Burden sharing in a banking crisis in Europe[1]

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Pan-European banks are starting to emerge, while arrangements for financial supervision and stability are still nationally rooted. This raises the issue who should bear the burden of any proposed recapitalisation in the event of failures in large cross-border banks. A recapitalisation is efficient if the social benefits (preserving systemic stability) exceed the cost of recapitalisation. Using the multi-country model of Freixas (2003), we show that ex post negotiations on burden sharing lead to an underprovision of recapitalisations.

Against this background, we explore different ex ante burden sharing mechanisms. The first is a general scheme financed from the seigniorage of participating central banks (generic burden sharing). The second relates the burden to the location of the assets of the bank to be recapitalised (specific burden sharing). As the specific scheme gives a better alignment of costs and benefits, it is better able to overcome the co-ordination failure. Finally, decision-making procedures are required for the administration of an ex ante burden sharing mechanism.

1. Introduction

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The establishment of a single, unified European financial system, plus a common eurozone currency, raises the issue of the appropriate level (federal or national) for managing financial stability. The emergence of pan-European banks has stimulated the debate on European arrangements for financial supervision and stability. The search for an appropriate division of labour between home and host supervisors in the European Union is part of this debate. The fiscal competence to deal with banking crises is inter-related with the banking supervisory function. It is not possible to move on one of these without the other (Goodhart, 2004).

[1] The opinions in the paper are those of the authors and not necessarily those of the Financial Markets Group or the Netherlands Ministry of Finance.

The fiscal costs of resolving a banking crisis can be large. In a worldwide sample of 40 banking crisis episodes, Honohan and Klingebiel (2003) find that governments spent on average 13% of national GDP to clean up the financial system. To clarify our position, the preferred route to solving a banking failure is a private sector solution. The use of public money should only be considered when the social benefits (in the form of preventing a wider banking crisis) exceed the costs of recapitalisation via taxpayers' money. The issue at stake in the European context is that not only national, but also cross-border, externalities should be taken into account in the decision-making process. The need for European arrangements ultimately depends on the intensity of cross-border externalities from bank failures within the EU (Schoenmaker and Oosterloo, 2005).

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The aim of the paper is to explore possible mechanisms for fiscal burden sharing in a banking crisis in Europe. The choice of mechanism for fiscal burden sharing is a political decision. The first mechanism could be a general fund to shoulder the burden of recapitalisation. This general fund could be financed from the seigniorage of the ECB (and of central banks from out-countries). Countries pay their relative share in the fund from their seigniorage. The main advantage of this system is that the costs of recapitalisation are smoothed over countries (and over time). There are, however, serious problems with this approach, not least that there is little (political) enthusiasm for cross-border fiscal transfers. The second mechanism involves specific burden sharing. In this scheme, only countries in which the problem bank is conducting business contribute to the burden sharing. A country's contribution can be related to the share of the problem bank's business in that country. In this way, cross-border transfers are largely avoided. Both schemes are subject to the free-rider problem. Countries that do not sign up to burden sharing nevertheless profit from burden sharing, as the stability of the European financial system is a public good.

The paper is organised as follows. In Section 2, we give a short overview of developments in financial supervision and stability. Section 3 contains the core of the paper. We first explain the possibility of co-ordination failure in crisis management in a multi-country setting. Next, we explore different mechanisms for *ex ante* burden sharing to overcome the co-ordination failure. The mechanisms are illustrated with numerical examples. In Section 4, we discuss briefly the decision-making framework for crisis management. The final section provides a conclusion.

2. Developments in financial supervision and stability

Large (cross-border) banks are emerging in Europe. Schoenmaker and Oosterloo (2005) document a statistically significant upward trend of emerging European banking groups in the period from 2000 till 2003. Until recently, there were just a few regional cross-border banks in retail, such as Nordea and Fortis. Other cross-border operations were mostly wholesale, often involving securities and derivatives operations in London. However, retail mergers are starting to take off. Examples are Santander-Abbey National in 2004 and Unicredito-HypoVereins and ABN AMRO-Antonveneta in 2005. Cross-border banking occurs across the EU and is not confined to the eurozone. London, and the UK, are central players. We argue therefore that EU-wide solutions rather than eurozone solutions are needed, following the legal framework of the EU banking directives.

The emergence of pan-European banks has implications for the role of both home country and host country authorities.

The emergence of pan-European banks has implications for the role of both home country and host country authorities. Functions such as risk management, treasury and internal audit are increasingly run on a group-wide basis at headquarters. These banks ask, for efficiency reasons, for a single supervisor for the whole bank, including the separately licensed subsidiaries. This reinforces the role of the home supervisor. Next, banks with headquarters in one EU country can have a large presence in other EU countries. This was not the case at the start of the single market for financial services, but is now starting to occur, particularly in the new Member States. Between 40 and 90% of the banking systems in the new Member States are foreign owned – mostly by West-European banks (ECB, 2005). Host country authorities have a legitimate interest in the financial stability of their market.

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What are the implications of these trends? The home supervisor will have an EU-wide coverage as consolidating supervisor, but the home country may want to confine the costs of a possible recapitalisation to the bank's home operations and national depositors. The home country may thus not be prepared to pay for the rescue of the bank's presence and depositors in other EU countries. The problem becomes more acute for large banks in small countries. The cost relative to the fiscal budget may be large in small countries, so the home country simply cannot bear the full burden alone (Dermine, 2000).[2] But this problem is also relevant for large banks in larger countries. There seems to be an assumption that the home country will pay in full, because of the home country principle for

[2] The Swiss banks, for example, may be "too big to save". We understand that the professed policy of the Swiss authorities is that they could only help the Swiss banks up to a limited (capped) amount and also only the domestic part of such banks.

supervision. This assumption is, we suspect, wrong, as national authorities are not inclined to make cross-border transfers. And even if they were to propose doing so, national parliaments may demand that tax-payers moneys are only used for domestic purposes.

Working on such a false (optimistic?) assumption could aggravate a crisis, as it might slowly become clear in the course of a crisis that the national authorities were prepared to cover only the domestic parts of their international banks. History shows that countries are not likely to bail out foreign depositors. An example is the rescue of the Italian bank Banco Ambrosiano in 1982. While the rescue operation covered the Italian operations, the Luxembourg subsidiary was originally not included (Goodhart and Schoenmaker, 1995).

It may be becoming increasingly difficult for a host country to manage financial stability, as the home supervisor takes all the main decisions on supervisory and stability matters. As explained more fully in the next section, Freixas (2003) has modelled the co-ordination between national authorities in crisis management.[3] His model indicates an underprovision of recapitalisation facilities in the case of improvised co-ordination. *Ex post* bargaining will lead to co-ordination failure. In theory, the problem for host countries only concerns branches. But banks manage their subsidiaries increasingly as dependent parts of the parent bank and prefer to avoid solo supervision of the subsidiary by the host country (in addition to consolidated supervision by the home country). Given that many key functions of international banks have become centralised, it could be extremely difficult for a host country to keep a subsidiary alive independently of the parent bank, even should it be willing in principle to do so.

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Before moving to solutions for home-host co-ordination, we note that early closure of problem banks would reduce the problem. There is an early precedent in European banking in the 18th and 19th centuries. An important feature of the free banking system in Scotland was unlimited liability (White, 1984). Unlimited liability provided shareholders with an incentive to behave prudently. Shareholders thus had an incentive to tackle problems timely, including, if needed, to close the bank. A more recent example of early closure is the prompt corrective action scheme (FDICIA) in the USA (Benston and Kaufman, 1997), which provides for a graduated series of sanctions that first may and then must be applied by the regulators to floundering banks. Finally, if capital drops below 2%, shareholders can recapitalise the bank, otherwise authorities will take it over and deal with it as appropriate. Early closure of problem banks would also be useful

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[3] Following Freixas (2003), we focus on the fiscal costs of lender of last resort and solvency support operations in a multi-country context. We do not look at deposit insurance arrangements. Deposit insurance issues for multi-national banks also raise thorny home-host issues.

in the EU (see also the European Shadow Financial Regulatory Committee (2005) for a similar proposal). A concern has been that early closure of a bank, before it becomes patently insolvent, could be held to be tantamount to the expropriation of shareholder value. A riposte to this is that, under FDICIA, shareholders still have the option of recapitalising their bank. Moreover, supervisors have a duty to shut banks that appear unsafe. Finally, if bank assets do turn out to be more valuable than (fixed interest) bank liabilities, this excess would be available for the shareholders.

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To improve home-host co-ordination, we believe that the home supervisor should have an EU-wide mandate, but that, to incorporate their interests, host countries should also be involved. An example can be found in the Capital Requirements Directive (incorporating Basle II into European legislation). Responding to the centralisation and integration of risk management at banks' headquarters, the CRD has a provision that the consolidating or home supervisor can approve the internal model of a bank after 6 months of discussion with the host supervisors.[4] This may create an incentive problem, the so-called hold-up problem. The home supervisor waits 6 months and then takes his own decision.

To solve this latter problem, a committee could be established to intermediate between home and host supervisors. For example, the relevant European bodies (President of the ECB, Chairman of CEBS and Commissioner for DG Internal Market) could appoint a five to seven member committee. Members should be appointed on the basis of job profiles and proven expertise. The host countries would have a right to appeal to this committee. To avoid having one country persistently appealing, appeals might normally need to come from at least two countries. The committee could then publish its findings in full to the members (thereby including the grounds of the conclusions), while only the conclusions would be made fully public. This is a policy of 'naming and shaming', as there would be no legal framework for sanctions.

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A more formalised system would be the creation of a supranational body. A central European Financial Authority, in tandem with the national financial supervisors, would form a European System of Financial Supervisors. In this system, the home country takes the lead for EU-wide operations of banks, but incorporates the input from host countries. If the home country is held to be failing to do this job effectively, and/or is criticised by the host country(ies), the central European Financial Authority could overrule the home supervisor and take decisions (see Schoenmaker

[4] It should be noted that the CRD specifies that "the consolidating supervisors shall do everything within their power to reach a joint decision".

and Oosterloo, 2006 for further details). Such a European System of Financial Supervisors could lead to duplication between the central body and the national supervisors. Moreover, the political appetite for this type of solution is currently limited.

3. Mechanisms for fiscal burden sharing

The fiscal costs of resolving a banking crisis can be large. In a world-wide sample of 40 banking crisis episodes, Honohan and Klingebiel (2003) find that governments spent on average 13% of national GDP to clean up the financial system. Scandinavia and Japan, for example, experienced a severe banking crisis in the 1990s. While the Scandinavian crisis amounted to a fiscal cost of 8% of GDP, the long-drawn-out Japanese crisis added up to a total fiscal cost of 20% of GDP. There are also broader, real, costs to the welfare of the economy. Hoggarth *et al* (2002) find that the cumulative output losses incurred during crisis periods are roughly 15–20% of GDP. In this paper, we do not take a view on whether public sector recapitalisations (in effect, temporary nationalisation) are desirable or not. We work on the assumption that authorities would want to recapitalise one or more problem banks if the social benefits (in the form of preserving systemic stability) exceed the costs of the recapitalisation; this has, after all, been the historical experience.

In a multi-country setting, the costs of such recapitalisation can be shared between countries. Freixas (2003) shows in a model that *ex post* negotiations on burden sharing lead to an underprovision of recapitalisations. Countries have an incentive to understate their share of the problem so as to incur a smaller share in the costs. This leaves the largest country, almost always the home country, with the decision whether to shoulder the costs on its own or to let the bank close, and possibly be liquidated. Freixas (2003) labels this mechanism, which reflects the current arrangements in Europe, as improvised co-operation. At the outset, we note that burden sharing in the case of an international banking crisis is a general problem. The Freixas model applies to any multi-country setting. We confine our search for solutions to the European setting, as a jurisdiction is available in the EU to implement binding agreements amongst nation states. Treaties with a wider coverage of states can, of course, be signed, but there is no international enforcement mechanism.

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The policy question is whether to do nothing (and keep the current arrangements with a likely underprovision of recapitalisations) or to move to arrangements at the European level. The trends described in Section 2 illustrate that this policy question is becoming more acute. On the one hand, the role of the home authorities is increasing because of the cen-

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tralisation of key management functions. On the other hand, the cross-border presence of banks is rising, notably in the 10 new member states but also in the former 15 member states, while the tools for host authorities to manage financial stability remain limited.

The purpose of this paper is to explore *ex ante* mechanisms for burden sharing in Europe to overcome the co-ordination failure in *ex post* negotiations. Some would argue that, to counter moral hazard, crisis management arrangements for lender of last resort and solvency support should not be specified in advance. We agree that constructive ambiguity regarding the decision to recapitalise, or not, can be useful to contain moral hazard. But the model of Freixas (2003) demonstrates that additional ambiguity over burden sharing would lead to fewer recapitalisations than is socially optimal. Our goal is to attain the same clarity at the European level as we currently have at the national level. At the national level, the financial risk of support operations, if any, is carried by the ministry of finance and the central bank, which therefore decide these operations. Clarity at the European level about how to share the costs among treasuries (and central banks) does not increase moral hazard.

Another view, expressed at the Riksbank Workshop[5] at which this paper was initially presented, was that the support for failing banks that are too big to close should come from insurance, rather than from public sector use of taxpayers' funds. The argument was that the authorities should identify such 'systemic' banks and require them to pay premia (in addition to existing deposit insurance) into a special European Deposit Insurance Fund (EDIC), which might be topped up, if necessary, via reinsurance. This Fund should then be able to handle all but the most extreme tail events.

There would, however, be a transitional problem while the EDIC was initially accumulating premium income; what if the crisis came early? Moreover, crises affecting banks are commonly macro-economic and general in nature, following asset market collapses and economic downturns, rather than individual and idiosyncratic (Scandinavia rather than Barings). In other words, such crises are not easily diversifiable events, but contagious epidemics. For such reasons, deposit insurance schemes have at times run out of funds (as did the FSLIC in the USA) and, more generally, lack credibility without the ultimate back-up of pledged government support. While we have some sympathy for the concept of an (additional) EDIC, we nevertheless believe that this only takes the issue of burden sharing back one step. In order to establish a credible EDIC, it would be

[5] Workshop on the future regulatory framework for banks in the EU, 13–14 February, 2006.

necessary to decide how the burden of meeting shortfalls from the calls upon its funds could be met.

When designing *ex ante* mechanisms for burden sharing, the following issues arise. First, should all countries join in the burden sharing (in a banking crisis, every country pays relative to its size) or only the countries involved (countries pay relative to the national presence of the problem bank)? Second, should the burden be shared according to a fixed or a flexible key (accommodating the specific circumstances)? In this paper, we explore two main mechanisms for *ex ante* agreement on burden sharing at the European level:

In this paper, we explore two main mechanisms for ex ante agreement on burden sharing at the European level: a general fund and specific burden sharing.

1. A general fund to shoulder the burden, financed from the seigniorage of the ECB (and of other central banks). All countries contribute according to a fixed key in this scheme;
2. Specific sharing of the burden, financed directly by the involved countries according to some key reflecting the geographic spread of the business of the failing bank.

The working of the mechanisms will be illustrated with examples of sharing the burden for the recapitalisation of a large European bank. Table 1 provides some details on the 30 largest banks in Europe. The micro-problems likely to cause the failure of a large bank are threefold: 1) accounting problems leading to a wrong presentation (i.e. overstating) of the value of assets; 2) one-off frauds (e.g. Barings in Singapore); 3) large creditor defaults if banks fail to diversify appropriately (e.g. Crédit Lyonnais' exposure to the film industry in Hollywood).

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Our results with one bank can easily be generalised to multiple banks. However, moving to the mode of a full-blown banking crisis makes the differences between the mechanisms less relevant and macroeconomic factors, such as a deep recession or large terms of trade decline, come into play (see, for example, Caprio and Klingebiel, 1997; Kaminsky and Reinhart, 1999; Honohan and Klingebiel, 2003). During such crisis periods, the authorities (government and central bank) will need to stand behind the banks and implicitly or explicitly guarantee their deposits to restore confidence in the financial system. This was the experience of the Scandinavian authorities during the 1990s.

3.1 GENERAL FUND

In the first mechanism, a European fund could be set up to shoulder the burden of a recapitalisation. This fund would be financed *ex post* by a part of the seigniorage of the ECB. Goodhart and Smith (1993) advocated

TABLE 1. TOP 30 EUROPEAN BANKS (2004 FIGURES)

Bank (Country)	Tier 1 Capital in € bn	Assets in € bn	Assets h (%)	Assets e (%)
1. HSBC (UK)	49.4	937.4	32	11
2. Crédit Agricole (France)	46.5	912.6	77	15
3. Royal Bank of Scotland (UK)	32.2	821.9	68	10
4. HBOS (UK)	26.9	557.7	90	5
5. BNP Paribas (France)	26.2	905.9	41	28
6. Santander Central Hispano (Spain)	24.4	575.4	37	52
7. Barclays Bank (UK)	23.6	728.4	75	5
8. Rabobank Group (Netherlands)	22.6	475.1	72	9
9. ING Bank (Netherlands)	21.1	616.5	48	37
10. UBS (Switzerland)	20.1	1125.5	11	33
11. ABN AMRO Bank (Netherlands)	19.8	608.6	36	22
12. Deutsche Bank (Germany)	18.7	840.0	25	41
13. Groupe Caisse d'Epargne (France)	18.4	543.9	50	38
14. Société Générale (France)	18.4	601.1	56	24
15. Crédit Mutuel (France)	18.2	387.3	n.a.	n.a.
16. Lloyds TSB Group (UK)	16.6	396.7	94	3
17. Credit Suisse Group (Switzerland)	15.9	706.8	21	33
18. HypoVereinsbank (Germany)	15.7	467.4	56	40
19. Banca Intesa (Italy)	15.6	274.6	71	20
20. Banco Bilbao Vizcaya Argentaria (Spain)	14.7	311.1	78	3
21. Fortis Bank (Belgium)	14.3	484.1	57	32
22. Groupe Banques Populaires (France)	13.4	250.4	n.a.	n.a.
23. Unicredit (Italy)	11.9	265.8	70	21
24. Dexia (Belgium)	11.0	389.1	12	65
25. SanPaolo IMI (Italy)	10.9	211.1	79	16
26. Nordea Group (Sweden)	10.6	276.0	30	67
27. Commerzbank (Germany)	10.5	424.9	75	15
28. KBC Bank (Belgium)	9.8	249.2	40	22
29. Bayerische Landesbank (Germany)	9.4	324.8	72	14
30. Caja de Ahorros y Pen. de Barcelona (Spain)	8.4	113.1	n.a.	n.a.
Average top 30 banks	**19.2**	**526.1**	**55**	**25**

Source: Top 1000 World Banks, The Banker, July 2005 for Tier 1 Capital and Assets; Update of Schoenmaker and Oosterloo (2005) for division of assets between home country and rest of Europe.

Notes: Banks are ranked according to 'capital strength' (Tier 1 Capital as of year-end 2004). Home is defined as a bank's assets in its home country (denoted by h); rest of Europe is defined as a bank's assets in other European countries (denoted by e); rest of world is defined as a bank's assets outside Europe (figures not shown). The three categories add up to 100%. The abbreviation 'n.a.' means 'not available'.

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using such seigniorage as a source of funding for the EU's federal budget. There is no need to have a pre-funded (*ex ante*) fund, if receipts are invested nationally (Ricardian equivalence). Whereas there could be some advantages in building up a *masse de manoeuvre* in advance, there are strong political arguments against, since such *ex ante* contributions would raise the measured fiscal deficit. During a crisis, bonds are issued by the ECB to finance the recapitalisation. These borrowed moneys are used to recapitalise the failing bank. This would cover the full nominal value needed for the rescue. The annual servicing costs of the bonds would be

paid from the seigniorage fund and born by the governments. First, interest on the outstanding bonds (flow) is paid out of the fund. Second, any loss on the bonds (stock) is also paid out of the fund. This is a sinking fund for the amortization of losses. Each participating country would pay into the fund, as and when needed, according to its relative share of the seigniorage proceeds. The relative shares can be determined with the ECB capital key for sharing the monetary income of the eurozone countries (see table A.1 in Annex 1). The ECB capital key for a country is the arithmetic average of a country's share in total GDP and its share in total population. In Box 1 we illustrate the working of the general fund. The general fund mechanism is akin to a rescue by the ECB, which would then need to be backed explicitly by the national governments (possibly via the NCBs).[6]

Box 1. Numerical example of a general fund for burden sharing

The working of a general fund for burden sharing can be illustrated with a numerical example for a possible recapitalisation of a representative European bank. We make the following assumptions:

1. There is a large loss: equity is wiped out and there is negative equity of half of tier 1 capital;
2. Adequate recapitalisation requires the restoration of tier 1 capital;
3. In a worst case scenario, the write down is the full negative equity with a margin of 1/4 of tier 1 capital;
4. Write down is over a period of 4 years (given a loss of this extent, it will take at least 3 to 4 years to restore the bank to health and sell it back to the private sector);
5. Annual interest is 5%;
6. Tier 1 capital of a 'representative' European bank is €20 bn (average of top 30 banks in table 1);
7. All EU countries join the general fund.

The ECB needs to issue €30 bn of bonds to recover the negative equity of €10 bn and to restore tier 1 capital of €20 bn. The annual interest payment on the bonds is €1.5 bn. The sinking fund for write down is €15 bn. The annual write down is €3.75 bn. These amounts add to a total annual cost for countries of €5.25 bn. Countries that join the burden sharing scheme pay this amount out of their seigniorage according to the ECB capital key (see table A.1). The annual contribution is, for example, €0.78 bn (14.9% of €5.25 bn) for France and €1.11 bn (21.1% of €5.25 bn) for Germany.

The general fund mechanism is an example of generic burden sharing by countries (proportional to the size of the participating countries). The costs of recapitalisation are smoothed over the participating countries, irrespective of the location of the failing bank. In addition, the costs are smoothed over time. From a macro-economic perspective, these smoothing mechanisms are positive.

The general fund mechanism is an example of generic burden sharing by countries (proportional to the size of the participating countries). In addition, the costs are smoothed over time.

[6] While a central bank can create unlimited amounts of liquidity, its capacity to absorb losses is limited to its capital (Goodhart and Schoenmaker, 1995). To give the ECB a credible role in rescues (lender of last resort and/or recapitalisation), its capital needs to be explicitly underwritten by the national governments.

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However, we see three major problems with such a general fund mechanism.[7] First, this construction will lead to international transfers between countries (a country may have to contribute its share to the recapitalisation of a problem bank that does not operate in its jurisdiction). Countries are not keen to sign up for schemes with built-in transfers, unless there is strong political commitment for solidarity (e.g. development aid and, less so, European regional funds). Second, general burden sharing generates adverse selection and moral hazard problems. Countries with weak banking systems profit over countries with strong banking systems. Therefore, countries with strong banks are less inclined to sign up (adverse selection). As the link between payment for a recapitalisation and responsibility for ex ante supervision is weakened, supervisory authorities may feel less of an incentive to provide an adequate level of supervisory effort (moral hazard). Third, burden sharing arrangements are subject to the free-rider problem. Countries that do not sign up to burden sharing still benefit from it, as the stability of the European financial system is a public good.

There are also some technical issues. What happens if the fund is exhausted? Box 1 illustrates that a large bank can be saved at a moderate annual cost for countries. The general fund can thus shoulder the recapitalisation of a few large banks. Multiple, contagious bank failures are a different case, as explained above. The authorities will then need to take more drastic action to restore confidence in the financial system. Moreover, the authorities may also need to take measures, such as reductions in interest rates, to counter the macro-economic causes of the banking crisis. Another issue is what to do with countries outside the euro-zone? We do not see a problem. The integration of European financial markets, as well as its regulatory backing, is EU-wide. All EU countries ('in' or 'out') can decide to join the burden sharing arrangement. This can only be done on an *ex ante* basis. If out-countries join the arrangement, their seigniorage is then notionally included in the fund. The General Council of the ECB (or a committee reporting to the General Council) is then the relevant decision-making body at the ECB (see section 4 on decision-making details). It is even conceivable that non-EU countries, such as Switzerland, might want to join. Switzerland has large banks (UBS and Credit Suisse in the top 30) with an equally large cross-border presence in Europe.

[7] A problem, not discussed here, is that the general fund mechanism may violate the EU Treaty's prohibition on monetary financing.

3.2. SPECIFIC SHARING

In the second mechanism, the burden is shared only by countries in which the failing bank is present. Each involved country pays its 'relevant' part of the burden. A key can be designed to reflect the relative presence of the problem bank in the different countries. Sullivan (1994) has examined three indicators – assets, income and employees – for measuring the geographic segmentation of international firms. Using just a single indicator increases the margin for error, as the indicator could, for example, be more susceptible to external shocks. Sullivan (1994) has developed the Transnationality Index, which is calculated as an unweighted average of (i) foreign assets to total assets, (ii) foreign income to total income, and (iii) foreign employment to total employment.

In the second mechanism, the burden is shared only by countries in which the failing bank is present. A key can be designed to reflect the relative presence of the problem bank in the different countries.

The selection of an adequate key should be related to the aim of a possible rescue (i.e. the social benefits). We see two main aims. The first is to mitigate effects on the real economy. The second is to mitigate the impact on the wider financial system (contagion). We do not include a third objective of helping depositors. Mandatory deposit insurance already exists in the EU (with a minimum coverage of € 20,000 per depositor) to take care of depositors. A good proxy for the real and contagious effects of a bank failure is assets. On the real side, assets (including loans) reflect the credit capacity of a bank. The availability of credit will be disrupted in a failure. On the contagion side, assets reflect the size of a bank. The contagious impact is (partly) related to the size of a failing bank. To minimise the margin for error, assets can be taken from audited accounts (see also below). We have calculated how the assets of the top 30 European banks are allocated between the home market (*h*), the rest of Europe (*e*), and the rest of the world (*w*). While these three categories add up to 100%, table 1 only shows the home market and the rest of Europe shares. In Box 2 we illustrate the working of the specific burden sharing scheme.

While we, therefore, argue that assets represent a better key than deposits, there are various ways of measuring them, for example, risk-weighted assets or not, and historic cost or market value. At this early stage in the discussion we do not want to be too specific, except to note that, in order to deter gaming (see below), the key should relate to the last pre-crisis set of audited figures, not to post-crisis estimates.

An important advantage of specific sharing arrangements is that there are almost no international transfers. Countries that experience the benefits of the recapitalisation, also pay for it. Provided assets are a good proxy for measuring the benefits (i.e. averting the real and contagious effects of a bank failure), the costs and the benefits are fully aligned. The

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specific sharing scheme is also incentive compatible: the fiscal authorities as principal will require from the supervisor as agent an optimal level of supervisory effort.

As in the general fund scheme, however, the specific sharing is subject to a free-rider problem.

As in the general fund scheme, however, the specific sharing is subject to a free-rider problem. This would be a problem for the United Kingdom in particular. All major banks have a large presence in London: 24% of banking assets in the EU are located in the UK, whereas the UK's share in the EU economy is far smaller, 16.6% of GDP or 14.4% of the ECB capital key (see table A.1). So it might be more difficult for the UK to join such a specific sharing arrangement. The UK would have to pay a sizeable proportion of such burden sharing, as can be seen in the example of Deutsche Bank in Box 2. At the same time, the UK might also experience sizeable stability benefits from pre-arranged recapitalisations.[8]

Box 2. Numerical examples of specific burden sharing

The working of a specific burden sharing program can be illustrated with a numerical example for the possible recapitalisation of a few large European banks. Three different banks are taken to demonstrate the specifics of each case: a pan-European bank (Deutsche Bank), a regional bank (Nordea) and a global bank (HSBC). Again, we make the following assumptions:

1. There is a large loss: equity is wiped out and there is negative equity of half of tier 1 capital;
2. Adequate recapitalisation requires the restoration of tier 1 capital;
3. Write down is the full negative equity with a margin of ¼ of tier 1 capital;
4. Write down is over a period of 4 years;
5. Annual interest is 5%;
6. All EU countries join the specific burden sharing.

To rescue Deutsche Bank, the involved countries need to issue €28.1 bn of bonds. The specific key for Deutsche (in table 1) is used to calculate the respective shares of the countries. Deutsche has 25% of its assets in Germany and 41% in the rest of Europe. The United Kingdom accounts for over half of the assets in the rest of Europe (let's say 21%). So Germany needs to issue €10.6 bn of bonds, the UK €8.9 bn and certain other EU countries €8.5 bn.[9] The respective annual costs to service (interest and write down) the bond issue are €1.86 bn for Germany, €1.56 bn for the UK and €1.49 bn for the other EU countries.

To rescue Nordea, the involved countries need to issue €15.9 bn of bonds. Nordea has 30% of its assets in Sweden and 67% in the rest of Europe. The rest of Europe is divided into 26% in Denmark, 21% in Finland, 15% in Norway, 1% in Poland and the Baltic States and 4% in other EU countries. So Sweden needs to issue €4.9 bn of bonds, Denmark €4.3 bn, Finland €3.5 bn, Norway €2.4 bn and certain other EU countries €0.8 bn. The respective annual costs to service the bond issue are €0.86 bn for Sweden, €0.75 bn for Denmark, €0.61 bn for Finland, €0.42 bn for Norway and €0.14 bn for the other EU countries.

[8] An issue for discussion is whether assets are a good proxy for the presence of banks in the UK. The London operations of the major banks are primarily wholesale. This should make no difference when measuring the contagious effects. But the real effects can be overstated as they are more related to banks' retail than wholesale operations.

[9] As only European countries join the burden sharing, the asset key needs to be rebased to the European part (h+e). The rebased home part (h*100/(h+e)) and the rebased rest of Europe part (e*100/(h+e)) then add up to 100 per cent.

To rescue HSBC, the involved countries need to issue €74.1 bn of bonds. HSBC has 32% of its assets in the UK and only 11% in the rest of Europe. France accounts for 5% of the assets in the rest of Europe. So the UK needs to issue €54.8 bn of bonds, France €8.2 bn and certain other EU countries €11.1 bn. The respective annual costs to service the bond issue are €9.59 bn for the UK, €1.44 bn for France and €1.94 bn for the other EU countries.

An important technical issue is gaming on the key. A country may have an incentive to put pressure on a faltering bank to move assets cross-border or off-balance (securitisation) to reduce its share in any such burden sharing. To prevent last-minute asset movements at the onset of banking problems, we would propose to use the last audited (and published) figures on assets. Moreover, securitisation does not pose a problem if it is properly done (i.e. the risk has really gone from the balance sheet in line with the Basle II rules on securitisation).

Finally, there are some concerns surrounding both mechanisms. First, there is a concern with foreign banks in small countries. What if the bank is systemic in the host country, but not in the home country? The bank might then not be rescued. This could be a problem for the new Member States in particular. To alleviate this problem, the key could be made a function of the assets of the problem bank in a country and the assets of the problem bank in that country divided by the total assets of that country's banking system. The small countries would then shoulder a larger share of the burden and have an, accordingly, larger share in the vote. However, the, mostly West-European, parent banks of the subsidiary banks in Eastern Europe are often large retail banks that are also systemic in the home country.

Finally, there are some concerns surrounding both mechanisms. First, there is a concern with foreign banks in small countries.

Second, it could be difficult to organise burden sharing for truly international banks which have a large part of their business outside Europe. While only a part of the benefit will fall within Europe, the European countries have to pay the full cost. Examples are the Swiss banks (UBS and SBC) and HSBC (see box 2). Moreover, such mechanisms fail to address crisis problems caused by the failures of banks headquartered outside Europe, e.g. in the Americas, Asia or Australia. That said, the specific approach to burden sharing could be undertaken for any international group, not just within the EU. Indeed, the wider the set of countries involved, the better. There would be nothing, in principle, to stop such cross-border burden sharing arrangements being extended beyond the EU to encompass the USA, Australia, Japan, and other willing countries.

Second, it could be difficult to organise burden sharing for truly international banks which have a large part of their business outside Europe.

It should be noted, however, that a legal basis is needed to create binding *ex ante* burden sharing arrangements. We believe that Memoranda of Understanding (MoUs), which are often used between national supervisors (and central banks), will not be sufficient because

It should be noted that a legal basis is needed to create binding ex ante burden sharing arrangements.

MoUs (soft law) are not enforceable. A legal basis (hard law) can be readily provided within the EU (the legal instruments and the institutional framework to negotiate and enforce such instruments are available). Legally binding arrangements beyond the EU (i.e. a full international Treaty) may be much more difficult to get agreed, signed and enforced. An example of legally binding burden sharing in the European context is contained in Annex 2. In the 1960s, a number of member countries of the OECD Nuclear Energy Agency agreed the Paris Convention and the Brussels Supplementary Convention to share the liability costs in case of a nuclear incident.

4. Decision-making framework

The guiding principle for decision-making on crisis management is "he who pays the piper calls the tune" (Goodhart and Schoenmaker, 1995). So long as recapitalisations are organised on a national basis, the national governments will normally want to oversee and undertake the function of supervision. That is the current set-up for financial supervision and crisis management, which are nationally organised. As there is no fiscal back-up to the ECB, the ECB is happy to let the NCBs take the lead on lender of last resort operations.

We now move to the question of how a possible European framework for crisis management might work.

We now move to the question of how a possible European framework for crisis management might work. The first step is that supervisors provide information on the severity of problems at banks in difficulties. This input can, for example, be organised through the Committee of European Banking Supervisors (CEBS), the new level 3 banking committee of the EU, or the Basle Committee on Banking Supervision. The former is more likely, as the latter only involves G-10 countries and leaves out non G-10 countries in the EU. CEBS is chaired by one of its members and has a secretariat in London. Teleconference facilities could be used for swiftly assembling information on banking problems. Gathering information to establish the size of the problem bank(s)'s loss should not be a problem. On the one hand, supervisors may have an incentive to underestimate the problem, because of the insurance through the burden sharing scheme (the smaller the loss, the larger the possibility of a rescue). On the other hand, supervisors (like any authority involved in crisis management) may have an incentive to overstate the problem. This is an example of disaster myopia (Guttentag and Herring, 1986). The bias can go either way, but we do not believe it is serious.

The second step is a possible rescue of banks in difficulties. The ECB could provide a proposal whether, or not, to undertake lender of last resort or recapitalisation actions. If out-countries have joined the burden

sharing system, the General Council of the ECB would be the appropriate decision-making body. The ECB's teleconference facilities could be used if needed. If there is a no-vote, national countries could do their own thing.

The third and final step would be that politicians (representing taxpayers) decide on the use of public funds. The key committee to prepare decisions is the Economic and Financial Committee (EFC) in which ministries of finance are represented. The Ministers of Finance in Ecofin would take the ultimate decision. This would, in effect, be the international counterpart of the tripartite decision-making systems (comprising supervisor (FSA), Central Bank and Ministry of Finance), now being established in several individual countries, e.g. the UK.

The European Commission should be involved in such decision-making. DG Internal Market is responsible for the internal market in financial services, while DG Competition is the relevant authority to check on the proper application of EU rules on state aid.

How many parties would be involved in the decision-making? The exact number would be determined by the model. In the general fund mechanism, the supervisors, central banks and ministries of finance of all EU countries (that join the loss-sharing) take part in the decision-making as well as CEBS, the ECB, Ecofin and the European Commission. This is up to 3*25 + 4 parties. In the specific burden sharing mechanism, only the *n* countries involved join the decision-making circle together with the European bodies. This is 3*n* + 4 parties (Goodhart, 2003). To enhance decision-making efficiency, a *de minimis* rule could be applied. For example, countries with less than 5% of the problem bank's assets do not come to the crisis management meeting, unless their small share of the bank's assets is large nationally, e.g. more than 15% of their overall national banking system (as in the case of Nordea in Estonia).

An organisational issue is how the involved countries meet: in an ad-hoc manner or in a fixed format?

An organisational issue is whether the involved countries meet, if and when needed, in an ad-hoc manner or in a fixed format? An example of ad-hoc meetings is the creation of interest groups. The countries that are relevant for each bank are identified. The supervisors, central banks and treasuries of those countries decide among themselves how to organise the meeting. The European framework would provide a fixed format. Given the growing number of pan-European banks, we do not believe it would be efficient to organise each case separately. The fixed format would allow for the inclusion of the relevant European bodies as well as the involved countries. The European bodies can then ensure that the rules of the game (see below) are properly applied.

Again, there are some technical issues. First, a crisis develops rapidly. So the chairman and the secretariat of the relevant committees and bodies have a prime role. Depending on the efficient organisation of the

committee or body (a teleconference can be organised at short notice, etc.), the members can influence the decision. Second, what are the dynamics of the decision-making? CEBS prepares a memo that states the problems at one or more banks. It is sent to the ECB with a copy to relevant members of Ecofin, so they can start to prepare. The ECB (not the European Commission) makes the proposal, if needed, within a few hours/half a day, because this requires financial stability experts. Third, how to vote? CEBS and the ECB can follow their own rules. The vote on the use of public money in Ecofin is different. In the general fund case, the vote will often be 'no' when banks pose problems in just a few countries.[10] In the specific sharing case, only countries involved subject to the *de minimis* rule vote. That can be done by simple majority voting with equal votes for everybody. The choice of voting scheme is a political, not an economic, issue.

What are the rules of the game? There is a precedent in European history for speedy confidential decision-making by many international players. In the former European Monetary System, confidential decision-making on realignments took place over the weekend by ministers of finance, central bankers and the European Commission. The rules of procedure of that committee, including the decision-making rule, could serve as a starting point for thinking about the development of a European structure for crisis management (Kremers, Schoenmaker and Wierts, 2001). More specifically, there should be a rule distinguishing cross-border crises with European burden sharing from national crises with no burden sharing. We note that burden sharing on a cross-border basis will assist cross-border mergers, as national authorities can also share the problems. In the design of the rules, proper attention should be paid to the incentives of all involved parties.

Finally, the recapitalisation we envisage would involve sacking the pre-existing management and writing down shareholder value to zero. This represents, in effect, temporary nationalisation. Somebody then has to appoint, and monitor, a new management team. We envisage that this task should normally be delegated to the authorities in the home country, subject to accountability, including annual reports to all those involved in such burden sharing. Those reports should also include estimates of likely time, and method, for re-sale to the private sector, i.e. exit. Such reports could then be debated by the same groups as initiated the recapitalisation.

[10] Some US academics would say that is no problem, as it will lead to fewer recapitalisations.

5. Conclusions

Our concern is simple and straightforward. We doubt whether, in the event of the failure of a large, integrated, cross-European bank, the home country supervisors, politicians and taxpayers would be prepared to meet the costs of recapitalising such a bank in its entirety. While depositors would be protected, up to a point, by national deposit insurance, the bank itself, perhaps outside its own country, would then probably be forced to close, and be liquidated. Such abrupt closure could cause widespread concern, possible panic, and systemic effects.

While we would not want to prejudge whether closure might, or might not, be preferable to recapitalisation, we feel reasonably sure that it would not be possible to bargain internationally over burden sharing after the event, *ex post* (see also Freixas, 2003). It would not work. If pan-European burden sharing, to allow for cross-border recapitalisation, is to be made possible, it would have to be on the basis of agreed *ex ante* rules.

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We have therefore explored two alternative sets of *ex ante* burden sharing mechanisms. The first is a general mechanism, based on the use of seigniorage funds. While this has some attractive smoothing properties, it runs into problems of causing cross-border fiscal transfers, and adverse selection, moral hazard and free-rider concerns. The other alternative is a specific burden sharing mechanism. This has somewhat fewer problems, but might cause particular problems for the UK. There would also be a number of technical problems, e.g. of preventing 'gaming'.

For its implementation, any such international, *ex ante*, burden sharing system would, unfortunately, require a complex, and somewhat unwieldy, decision-making process. We have outlined how this might work. But if it were established in advance, simulated 'war-games' could be undertaken to try to iron out complications, so that a real crisis could be handled more expeditiously. Again we emphasise that *ex post* improvisation will not work. To be effective, any cross-border rescue mechanism should be established *ex ante*. Any decision to move to any such European arrangement, and the choice of a particular mechanism for burden sharing, would, of course, be determined politically.

For its implementation, any such international, ex ante, burden sharing system would, unfortunately, require a complex, and somewhat unwieldy, decision-making process.

Of course, if the whole exercise, involving supervision, lender of last resort, and recapitalisation, could be handled at the central EU level, then much of the above complexity could be avoided. But it cannot; recapitalisation, and sometimes lender of last resort, need fiscal back-up, and no central fiscal competence is available for this purpose. Hence both LoLR and recapitalisation have to be supported by national Treasuries, with federal bodies playing, at best, a co-ordinating role.

Fiscal and supervisory arrangements are inter-related and should move in tandem, if at all.

With the ongoing integration of European financial markets, symbolised by the emergence of pan-European banks, there may be a future need for European arrangements for financial supervision and stability. We have argued that fiscal and supervisory arrangements are inter-related and should move in tandem, if at all.

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Annex 1 Country keys

Table A.1 contains several keys that can be used to share the costs in the event of a general burden sharing mechanism for a banking crisis. The ECB capital key for a country is the arithmetic average of a country's share in total GDP and its share in total population. The ECB capital key is used to share the monetary income (seigniorage) of the ECB. The GDP key is a country's share in total GDP. GDP reflects the wealth of a country and is an indirect indicator of the size of a country's financial system. The assets key is total assets of credit institutions (banks) in a country divided by total assets of EU-25 credit institutions. The banking assets key is a direct indicator of the size of a country's banking system.

TABLE A.1. COUNTRY KEYS (IN %; 2004 FIGURES)

Country	ECB capital key	GDP	Assets
Austria	2.1	2.3	2.2
Belgium	2.6	2.7	3.2
Cyprus	0.1	0.1	0.1
Czech Republic	1.5	0.8	0.3
Denmark	1.6	1.9	2.1
Estonia	0.2	0.1	0.0
Finland	1.3	1.4	0.7
France	14.9	15.9	15.2
Germany	21.1	21.4	22.7
Greece	1.9	1.6	0.8
Hungary	1.4	0.8	0.2
Ireland	0.9	1.4	2.5
Italy	13.1	13.0	7.8
Latvia	0.3	0.1	0.0
Lithuania	0.4	0.2	0.0
Luxembourg	0.2	0.2	2.4
Malta	0.1	0.0	0.1
Netherlands	4.0	4.7	5.8
Poland	5.1	1.9	0.5
Portugal	1.8	1.4	1.2
Slovenia	0.3	0.3	0.1
Slovakia	0.7	0.3	0.1
Spain	7.8	8.1	5.9
Sweden	2.4	2.7	2.0
United Kingdom	14.4	16.6	24.0
Total EU-25	**100**	**100**	**100**

Source: Website ECB (www.ecb.int) for ECB capital key; EU Banking Structures, ECB (2005) for GDP and Assets.

Annex 2 Burden sharing after a nuclear incident

This annex provides an example of international burden sharing in the event of a nuclear incident. A general mechanism is applied to share the burden. This example is interesting for two reasons. First, the geographical scope of damage caused by nuclear accidents is not confined to national boundaries. The meltdown of the Chernobyl reactor in 1986 is a clear example of an incident with severe consequences both in the former Soviet Union and in other countries. The pure form of externalities in nuclear incidents (partly) explains the choice of a general mechanism. Second, the Paris Convention and the Brussels Supplementary Convention are legally binding arrangements. The Conventions provide for a Tribunal to settle disputes amongst member countries.

A significant number of member countries of the OECD Nuclear Energy Agency are party to the Paris Convention on Third Party Liability in the Field of Nuclear Energy, established in 1960, and to the Brussels Convention Supplementary to the Paris Convention, established in 1963. These Conventions arrange the amount of compensation for damage which might result from an incident in a nuclear installation used for peaceful purposes. After the most recent update in 2004, the scheme works as follows:

1. Liability up to € 700 million rests on the operator of a reactor (i.e. a nuclear installation). The operator is required to insure his liability (Paris Convention);
2. Liability from € 700 up to 1200 million rests on the country in whose territory the liable reactor is situated (Brussels Supplementary Convention);
3. Liability from € 1200 up to 1500 million is shared among all participating countries (Brussels Supplementary Convention).

The third tier is international burden sharing. The Brussels Supplementary Convention is basically a West-European Treaty administered by the OECD. The contracting parties are 13 European countries: the former EU-15 countries (except for Austria, Greece, Ireland, Luxemburg and Portugal), Norway, Slovenia (the first East-European country to join) and Switzerland (to be a party soon). The burden sharing arrangement is an example of general burden sharing. The burden sharing key was originally based for 50% on a country's share in total GDP and for 50% on a country's thermal power of reactors in its territories as a ratio of total thermal power of reactors in all participating countries. In 2004 the key was renegotiated to 35% related to GDP and 65% related to thermal power. The

burden sharing mechanism has not been invoked since its inception in the 1960s.

Article 17 of the Brussels Supplementary Convention provides for the settlement of disputes between member countries. After bilateral consultations (6 months) and multilateral consultations (a further 3 months) between member countries, the dispute can be submitted to the European Nuclear Energy Tribunal.