hungary decrees on money circulation, foreign exchange, data supply and minimum reserves (credit institutions).

(e) The NBH issues licences for exercising certain financial services and is involved, with the Hungarian Financial Supervisory Authority, in the issuance and withdrawals of other licences.

There is no emergency solvency assistance to non-depositories by any of the central banks surveyed, nor to depository institutions (except in the case of Chile). Just three central banks in the survey resolve conflicting legal claims of failed institutions' creditors. Only seven provide deposit insurance themselves. Honest brokering is a central bank function in all industrial and most developing (but no transition) economies. In the United Kingdom, and some other countries, this is mainly limited to cases of systemic risk, and will involve co-operation with other supervisory bodies.

The position is less clear-cut for sales of failing institutions' assets. For 4 industrial countries (Denmark, Netherlands, New Zealand and Singapore), 1 transition economy (Russia) and 10 of the 16 respondents from developing countries, this aspect of resolving crises is, at least in part, a central bank function. The Czech National Bank has a restricted role here, while in the United Kingdom,⁽¹⁾ and in some other countries undergoing similar changes, the central bank's role in crisis resolution would be coordinated with other agencies, and will doubtless evolve with experience.

Turning to regulation and supervision, we observe that 5 of the 13 industrial countries sampled currently regulate banks and 8 do not. Before 1998, these numbers would have been reversed, since it was in that year that Australia, South Korea and the United Kingdom saw their central banks lose these responsibilities. Among the 8 transition countries, Hungary is the sole non-regulator. Of the 16 developing countries, all but 3 (Chile, Mexico and Peru) regulate banks, while Chile and Mexico have a limited part in this. Every central bank that *regulates* banks also *supervises* them, although the supervisory regime operated by the Reserve Bank of New Zealand relies upon disclosure and market monitoring. Thailand and Zimbabwe have the only regulating central banks that do not also grant and revoke charters, while Hungary and Mexico have the only non-regulating central banks with some (very limited) licensing and supervision⁽²⁾ responsibilities.

Among the 25 respondents that regulate banks, only 9 also regulate and supervise some or all non-bank financial institutions. These are Ireland, the Netherlands, Singapore and 6 Commonwealth central banks in the developing countries sub-sample. Usually supervision is accompanied by writing business codes of conduct, or overseeing compliance with them, for the range of financial institutions supervised. No non-regulators exercise an accounting conventions role. Most bank regulators, on the other hand, do this: 7 of the smallest countries are the only exceptions here.

The survey describes the functions of central banks at March 2000. In some cases, such as Brazil, Estonia, Ireland, Latvia, Malta and Slovenia, current arrangements are under review. Traditionally, nearly all central banks

supervised banks and banks alone. This is still true of most central banks. But several important changes had previously taken place. The Reserve Bank of South Africa took over bank regulation and supervision from the Ministry of Finance in 1987. Subsequent changes have usually been in the opposite direction. In 1998, Australia, Japan, South Korea and the United Kingdom transferred bank supervision and regulation from the central bank to a single new agency (two in Australia) that would also superintend other financial institutions. Several countries, whose central banks had never regulated or supervised, amalgamated the bodies responsible for this (Norway in 1986, Canada in 1987, Denmark in 1988, and Sweden in 1991). The rationale for having a single regulator has recently been expounded, for the British case, by Briault (1999), and also by Goodhart (2000), while Hawkesby (2000) and Taylor and Fleming (1999) provide other perspectives on this issue. Further discussion on the various institutional models can be found in Juliette Healey's contribution to the Symposium.

What are the main insights to be gleaned from this survey? One is that central banks tend to exercise a larger range of functions in smaller and poorer economies, where financial markets are usually less developed. It is noteworthy that the 5 industrial countries in the sample with regulatory and supervisory responsibilities include the 3 smallest by population (Singapore, Ireland and New Zealand). By contrast, 20 of the transition and developing countries' central banks perform regulatory and supervisory duties. In the 4 that do not, ie Chile, Hungary, Mexico and Peru, GDP per head is somewhat above average for their groups.

These tendencies are also noticeable within continents. India and Indonesia display fewer 'ticks' in the tables than do smaller Malaysia or Sri Lanka. The Reserve Bank of South Africa exhibits a somewhat narrower range of functions than its counterparts in Zimbabwe, Malawi or Uganda, all of which are both smaller and poorer. The same holds true of Cyprus compared with Malta and, in GDP terms at least, of Mexico against Brazil. Among the transition countries, Russia's central bank exhibits the widest responsibilities and by far the lowest GDP per head. There are exceptions to this: two pronounced outliers are the Netherlands, with a wider range of ticks than all but Singapore in the industrial country sample, and Peru, which has the narrowest of all the 37 countries despite its relatively modest wealth and population. Nevertheless there is clear evidence that broader central bank responsibilities go hand in hand, in the main, with lower total GDP and also with lower GDP per head; financial markets are generally less sophisticated in such economies.

The reasons for this are not hard to find. Higher income per head brings disproportionately greater size, diversity and sophistication of financial institutions, and, with it, greater advantages from delegating regulation and supervision to a separate institution (or set of institutions). Greater national

(1) Rodgers (1997) describes the main changes in the Bank of England's functions.

(2) These are specific to certain financial markets.

income allows greater resources to meet the fixed costs of additional agencies (although many richer countries have displayed a recent tendency to aggregate them, in recognition of the blurring of boundaries between different types of financial institution). In less advanced economies, banks tend to be less complex, and financial markets are typically simpler. Both are dominated to a greater degree, given the limited private sector, by the macroeconomic considerations of government finance and foreign exchange, and thus core terrain for the central bank. Governments could and sometimes do undertake several aspects of financial administration themselves. Nonetheless, operating at arm's length, through central banks, may take advantage of greater credibility and more experienced or suitable staff.

A second finding is that, by and large, the extent of central banks' regulatory and supervisory functions is negatively correlated with their degree of independence. Within the group of industrial and transition countries, this relationship actually goes the other way: non-regulatory central banks have an unweighted mean independence score (as calculated in Mahadeva and Sterne (2000)) of 82 against 86 for those that regulate. This difference is modest and too much should not be read into it. Developing countries exhibit much lower independence and more widespread regulation, and this creates the negative association overall.

It is apparent that safeguarding the integrity of the payments system and keeping prices stable are the central functions shared by every central bank. A currency board maintains price stability by proxy, by keeping a fixed exchange rate link to another currency. Argentina does this through its one-to-one link with the US dollar, and Bulgaria and Estonia through their tie to the Deutsche Mark and hence the euro. The other central banks in the survey aim for price stability directly, operating independent monetary policies, or, in the case of Finland, Ireland, and the Netherlands, under the direction of the European Central Bank.

Price stability is the main objective of monetary policy. But, as we shall see in Section 6, both monetary policy, and policies for financial stability, are closely intertwined. The foremost threat to financial stability comes from the failure of banks, to which we turn next.

3 Financial crises and the morbidity of banks

The most obvious symptom of a financial crisis is a bank failure. So it is useful to give a broad indication of financial institutions' survival rates. Each year, on average, about 960 financial firms out of 1,000 survive as independent entities. Thirty-four in a thousand join a larger institution as a result of takeover or merger. Finally, the remaining five or six in a thousand perish and vanish, with uninsured depositors standing to lose some of their funds.

These figures are widely drawn averages. They relate to the past century's experience in Western Europe and North America, much of which is described, for example, in Heffernan (1996) and sources cited therein. The annual mortality hazard faced by a financial institution is, on this showing, less than one third of that now confronting a person in those countries; financial institutions are more like Galapagos turtles or oak trees in this regard—they appear to have a half-life of about 115 years. If survival is defined more strictly as neither death nor absorption into a larger company, morbidity worsens to give a half-life of some 24 years.

Averages such as these conceal large disparities. Clearing banks have somewhat better survival prospects than other financial institutions. In finance, just as in the wider economy, large firms are less prone to death or takeover than smaller ones. Probably the highest mortality rates have been recorded recently for new small banks in the Czech Republic: Mantousek and Taci (2000a, 2000b) show that only 2 out of 19 of these institutions, founded after the Velvet Revolution of 1989, had survived a decade by 1999.

Death rates, on broad and narrow definitions, are apt to vary across countries. They also show a very pronounced tendency to cluster in time. The early 1930s witnessed a massive rash of bank closures, especially in the United States, when both nominal bank deposits and the number of banks shrank by more than one third. Severe recessions, and large falls in the prices of equity and real estate, almost invariably accompany increased risks of bank failure. Although cause and effect are hard to identify here, Richard Brealey, in his contribution to the Symposium report, cites important evidence demonstrating that downturns in industrial production and equity prices tend to lead banking failures by about three quarters.

The rate of bank failure also appears to be sensitive to the character of the supervision and regulatory regimes. Tighter supervision and stiffer requirements for reserves and capital should succeed in prolonging a financial institution's expectation of life (but the evidence does not testify to a robust link, as Brealey shows). On the other hand more intense competition between financial institutions—which may result from changes in the regulatory regime—is apt to have the opposite effect. Davis (1999) provides valuable evidence testifying to this, and other concomitants or precipitators of bank failure, in his analysis of macro-prudential indicators of financial turbulence. Demirgüç-Kunt and Detragiache (1998a, 1998b) provide further empirical support.⁽¹⁾

4 Competition and safety

The simplest view of financial markets is that they are perfectly competitive. In perfectly competitive markets, all financial institutions would take the prices of their products

(1) In their contribution to the Symposium, Hoggarth and Soussa also stress the argument that central bank involvement in support of troubled financial institutions is liable to become more necessary as competition intensifies.

as given, outside their control. No retail bank could influence the interest rates on its deposits or advances, for example. Profits would vary as market conditions fluctuated, around a level that gave a 'normal' rate of return on capital. Margins and spreads would be narrow, even wafer-thin. It would not be necessary to have a large number of banks to achieve such an outcome. There could be intense competition between just two banks, or even, in the very special conditions of 'perfect contestability',⁽¹⁾ there might be just one incumbent bank, forced by a hypothetical entrant to price its products at cost. Alternatively, there could be just one bank, or more, owned by its customers, and setting its interest rates to maximise their welfare.⁽²⁾

At the opposite extreme, we could have monopoly. A single bank, immune from entry, could set its prices at will, presumably to maximise its profits. If it could price-discriminate perfectly in all its markets and set out to maximise profit, its total volume of activity would resemble that of a perfectly competitive banking industry, although profits would then be very large. Short of perfect price discrimination, both the volume of activity and profits would be somewhat smaller. In comparison with perfect competition, we would see lower activity and larger profit levels. Such an outcome would occur with one firm, but it could arise under other circumstances: there might be two, three or many banks, as long as all of them acted as one and colluded in all their decisions. The risks of insolvency would be smallest in the case of monopoly, and highest under perfect competition.

Between these extremes lies a huge range of intermediate possibilities, best described as oligopoly. One type of banking oligopoly would see banks as independent quantity-setters in their deposit and loan markets, taking the actions of their competitors as given. This is known as Cournot oligopoly. A model of Cournot oligopoly, or strictly speaking oligopsony from the standpoint of deposits, is the most natural starting-place for economists thinking about banks.

In an oligopoly satisfying Cournot's assumptions, total deposits and loans will be smaller than under perfect competition, but higher than under (non price discriminating) monopoly. Profit and spreads will lie between these two extremes. The critical variable in Cournot oligopoly is the number of banks: output is larger and spreads and profits smaller, the greater the number of banks participating in the market. More banks imply more competition, but also, as we shall see, greater risks of financial fragility.

The number of banks is also critical in other circumstances. The more banks there are, the harder it is for them to reach an understanding to limit competition. It is far easier for two banks to collude effectively than three or four. And if banks are characterised by quite intense price competition, but vary in costs, the prices of financial products may tend to gravitate towards the unit costs of the bank with the second-lowest cost. Add another bank, and some incumbents may have to shave their margins further. They could be driven out of business if they fail to reduce their costs to match. Widening access to financial markets (permitting foreign banks to establish themselves in the domestic market, or removing territorial boundaries between financial institutions previously specialised in different markets, for example) will be good for competition but bad for incumbents' profits.

If there were no fixed costs, introducing another firm would bring more extra benefit to banks' customers, in the form of keener prices, than the cost to banks' owners in the form of lower profits. So in that case, the optimum number of banks would be limitless; and free entry would make for perfect competition by driving profits to zero.

In the presence of fixed costs, which are, say, the same for any firm, the picture changes completely. Free entry would make the number of banks finite. Depositors would have to receive lower interest than the rate the banks could earn on assets, in order to pay for the overhead costs. And the optimum number of banks, the number that maximised the sum of customers' welfare and owners' profit, would be smaller still. Free entry would lead to overcrowding: getting rid of a bank or two at this point would typically save more in total costs than the accompanying sacrifice in consumer welfare. The reason for this is that, at this point, the departure of one bank would raise all banks' profits by more than it would reduce the surplus of banks' customers. The deterioration in depositors' interest would be very small, compared with the gain in the profits earned by the owners of the banks.

This finding about Cournot oligopoly, which can easily be extended to banks, is due to Mankiw and Whinston (1986). The same result is often (but not invariably) encountered under another market form intermediate between perfect competition and monopoly. This is monopolistic competition, which arises when the characteristics of banks' products differ, say by location.⁽³⁾ The fact that the number of firms is socially excessive under Cournot oligopoly with free entry follows for sure in tranquil conditions, when financial markets are not subject to random shocks. It is displayed even more

(1) These conditions include: (a) the absence of sunk costs, specific to current operations, which cannot be recovered on exit; (b) no incumbent able to change prices until after consumers have had a chance to switch suppliers; and (c) all firms, incumbent and outsiders alike, with access to the same technology and the same price and quality of inputs. The threat of entry then forces an incumbent to price at average cost, which will equal marginal cost if average cost is flat. Consumers' costs of switching banks, freedom to reprice almost instantaneously, the sunk costs of acquiring information and the obstacles to hiring specialised personnel make banking less than perfectly contestable in practice.

(2) Mutual institutions have been long-established in the financial sector, but rarely among market leaders, and current trends are against them.

(3) In Salop (1979), for example, free entry leads to twice as many firms as the social ideal.

forcefully in a stochastic environment, when banks' fixed costs are liable to random movement, for example; furthermore, Bolton and Freixas (2000) show that it will be the riskiest borrowers that opt for bank loans, as opposed to equity or debentures (bonds), for external finance.

In a simple case, the optimum number of firms plus one equals the number of firms under free entry, plus one, raised to the power of two thirds—so if free entry gave room for eight banks, for example, the social ideal would be just three. With random shocks and the risk of socially costly insolvency, the ideal number of banks shrinks still further. These arguments are explored in detail, for the Cournot oligopoly case, by Mullineux and Sinclair (2000).

Further light on the trade-off between competition and safety in banking is thrown by the observation that a troubled bank, desperate to survive if it possibly can, will be tempted to take great risks. Failure is an awful prospect, but it really makes no difference how large the bank's debts are in the event of failure. From the owner's and employee's standpoints, going bankrupt because net liabilities are £1 is as bad as bankruptcy with net debts of £1 billion. The downside risk is effectively truncated. A large gamble, if successful, could pull the bank off the rocks towards which it may be heading. So, in an instance like this, an extra gamble would be cheap or even free. There is no extra cost to the gambler if it fails, and a very large gain, in the form of survival, if it succeeds.

The damaging social consequences of an incentive to take free bets constitute the key argument for making the punishment fit the crime. A death penalty for minor theft might discourage minor theft, but it will induce some malefactors to substitute into more heinous activities. In adverse circumstances, bankers taking free bets—'gambling for resurrection', or gambling to survive—may become a much likelier phenomenon as the number of banks increases. This is because profits will fall, and each bank will edge closer to the region where bets for survival become cheap or free. If emergency lending assistance is given to a bank close to the edge, monitoring by those providing it needs to ensure that the aid is not frittered on gambles that could make the financial system less secure, not more.⁽¹⁾

Technically, the free (cheaper) bets on (near) a bank's survival boundary represent a convexification of returns. An otherwise risk-neutral individual is encouraged to gamble, and the incentive to gamble is stronger, the greater the likelihood of being at the point of kink for returns. The key point here is not just that more banks and greater competition raise the chance that one or more banks might slip into insolvency, but, still more important, that the risk of

this is increased because of the greater incentive to take a gamble in this region.

Free bet incentives also qualify the case for deposit insurance: fully insured depositors need no longer worry about where they lodge their funds, so riskier banks prosper at the expense of the taxpayers or shareholders of safer banks, and each bank is itself encouraged to take on more risk too. As Hoggarth and Soussa argue in their contribution to the Symposium, free bet incentives raise problems for the lender of last resort as well. They can even affect the regulator, who may share a sick bank's inclination to wait for the chance of better news, and be tempted into forbearance or procrastination.

A banking system with fewer banks may well be a safer one. Yet safety is not everything. Competition brings undoubted benefits. Barriers to entry, official or natural, can act as a screen behind which collusion, inefficiency and unhealthy lending practices flourish. The admission of another bank, a foreign one perhaps, may blow away the cobwebs of cronyism.

There are also growth effects. Most models of endogenous growth ultimately reduce to two fundamental equations linking the rates of growth and real interest.⁽²⁾ One equation is positive: higher real interest for households that save implies a faster long-run growth rate of consumption and income. The other is often negative: higher real interest rates for corporate borrowers deter innovation and invention. Greater competition between banks narrows the gap between interest rates facing lenders and borrowers, and should therefore make for faster long-run growth.⁽³⁾

So policy-makers face an intriguing dilemma. Fewer well-padded banks make for a safer, but growth-stifling financial environment. The faster growth that comes from keener competition among banks makes for a bumpier ride. The agency entrusted with regulation and supervision faces conflicting pressures. At one end, there is the risk of capture by the incumbent banking interests. At the other, the constituencies of borrowers and depositors may take over, forcing narrow interest spreads and imperilling financial stability.⁽⁴⁾ Fashions change: in the early days of Britain's privatisations in the 1980s, regulators appointed to oversee utility pricing may have been lenient to profit (Vickers and Yarrow (1988)); later, under political pressure, most of them appear to have become much tougher. History might easily repeat itself in the banking arena.

The complex dilemma of safety versus competition confronting financial regulators is modulated, of course, by BIS capital adequacy and risk arrangements, which are

(1) Mitchell (2000) and Aghion, Bolton and Fries (1999) explore some of the implications of these ideas, and the incentives for banks to roll over doubtful loans.

(2) For example, Aghion and Howitt (1992, 1998) and Romer (1990).

(3) King and Levine (1993) were the first to argue this; see also Fry (1995).

(4) Boot and Thakor (2000) show that increased interbank competition must benefit some borrowers, but not necessarily all of them.

currently under review.⁽¹⁾ Many difficult choices remain. Hellman, Murdock and Stiglitz (2000) show that capital adequacy ratios by themselves will establish Pareto-inefficient outcomes, when interest rates on deposits are determined by unfettered competition between banks. The problem arises because competition and capital adequacy ratios together undermine franchise valuations, and this undoes some of the reduction in the incentive to gamble that higher ratios bring. One instrument that could be valuable here, as Hellman *et al* show, is a ceiling on deposit interest rates. Furthermore, as Brealey emphasises in his contribution to the Symposium, neither regulation, nor the imposition of capital standards, succeeds in preventing financial crises.

There are certainly powerful arguments for resolving the safety versus competition dilemma within the confines of a single institution, which might be, but need not be, the central bank itself.

5 Financial crises and international capital movements

Sharp price changes in foreign exchange and other asset markets can precipitate a financial crisis. A currency crisis is not the same as a bank crisis, but each can trigger the other. Marion (1999) provides an excellent analysis of the parallels and differences between the two. Under some conditions, McCallum (2000) shows that a currency crisis can be predicted. If, all else equal, one country's monetary aggregates and credit always grow faster than the other's, a fixed exchange rate peg between the two can last for a while, supported by sales of the former's reserves. But at some point, before reserves run out, the exchange rate will start to slide, the home country's interest rate will jump, and a step decline in reserves is needed to accommodate the fall in real money demand.

In foreign exchange and other asset markets, trade volume and price volatility are notoriously unsteady. They are also positively associated. Volume instability points to heterogeneity among market participants. As in Sinclair (1990), they may differ in trading strategies, expectations and information. Some are noise traders who minimise transactions to save commissions. Others back evidence for mean-reversion in asset prices, use economic models or exploit private information. A further group may imitate, thinking 'I don't know why people are selling this, but I assume they have good reasons'. Diverse information sets, as Morris and Shin (1998, 1999) argue, may also create conditions for a critical mass of speculators that converts a vulnerable currency into a crisis victim, if the authorities are believed to view currency defence as too expensive.

The 1997 crises enveloping Thailand, Indonesia and South Korea jumped international boundaries at great speed. One

common factor here was the concentration of financial risks in the banking system, risks that would have been dispersed much more widely through capital markets in richer countries. Within a year they had spread to some other countries, including Russia. In every country that succumbed to them, these crises resulted in destruction of previous exchange rate parities after heavy speculative attack. Sharp falls in local equity prices in local currency, deterioration in the perceived quality of local banks' loans, and an adverse revaluation of the solvency prospects of several local financial institutions, were other concomitants. Some of the countries that managed to emerge virtually unscathed, like Hong Kong or Singapore, had a complete absence of restrictions on international capital flows. Others, like Chile, India and Malaysia, had retained or were to impose some measure of control. This last fact prompted some observers to argue that freeing international capital movements was a risky and unwise step.

International capital movements are a form of trade—trade in goods at different dates, or in different contingencies. So restricting them is open to the standard objections to levying tariffs on imports, for example. This is never acceptable under otherwise ideal conditions. In the face of some distortion, such as imperfect competition or market incompleteness, it is always (or almost always) inferior to removing the distortion at (or closer to) its source by other means. Peter Sinclair and Chang Shu, in their contribution to the Symposium report, conclude that capital movements should generally be more blessing than curse, and that policies to restrict them are typically dominated. They also cite evidence that the effectiveness of controls wanes with time and is undermined by evasion. Nonetheless, modest tapering taxes on capital flows may have benefits under emergency conditions, for countries experiencing indigestible inflows, for example, or in the immediate aftermath of a particularly serious crisis.

6 The links between financial stability policy and monetary policy

One important argument for preserving a financial stability function in a central bank, even when regulation of financial firms passes to another institution, is that monetary and financial stability policy are intertwined.

Monetary policy can have important implications for financial stability; financial stability decisions will also have implications for monetary policy. Some of these links are investigated below. We consider first the effects of monetary policy on financial stability.

If monetary policy is mishandled, inflation may become rapid and volatile. Positive inflation surprises redistribute real wealth from lenders to borrowers contracting in nominal (unindexed) loan instruments. Negative inflation

(1) Richard Brealey, in his contribution to the Symposium, has numerous pertinent observations upon them. He commends the proposed adoption of explicit market value accounting as a solution to the problem of forbearance towards suspect loans, but queries popular reasons for opposing an expansion of banks' capital on the ground that it is unclear why equity should be much more expensive than debt.

surprises have the opposite effect. The size of this redistribution is greatest when the instruments are at fixed, as opposed to floating, interest. Redistribution in either direction may provoke bankruptcy, with serious implications for the quality and performance of banks' loans. Since inflation surprises, negative and positive, increase with the variance of inflation, and since the variance of inflation appears apt to increase with its speed, these risks are liable to increase with the average rate of inflation.

There is also some risk attached to a very tight, sustained monetary policy that pushes inflation to very low, even negative levels. The lower the rate of inflation, the greater the attraction of holding cash rather than interest-bearing bank deposits. Any switch away from bank deposits is liable to reduce the profits earned by banks, and particularly so in an oligopolistic setting of the Cournot type described above when the number of banks is given. Reducing banks' profits implies a greater chance, in a stochastic environment, however remote, that one or more banks will sooner or later run into insolvency. At sufficiently modest rates, inflation does not just bring seigniorage gains to the government or the monetary authorities. If imperfectly competitive, the banks tend to share some of this seigniorage as well.

A third link running from monetary policy to financial stability policy stems from interest rate setting. Above all, monetary policy aims at stabilising inflation, with short-run nominal interest rates now widely accepted as the instrument of choice. Sharp, temporary alterations in short nominal rates may add to uncertainties in financial markets. Particularly when delayed—so that the magnitude (and duration) of the alterations, when they come, is greater than it otherwise could have been—interest rate swings tend to increase the variance of the rate of business failures. This has adverse effects on the balance sheets of banks at times of credit crunch. These effects are greatest when monetary policy is 'too much, too late'. Timely, modest interest responses to inflation surprises can contribute powerfully to long-run financial stability.

So much for the impact of monetary policy upon financial stability. What of the reverse? More effective supervision, to reduce the risks of bank failures, increases confidence in banks' liabilities. Widely defined, money demand should go up. This has no persistent effect on the rate of inflation, but the transition to a 'safer' regime of financial control will imply lower equilibrium inflation for any given path of nominal monetary aggregates as velocity subsides. Put another way, policy decisions that make the banking system look more hazardous could generate a flight from broad money, and exacerbate the rate of inflation in the short run through a variety of mechanisms (not least via the foreign exchange rate). A lender of last resort function, wisely deployed, may also enhance confidence in the liabilities of banks. So its removal could conceivably trigger a transitory burst of inflation in extreme circumstances.

The intense debate between the Banking and Currency Schools in the era of the 1844 Bank of England Act also throws light upon these issues. The Currency School, widely seen as the antecedent of modern monetarists, was alarmed that a lender of last resort mechanism might ultimately endogenise the supply of money. If liquidity is continually pumped into commercial banks at modest rates of interest, the monetary authorities could ultimately lose control over the price level, Currency School adherents argued. Their opponents stressed the case for the central bank to meet the legitimate needs of commerce: acting as lender of last resort, the monetary authority could stabilise the business cycle, contributing to greater stability in not just the real variables of the macroeconomy, but possibly the nominal variables as well.

On the other hand, financial stability concerns may translate into greater aversion to wobbles in aggregate output relative to wobbles in inflation. Any resulting shift from stabilising the price level to stabilising output is likely to generate greater volatility in inflation, and quite possibly higher average expected and actual rates of inflation as well. Rogoff's (1985) plea for monetary policy to be conducted by a conservative central banker could be compromised if financial stability concerns made the central banker less averse to inflation or inflation swings. Finally, the transmission mechanism for monetary policy may be gravely impaired if credit flows are warped by a defective or unstable financial system.

If the central bank has no responsibility for financial stability *per se*, these numerous linkages between financial and monetary policy are liable to be disregarded. Serious conflicts of interest could arise between the central bank and the agency, or agencies, charged with protecting the stability of the financial system. Organising co-operation between distinct institutions is awkward. It becomes progressively harder, if the central bank has shed these functions, as staff turnover effaces old habits of consultation between erstwhile colleagues. Significant delays could ensue, particularly if channels of information are subject to filtering or blockage. Inefficient outcomes might easily result. Those who argue that the central bank should retain some financial stability responsibilities would stress the advantages of internalising, within a single institution, the discussions that relate to these financial-monetary policy links.

These observations do not, however, imply that all aspects of regulation and supervision belong within the central bank.⁽¹⁾ The 'narrow model', with its separation of supervision and regulation from the central bank's core functions, brings the advantage of a clean, sharp delineation of responsibilities between distinct institutions. The fact that countries' institutional arrangements differ so widely in this respect should not be taken to suggest that some are right and others are mistaken. What is best for one country may well be less than best for another.

(1) The 'broad model' described by Healey in her report to the Symposium.

7 Bakers and firefighters

Bread, and those who bake it, are in continuous demand. Firemen are needed only in emergencies. Monetary policy-makers are like bakers. A continuous watch on macroeconomic and monetary conditions must be kept. Interest rates need to be reset, even if only to be confirmed at unchanged levels, at regular and frequent intervals. Financial stability experts, by contrast, are primarily firefighters. Part of this work involves surveillance, and trying to prevent or contain fires by the building of fireproof structures. This relates to the design of the payments system, minimum capital accords, and—since fires do not respect country borders—the international financial architecture as well. A general oversight of financial conditions needs to be maintained at all times, but really close monitoring and intervention is reserved for financial institutions in serious trouble. Checking that fire extinguishers and alarms are in place and in working order, and that fire breaks and walls and regulations are respected, is an important recurrent task, but fighting fires that break out is the prime responsibility. Even in a large economy, it is not as if little fires are happening much of the time. Fires, especially big fires, are occasional events. And just as the externality of fire damage is the central argument for suspecting that individuals will take inadequate precautions if left to themselves, the web of adverse externalities and risks of contagion in financial crises provides the key case against pure *laissez faire*. The externalities that go with systemic risk are the principal reason why a central institution is needed to help ensure the stability of the financial system.

While the need for an institution to formulate and operate monetary policy is beyond doubt, some observers are apt to be sceptical about the usefulness of those responsible for maintaining financial stability. When financial stabilisers, if we may call them this, succeed in preventing fires, their value is invisible to the naked eye. If they succeed in containing a fire, it is hard to establish that the fire would have been worse in their absence. Worse, ill-informed popular opinion seeks scapegoats. Any fire may see them blamed for having, allegedly, allowed it to start in the first place. Like an ailing financial institution, financial stabilisers may be tempted to delay intervention, in the hope that tomorrow brings better news. Rain, or a change in wind direction, might snuff out an incipient fire before any damage is done. The need for timely information-sharing between the supervisor and the financial stabiliser, and for prompt corrective action, is stressed in many contributions to the Symposium—and particularly by Hoggarth and Soussa.

Firefighting is no simple task. Nor is fire-watching. There is a grey area between performing and non-performing loans. Valuing collateral or unquoted assets takes time. The

markets for many types of debt are thin. Future debt serviceability is never known. The variances and covariances⁽¹⁾ of returns on all assets are notoriously non-stationary. Brokering an urgent informal auction or rescue of a troubled institution is never straightforward, nor is weighing the benefits and costs of emergency assistance under extreme time pressure, or countering the temptation for lenders to preserve goodwill or stay alive by rolling over suspect debts. All these factors pose real challenge. So, too, does the complex task of promoting robust financial structures, surveillance and macro-prudential analysis, which together form a large part of what financial stabilisers do. The value of experienced staff, and the awkward tendency for financial crises to cluster over time, make it very unwise for those in authority in tranquil periods to dispense with their financial firemen, tempting though that might sometimes seem.

Whatever the institutional arrangements a country has established for safeguarding its financial stability, there are powerful practical reasons for not altering them without due cause. There are costs and risks associated with the transition from one regime to another. If a new institution, with some inexperienced personnel, is entrusted with financial stability issues, it may be tempted to rely heavily on the rule-book. New rules are cheap to write, but they are costly to learn, interpret, obey and enforce.⁽²⁾ In the absence of compelling reasons to the contrary, a country may do better to refine its existing arrangements than to import an alien model to which its particular circumstances are ill-suited. So wherever the firefighters work, alongside the bakers or elsewhere, rehousing them may well not prove advantageous.

8 Conclusions

Safeguarding financial stability is a core function of the modern central bank, no less than market operations and the conduct of monetary policy. This is evident from a detailed survey of 37 central banks, drawn from a wide variety of industrial, transition and developing countries. For those central banks that have never acted as regulator or supervisor of financial institutions, and for those that have recently shed these roles, financial stability responsibilities may be shared with other agencies, but the central bank is still very much in the game. This is particularly true in circumstances where bank failure would pose systemic risk. Threats to financial stability may arise from many sources, including excessive competition or overcrowding in the banking sector, misguided or misapplied regulation or lending to troubled institutions, undue forbearance, and currency crises. Financial stability impinges upon monetary policy and reacts to it. There are therefore powerful arguments for retaining responsibility for both within the central bank.

(1) Omission of covariances across different risky assets is one of the unfortunate features of the Basel Accord rules as they stand at present; this is one of several reasons why those monitoring financial stability need to do much more than merely check whether these rules are obeyed.

(2) As David Llewellyn stresses in his contribution to the Symposium.

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