BURDEN SHARING FOR CROSS-BORDER BANKS

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1 Introduction

The Single Market in banking has promoted the development of cross-border banking within Europe. While regulation has been moved to the European level (through EU Directives and Regulations), the institutional framework for supervision and resolution of banks is still predominantly at the national level. The recent financial crisis indicates that the current situation is not stable. Home countries ignore cross-border externalities when dealing with a failing bank. We need either to move to more Europe, or to less Europe [Turner (2009), Schoenmaker (2010a)]. In the first case, supervision and resolution would also be transferred to the European level. In the second case, the home country principle, which allows cross-border services or branches within the EU from the home country without host supervision, would de *facto* be abandoned. This could be done by (implicitly) requesting to put major cross-border operations in subsidiaries which are separately supervised by the host country. Some supervisors are already moving towards this route.

The debate on the institutional framework has focused so far on the supervisory side. De Larosière (2009) has proposed a European System of Financial Supervisors, with three sectoral European Supervisory Authorities at the centre. These proposals set some useful steps towards European supervision, but the supervisory mandate remains predominantly at the national level. In this article, we argue that we should focus on the end-game of resolution. So, we first need adequate European arrangements for resolution of cross-border banks, before we can move to full European financial supervision. A European resolution regime would ensure that cross-border externalities are taken into account.

The aim of this article is to explore burden sharing mechanisms that can help to recapitalise ailing cross-border banks. Burden sharing would be the centre-piece of a European resolution framework. To be clear, private sector solutions to deal with ailing banks are the preferred route. Only when the systemic impact of the failure of a large cross-border bank would exceed the cost of recapitalisation, burden sharing should be considered. Following Goodhart and Schoenmaker (2006, 2009), we explore different *ex ante* burden sharing mechanisms to overcome the co-ordination failure of national authorities. The first is a general scheme financed collectively by the participating countries (generic burden sharing). The second relates the burden to the location of the assets of the bank to be recapitalised (specific burden sharing). The working of the two mechanisms is calibrated with data on large cross-border banks in Europe. As the costs and benefits are better aligned in the specific scheme, the latter is better able to overcome the co-ordination failure.

Moving from theory to practical politics, a proposal for burden sharing could be incorporated in the resolution plan of Living Wills. The Living Will is a new concept to deal with too-big-to-fail and consists of a recovery and resolution plan to be used when a bank may get into difficulties. Living Wills may thus enable specific burden sharing institution by institution.

This article is organised as follows. In section 2, we examine the scope for cross-border externalities. Section 3 analyses different mechanisms for burden sharing. Section 4 discusses the political economy of burden sharing. Finally, section 5 concludes.

2 Cross-border externalities

The (potential) failure of a bank can have negative externalities by affecting other banks or the economy at large. There are several reasons for such externalities [Brunnermeier et al (2009)].

The first is the direct exposure channel. This refers to "domino effect" resulting from exposures among financial institutions in interbank markets, derivative markets and payment systems. Financial institutions are interconnected through these markets and systems. Because of these related exposures, the failure of one or more financial institutions can cause other financial institutions to fail, and thereby the whole financial system to be shocked. These effects also exists cross-border. Allen and Gale (2000), for example, incorporate the role of the interbank market in a contagion model by focusing on the physical exposures among banks in different regions and the real linkages between regions. They show how interconnections can lead to contagion.

The second externality arises from information asymmetries and can be called the pure information contagion channel. This channel relates to contagious withdrawals when depositors are imperfectly informed about the type of shocks hitting financial institutions (idiosyncratic or systematic). Particular in the context of banks that are funded with short term liabilities, the failure of a single institution can easily trigger such a chain reaction. If an institution fails, this may give albeit noisy signal that the solvency of similar financial institutions maybe in question. After the failure of Lehman Brothers, for example, the solvency of many other US investment banks was questioned. This triggers a run or flight to safety from such financial institutions, even when they themselves are not at increased risk of failure. When the failure of a bank is clearly perceived to be idiosyncratic (e.g. BCCI[1] or Barings), there is no wider contagion. Again, these effects can occur on a cross-border basis and also involve flights from countries perceived to be at risk.

The third is the fire-sale of assets, as also happened in the 2007-2009 financial crisis. A real shock, such as the downturn in the US housing market in 2006, or a financial shock, such as an increase in interest rates, may lead to an initial decline in asset values. When financial institutions are highly leveraged or face liquidity problem, a decline in asset values may force individual financial institutions to sell such assets. The initial sale of assets can turn into a liquidity spiral [Brunnermeier and Pedersen (2009)]. A liquidity spiral is an internal amplifying process, whereby falling asset prices financial institutions to sell more (deleveraging), which further drives down asset prices and worsens financial institutions' balance sheets and net worth. The vicious spiral may ultimately drive prices down well-below fundamental value, when left unchecked.

Externalities are spill-over effects which markets cannot solve. When assessing the private costs of a bank failure, market participants do not look at the wider impact on the financial system through the exposure or information channels. Moreover, market dynamics may be at the root of the externality. While selling an asset when perceived risk increases may be a prudent response for an individual financial institution, it may cause a collapse in the asset price if many institutions act in this way. The governments can incorporate these externalities in their actions and decision-making. On the basis of an overall welfare calculation, authorities can decide whether intervention in a financial institution is socially optimal (financial stability benefits exceed the total costs) or not. The challenge governments face is that they do not want to undermine market discipline by intervening unnecessarily. Private sector solutions to systemic problems are the preferred route. Only when externalities arise that make that the alternative worse, should public intervention be considered. And even then, governments should retain market discipline as much as possible. When a possible (partial or full) rescue is contemplated, shareholders and unsecured creditors, for example, should share the burden and lose their money first.

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1. Nevertheless, BCCI might have had some contagion in the so-called "ethnic bank" crisis in the UK.

GEOGRAPHICAL SPREAD OF ACTIVITIES FOR TOP 60 BANKS (2005 FIGURES) TABLE 1

	HOME COUNTRY: *h*	FOREIGN COUNTRIES: *f*
American banks	78%	22%
Asian-Pacific banks	86%	14%
European banks	53%	47%

SOURCE: Schoenmaker and Van Laecke (2007).

2.1 CROSS-BORDER EXTERNALITIES

How in a world with cross-border financial activities are externalities addressed? A starting point would be that national authorities by mandate, accountability or otherwise, place priority on domestic objectives [Herring (2007); Schoenmaker (2010b)]. Examples of such domestic objectives are safeguarding the domestic financial system, protecting the domestic financial system, and minimising the fiscal costs of recapitalisation or insolvency to domestic taxpayers. Guided by these objectives, national authorities typically only take externalities in their own national financial system into account in their decision-making, with cross-border externalities largely ignored [Schoenmaker and Oosterloo (2005)]. This leads to globally inefficient outcomes.

Considering the case of a bank recapitalisation and applying game theory, several authors have modeled the causes of these externalities in a multi-country setting [e.g., Freixas (2003), Schinasi (2007), and Goodhart and Schoenmaker (2009)]. In these models, the decision rule is that it is only socially optimal to recapitalise a failing bank when the benefits of preserving financial stability exceed the costs of recapitalisation; otherwise the bank should be put into liquidation. In a single country setting, national authorities make this welfare calculation and accordingly reach the first best solution. But in a multi-country setting, this decision rule can result in an undersupply of recapitalisations of banks in difficulties, as national authorities have an incentive to play down their share in potential recapitalisation. As the home country has typically the largest stake in the game, the game is reduced to a decision for the home country either to rescue a failing bank as a whole on its own, or to let it fail.[2] The externalities in the home country only are thus weighed against the total cost of recapitalisation, resulting in an undersupply of recapitalisations. There is in essence a free-rider effect in the production of the global public good of financial stability.

2.2 EMPIRICAL ASSESSMENT

The scope for coordination failure depends on the intensity of cross-border activities. How integrated is the banking system? There are several indicators to measure the spread of banking activities over different countries (Sullivan, 1994). An often used indicator is the Transnationality Index (TNI), 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. TNI reflects a bank's foreign business *(f).* The remainder is a bank's business in the home country *(h).* Schoenmaker and Van Laecke (2007) report the TNI for the largest 60 banks using 2005 figures.

Table 1 indicates that American and Asian-Pacific banks are primarily domestically oriented *($h \approx 0.8$).* The degree of financial integration is limited. So, international coordination failure is less of an issue for American and Asian-Pacific countries. By contrast, the cross-border penetration of the European banks is close to 50% *($f \approx 0.5$).* These data suggest that the Euro-

2. That is what happened, for example, in Lehman failure. While Lehman had many foreign operations, including a large operation in the UK, the US authorities resolved Lehman on domestic grounds. In that context, the Federal Reserve Bank of New York provided liquidity to the US broker-dealer (LBI) in order to effect an orderly wind-down outside of bankruptcy, but not for the foreign parts which had to file immediately for bankruptcy (Basel Committee of Banking Supervision, 2010).

pean level of integration may lead to coordination failure among European countries. While the Single Market in banking has promoted cross-border banking, national member states are still responsible for crisis resolution. The institutional framework for bank resolution has thus not kept pace with banking integration. By contrast, in the US, banks can be chartered at the federal level and also be resolved at the federal level.

3 European coordination: burden sharing

Goodhart and Schoenmaker (2006; 2009) explore *ex ante* mechanisms for burden sharing in Europe to overcome the co-ordination failure in *ex post* negotiations. Some would argue that crisis management arrangements for lender of last resort and solvency support should not be specified in advance to counter moral hazard. 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 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 ministry of finance and central bank bear the financial risk of support operations, if any, and therefore decide on these operations. Clarity at the European level how to share the costs among treasuries and central banks in the case of the failure of a European bank does not increase moral hazard compared to the national level in the case of the failure of a domestic bank. So we propose full transparency on crisis management arrangements (the "how" question), but constructive ambiguity on the application of these arrangements (the "whether" question).

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

1 General fund to shoulder the burden, set up by the European Central Bank (ECB) or the European Investment Bank (EIB). 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 some European banks. As small- and medium-sized banks tend to be predominantly domestically oriented, we focus on the cross-border activities of large banking groups. To calibrate the numerical examples, table 2 provides some details on the 25 largest banks in Europe. The assets of this top 25 range from € 400 to 2,500 bn. The average minimum capital requirement (calculated as Tier 1 capital - the regulatory minimum of 4% of risk weighted assets) of this group of large banks is € 28.7 bn. These banks conduct on average 57 percent of their business at home *(h ≈ 0.57),* 25 percent in the rest of Europe *(e ≈ 0.25),* and 18 percent in the rest of the world *(w ≈ 0.18).*

3.1 GENERAL FUND

In the first general mechanism, a European fund could be set up to shoulder the burden of a recapitalisation. The EU countries could use the European Central Bank (ECB) or the European Investment Bank (EIB)[3] to set up a general fund. There is no need to have a pre-funded

3. The ECB could then be used in General Council format, in which all EU Member States participate. For the EIB, the EU Member States are the shareholders, and thus the owners, of the EIB.

TOP 25 EUROPEAN BANKS (2008 FIGURES) TABLE 2

BANK (COUNTRY)	MIN CAPITAL	ASSETS		
	IN € BN	IN € BN	*h* (%)	*e* (%)
1 Royal Bank of Scotland (UK)	70.7	2430.2	54	16
2 Deutsche Bank (Germany) (a)	30.1	2127.8	18	47
3 Barclays Bank (UK)	37.7	2077.4	32	23
4 BNP Paris (France)	40.4	2005.3	59	21
5 HSBC (UK)	66.2	1678.5	36	13
6 Crédit Agricole (France)	49.8	1554.5	75	13
7 UBS (Switzerland)	21.8	1315.0	11	40
8 ING Bank (Netherlands)	31.0	1286.5	40	33
9 Société Générale (France)	29.3	1091.7	71	14
10 Santander Central Hispano (Spain)	45.3	1014.1	36	47
11 UniCredit (Italy)	33.0	1010.2	38	46
12 Credit Suisse (Switzerland)	22.4	763.8	15	28
13 HBOS (UK)	20.0	698.2	80	10
14 Dexia (Belgium)	15.5	629.0	44	40
15 Intesa Sanpaolo (Italy)	26.2	614.6	85	12
16 Commerzbank (Germany)	21.7	604.0	73	21
17 Rabobank (Netherlands)	29.4	591.4	70	15
18 Crédit Mutuel (France)	24.7	562.0	87	8
19 Banco Bilbao Vizcaya Argentaria (Spain)	21.6	524.3	70	2
20 Danske Bank (Denmark)	11.6	465.5	67	33
21 Nordea Group (Sweden)	15.2	458.0	26	74
22 Lloyds TSB Group (UK)	13.9	441.2	97	2
23 Landesbank Baden-Württemberg (Germany)	11.8	432.7	100	0
24 Bayerische Landesbank (Germany)	10.9	407.4	79	21
25 Groupe Banques Populaires (France)	17.1	389.9	88	6
Average top 25 banks	28.7	1006.9	57	25

SOURCE: Updated from Schoenmaker and Oosterloo (2005).

Notes: Banks are ranked according to assets (as of year-end 2008). Minimum capital is Tier 1 capital (as of year-end 2008). 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 (denoted by *w;* figures not shown). The three categories add up to 100%.
a. 2006 figures.

(ex ante) fund, if receipts are nationally invested (Ricardian equivalence), since this would just raise the measured fiscal deficit, while changing nothing real. During a crisis, bonds are issued by the ECB or the EIB 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 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 amortisation of losses. Each participating country *j* would pay into the fund, as and when needed, according to a relative key *(k):* $k_j = g_j$. We propose to apply a GDP based key *(g),* which measures a country's relative share in total GDP. GDP reflects the size of a country's economy and is an indirect indicator of a country's

GENERAL BURDEN SHARING FOR GREECE

BOX 1

The Greek tragedy seems to have reached its climax on 25 March 2010. In a historical declaration, Euro-area leaders have agreed to a package of IMF assistance and euro-area burden sharing. The politics of the deal are quite clear. Euro-area governments have not been able to discipline one of their peers. By insisting on an intergovernmental approach of gentle peer pressure, euro-area leaders keep on having difficulties enforcing fiscal discipline in Greece. Ultimately there was no way out and Europe was forced to invite the IMF with its famous conditionality. To limit moral hazard, bail-out support should only be given under severe restrictions. An alternative to IMF conditionality would have been vesting supranational powers in the European Commission. But euro-area leaders have shied away from such fiscal discipline from the Commission. Not least because they could find themselves one day at the receiving end. The political union is thus still in the making.

Next, as the credibility of the Euro is at stake, euro-area leaders have chosen solidarity with Greece. They have agreed to a general form of burden sharing based on the ECB capital key. Back in 2006, Goodhart and Schoenmaker (2006) did some exploratory work on burden sharing in a banking crisis, not yet thinking of a government crisis. One of their main proposals was to use the ECB capital key. That seemed sensible. In good times, the capital key is used to share the benefits of monetary union, the seignorage. In bad times, the same key is used to share the (potential) costs of keeping the monetary union together. Europe has thus shown that they can achieve solidarity.

Finally, how is the burden sharing key calculated? 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 current ECB capital key is given in the Appendix. First, the ECB capital key *(c)* needs to be debased from the full set of 27 EU member countries to the 16 euro area members. In addition Greece needs to be excluded. The contribution of each EMU member state is then: $c_j / \sum_j c_j$ (*j* is EMU member countries with the exception of Greece). The resulting key for Greece's burden sharing is given in the accompanying table.

BURDEN SHARING KEY FOR GREECE

	COUNTRY	KEY (in %)		COUNTRY	KEY (in %)
1	Austria	2.8	9	Italy	18.4
2	Belgium	3.5	10	Luxembourg	0.3
3	Cyprus	0.1	11	Malta	0.1
4	Finland	1.9	12	Netherlands	5.9
5	France	20.9	13	Portugal	2.7
6	Germany	27.9	14	Slovakia	1.0
7	Greece	—	15	Slovenia	0.4
8	Ireland	1.6	16	Spain	12.2
				Total euro area-16	100.0

financial system. Alternatively, the ECB capital key *(c)* can be used when applying the ECB route (see the Appendix for the general keys). Although we discuss burden sharing for ailing banks, burden sharing has also been used for a rescue package of loans to Greece. Box 1 illustrates the application of general burden sharing to Greece. The share for Spain is 12.2%.

3.1.1 Numerical example

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 *i.* We make the following assumptions:

1 $L_i = 1.5 * E_i$. There is a large loss (L_i). Equity is wiped out and there is negative equity of half of the regulatory minimum capital (E_i). Adequate recapitalisation requires the restoration of the minimum capital requirement;

2 $W_i = 0.75 * E_i$. In a worst case scenario, the write down (W_i) is the full negative equity with a margin of one-fourth of minimum capital. The 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 to sell it back to the private sector);

3 i = 5%. Annual interest is 5%;

4 E_i = 28.7 bn. The regulatory minimum capital requirement of a "representative" European bank is € 28.7 bn (average of top 25 banks in table 2);

5 All EU countries join the general fund.

The ECB/EIB needs to issue € 43.1 bn of bonds to recover the negative equity of € 14.4 bn and to restore minimum capital of € 28.7 bn. The annual interest payment on the bonds is € 2.2 bn. The sinking fund for write down is € 21.5 bn. The annual write down is € 5.4 bn. These amounts add to a total annual cost for countries of € 7.6 bn. Countries that join the burden sharing scheme pay this amount according to the GDP key (g_j) as specified in table A.1 (see the Appendix). The annual contribution is, for example, € 1.5 bn $(k_j$ = 20.0%) for Germany and € 0.7 bn $(k_j$ = 8.8%) for Spain.

This numerical example illustrates that the recapitalisation of a "typical" large European bank appears to need a general fund of € 43.1 bn. The servicing of this general fund results in an annual cost of € 7.6 bn. The contribution of individual countries to the annual cost ranges from € 1.5 bn for Germany to € 0.008 bn for countries such as Cyprus and Malta.

3.2 SPECIFIC SHARING

In the second mechanism, only countries in which the failing bank is present share in the burden. 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. 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 aim is mitigating the effects on the real economy. The second is mitigating the impact on the wider financial system (contagion). We do not include a third objective of helping depositors. There is already mandatory deposit insurance in the EU to take care of depositors. A good proxy for the real and contagious effects of the failure of bank i is assets (a): $k_{ij} = a_{ij} / (h_i + e_i)$. Note that as only European countries join the burden sharing, the key needs to be rebased to the European part $(h_i + e_i)$ of the assets of bank i (a_{ij}). On the real side, assets (including loans) reflect the credit capacity of a bank. The availability of credit will be disrupted in case of a failure (Gale, 1993). On the contagion side, assets reflect the size of a bank. The contagious impact is (partly) related to the size of a failing bank. We have calculated how the assets of the top 25 European banks are allocated between the home market (h_i), the rest of Europe (e_i), and the rest of the world (w_i) for each bank i. While these three categories add up to 100%, we only show the home market and the rest of Europe shares in table 2.

3.2.1 Numerical examples

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 i 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 $L_i = 1.5 * E_i$. There is a large loss (L_i). Equity is wiped out and there is negative equity of half of the regulatory minimum capital (E_i). Adequate recapitalisation requires the restoration of the minimum capital requirement;

2 $W_i = 0.75 * E_i$. In a worst case scenario, the write down (W_i) is the full negative equity with a margin of one-fourth of minimum capital. The 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 to sell it back to the private sector);

3 i = 5%. Annual interest is 5%;

4 All EU countries join the specific burden sharing program.

The involved countries need to issue € 45.2 bn of bonds to rescue Deutsche Bank (E_i = 30.1 bn). The burden is shared according to the asset key: $a_{ij} / (h_i + e_i)$. The specific geographic distribution of Deutsche Bank's assets (in table 1) is used to calculate the respective shares of the countries. Deutsche has 18% of its assets in Germany and 47% of its assets in the rest of Europe. The United Kingdom accounts for over half of assets in the rest of Europe; let's say 25%. So Germany needs to issue € 12.6 bn of bonds (k_{ij} = 0.28), the UK € 17.2 bn (k_{ij} = 0.38) and certain other EU countries € 15.4 bn (k_{ij} = 0.34). The respective annual costs to service (interest and write down) their bond issue are € 2.2 bn for Germany, € 3.0 bn for the UK and € 2.7 bn for the other EU countries.

The involved countries need to issue € 22.8 bn of bonds to rescue Nordea (E_i = 15.2 bn). Nordea has 26% of its assets in Sweden and 74% of the its assets in the rest of Europe. The rest of Europe is divided in 37% in Finland, 23% in Denmark, 10% in Norway[4] and 3% in Poland, Russia and the Baltic States. So Sweden needs to issue € 5.9 bn of bonds (k_{ij} = 0.26), Finland € 8.5 bn (k_{ij} = 0.37), Denmark € 5.4 bn (k_{ij} = 0.23), Norway € 2.3 bn (k_{ij} = 0.10) and the other countries € 0.7 bn (k_{ij} = 0.03). The respective annual costs to service its bond issue are € 1.0 bn for Sweden, € 1.5 bn for Finland, € 0.9 bn for Denmark, € 0.4 bn for Norway and € 0.1 bn for the other countries.

The involved countries need to issue € 99.3 bn of bonds to rescue HSBC (E_i = 66.2 bn). HSBC has 36% of its assets in the UK and only 15% of the its assets in the rest of Europe. France counts for 13% of assets in the rest of Europe. So the UK needs to issue € 70.1 bn of bonds (k_{ij} = 0.71), France € 25.3 bn (k_{ij} = 0.25) and certain other EU countries € 3.9 bn (k_{ij} = 0.04). The respective annual costs to service its bond issue are € 12.3 bn for the UK, € 4.4 bn for France and € 0.7 bn for the other EU countries.

Summing up, it appears that in the case of the Scandinavian bank, Nordea, the costs are shared almost equally by the four Scandinavian countries, Denmark, Finland, Norway and Sweden. This is a clear example of a regional distribution of the burden. The costs of rescuing a pan-European bank, such as Deutsche Bank, is spread over Europe with large contributions by the home country, Germany (28%), and Europe's financial centre, London, in the United Kingdom (38%). Finally, the burden sharing for the international bank HSBC, headquartered in London, would be difficult. Only half of HSBC's business is in Europe (52% of which 36% in the UK, 13% in France and 2% in other European countries), while these European countries have to shoulder the full burden in a European based specific burden sharing programme.

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. How-

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4. Norway is not a member state of the European Union. For this example, we assume that Norway as member of the European Economic Area joins the specific burden sharing scheme.

ever, 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.

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 Credit Suisse) and HSBC (see table 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.

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 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.

4 Political economy of burden sharing

Which mechanism is better? This is not only an issue of economics but also of political feasibility (Pauly, 2009). The main determinant is the specification of the key for burden sharing. The goal of selecting an appropriate key is to align the benefits and the contribution to the costs as much as possible.

The general fund mechanism is an example of generic burden sharing by countries (proportionate 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. However, we see two major problems with such a general fund mechanism. First, this construction will lead to international transfers between countries (a country may have to contribute its share to a recapitalisation while the problem bank is not operating in its jurisdiction). Countries are politically 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). This is a reflection of the earlier mentioned problem that benefits and costs are not aligned. 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 lessened, supervisory authorities may feel less of an incentive to provide an adequate level of supervisory effort (moral hazard). Countries that do not sign up to burden sharing profit from burden sharing, as the stability of the European financial system is a public good.

An important political advantage of specific sharing arrangements is that there are almost no international transfers. Countries that experience the benefits of the recapitalisation, also pay for the recapitalisation. Provided that 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 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. Countries that do not sign up to burden sharing profit from burden sharing, as the stability of the European financial system is a public good. This would be, in particular, a problem for the United Kingdom. All major banks have a large presence in London. 21% of banking assets in the EU are located in the UK, while the UK's share in the EU economy is far lower at 15% of GDP (see the Appendix). 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 numerical example of Deutsche Bank. But, at the same time, the UK might also experience sizeable stability benefits from pre-arranged recapitalisations.[5]

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 various ways of measuring assets, for example, risk-weighted assets or not, and historic cost or market value. At this early stage in the discussion we would not want to try to be too specific, except to note that, in order to deter gaming, the key should relate to the last pre-crisis set of audited figures, not to post-crisis estimates.

Insofar assets are a good proxy for the real and contagious effects of a bank failure, the specific sharing mechanism will come close to an efficient solution of the co-ordination problem. Countries facing systemic disruption are asked to contribute. They will do so if the stability effects in their country exceed their contribution. The general mechanism will work differently: there need to be a majority of countries that have sufficient benefits. Regional banks (Scandinavia, Benelux) will, for example, never be rescued, because the share of their countries in the vote is too small. Remember that we assume that there is a collective vote of all involved countries: they jointly decide to rescue or to close the bank. Given that most European banks do not have a relatively equal spread over all European countries, the voting in the general scheme will be sub-optimal to the voting in the specific scheme.

Summing up, specific burden sharing is prefered as it offers a more efficient solution to the co-ordination problem of individual banks in difficulties (economics) and does not involve cross-border transfers of taxpayers money (politics). At a later stage, a general mechanism may be considered. When one moves to the mode of a full blown banking crisis, the differences between the mechanisms become less relevant and macro-economic 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 (governments and central banks) will need to stand behind the banks and implicitly or explicitly guarantee their deposits to restore confidence in the financial system. This is the experience of most countries in the 2007-2009 financial crisis, and earlier of the Scandinavian authorities during the 1990s.

A case in point of (implicit) burden sharing during a crisis is the application of the lender of last resort (LOLR) function of the ECB [Schoenmaker (2010b)]. The ECB can act as general LOLR flooding the interbank market with liquidity when needed. Art 18.1 of the Statute of the ESCB

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5. 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 for measuring the contagious effects. But the real effects can be overstated as these effects are more related to retail than to wholesale operations of banks.

provides the basis for this classical central banking tool: "In order to achieve the objectives of the ESCB and to carry out its tasks, the ECB and the national central banks may … conduct credit operations with credit institutions and other market participants, with lending based on adequate collateral". So, the ECB needs to take adequate collateral. During the 2007-2009 financial crisis the ECB has expanded the range of eligible collateral. As the range of collateral expands beyond safe assets such as Treasuries, credit risk increases. The ECB has made a provision of EUR 5.7 billion for the increased credit risk of its general LOLR operations. The national central banks (NCBs) have underwritten this provision according to their capital key in the share capital of the ECB. As each NCB is backed by its own government, the ECB's expansion of collateral rules is implicitly underwritten by the national governments of the euro area.[6]

Moving from theory to practical politics, Avgouleas, Goodhart and Schoenmaker (2010) suggest to incorporate a proposal for burden sharing in the resolution plan of Living Wills. A Living Will is a recovery and resolution plan to be used when a bank may get into difficulties. Living Wills will thus enable specific burden sharing institution by institution. In a well-designed specific burden sharing system, each country's contribution to the costs (i.e. the share in the burden) is aligned with that country's benefits (i.e. the maintenance of financial stability). Countries facing systemic disruption are asked to contribute. They will do so if the stability effects in their country exceed their contribution. To be practical, only the countries from the core supervisory college are involved in the resolution plan. A core supervisory college could for resolution purposes turn into a cross-border stability group containing the supervisors, central banks and ministries of finance from the core countries. Such cross-border stability groups are currently suggested for the EU (European Union, 2008).

As full burden sharing across the EU, or even wider globally, is politically not feasible at this stage, a start could be made among more likeminded countries at the regional level [Dermine and Schoenmaker (2010)]. To illustrate the working of institution by institution burden sharing, Dermine and Schoenmaker (2010) use the equity-to-GDP ratio (based on book value) as an indicator of the unexpected losses that could arise and of the subsequent public bailout costs. Applying this indicator, Sweden faces a potential bailout cost for Nordea of 5.3% of its GDP (2007 figures). Under a burden sharing system of the core countries, the four Nordic countries (Denmark, Finland, Norway, and Sweden) split the bill almost equally (24%, 39%, 11% and 27%; see Table 2). Burden sharing would thus substantially reduce Sweden's share from 5.3% to 1.4% of its GDP.

The preparation of a burden sharing arrangement in a resolution plan strengthens the cohesion in the core supervisory college. As each core country may have to pay up, it has an incentive to make sure that supervision is properly done to minimise the possibility of failure. So the key host supervisors will be induced by their ministries to take fully part in the supervisory college of a particular bank. In that way, the urgency for making a periodic joint assessment of the soundness of this particular bank by all involved supervisors will increase.

4.1 INTEGRATED FRAMEWORK

An integrated framework for financial supervision and financial stability involves three stages: preventive, remedial and resolution. Table 3 presents these stages, in a stylised manner. The presence of various stages already shows that the stages and the different tools in each stage are interrelated and the tools should thus be considered jointly with each other. When designing new European arrangements, policymakers usually work from preventive to resolution. So,

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6. The ECB used the ECB capital key to share the provisions (see Appendix). The ECB capital key is debased to the euro area members. The contribution of each EMU member state is : $c_j / \sum_j c_j$ (j is EMU member countries).

TOOLKIT FOR FINANCIAL SUPERVISION AND STABILITY TABLE 3

		I PREVENTIVE	II REMEDIAL	III RESOLUTION
A	Supervision of individual financial institutions	1 licensing 2 ongoing supervision	1 internal controls 2 management 3 liquidity rules 4 capital requirements (cross-sectional)	1 private sector solution 2 bankruptcy/ restructuring 3 individual LOLR 4 individual capital injection
B	Overall financial stability	1 financial system design 2 financial stability review	1 liquidity charge 2 capital surcharge (longitudinal)	1 general LOLR 2 general capital support

SOURCE: Schoenmaker (2010b).

first supervisory arrangements are addressed. De Larosière Group (2009), for example, proposes a European System of Financial Supervisors, with three new European Supervisory Authorities (ESAs) at the centre. We propose the reverse; we should work backwards from the endgame of resolution (burden sharing). The framework guiding the interventions at the various stages of various actors should be incentive compatible. It is clear analytically, and as confirmed by this and past crises, that incentives to intervene using the various prevention and remedial actions will be driven by the (financial) resources at risk from failing to take proper actions. As such, prevention and remedial actions are closely interrelated with resolution. This analysis helps to decide on how best to design the division of powers in table 3. Goodhart and Schoenmaker (2006) propose a backward-solving approach starting at resolution (the right-hand column in table 3). The guiding principle for decision-making on crisis management is "he who pays the piper calls the tune".

This interrelation also means that the interventions in each stage should be managed at the same geographical level – national or European (Goodhart and Schoenmaker, 2006).[7] That is currently not the case. Table 4 provides the current division of powers in the European Union. The supervisory tools are in the realm of national authorities. Although there is some coordination in the level 3 supervisory committees (CEBS, CEIOPS, CESR), formal powers rest firmly at the national level. The stability tools are more of a mixed bag. Both the ECB and national central banks are active in improving the infrastructure and publishing financial stability reviews. There are no financial stability tools at the remedial stage. This is an important gap in the toolkit, both in Europe and elsewhere. Perotti and Suarez (2009) propose a liquidity charge for liquidity mismatches. Another tool would be a macro-prudential capital surcharge which moves countercyclical. At the resolution stage, there is a split between general LOLR responsibility for the ECB and general capital support by national governments.

What do we conclude from our backward-solving approach? So long as liquidity or capital injections or other forms of (fiscal) burden sharing are organised and paid on a national basis, so long will national governments normally want to oversee and undertake supervision functions.[8] What otherwise is the incentive for a national supervisor to put in sufficient effort, when

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7. Taking a different view, Posen and Véron (2009) argue that the arrangements for supervision and stability can be considered separately. In the European context, Posen and Véron propose to move supervision to the European level, while leaving the more thorny issue of burden sharing aside and thus to keep the core of crisis management (capital support by the government) at the national level. **8.** See, for example, the arrangements in Europe. As there is no fiscal back-up for the European Central Bank (ECB), the ECB is happy to let the national central banks (NCBs) take the lead on individual lender of last resort operations.

CURRENT DIVISION OF POWERS TABLE 4

		I PREVENTIVE	II REMEDIAL	III RESOLUTION
A	Supervision of individual financial institutions	National	National	National
B	Overall financial stability	European/national	None	European (general lolr) National (general capital)

SOURCE: Schoenmaker (2010b).

the costs of failing supervision are shared with other countries? Why would national governments be prepared to support ailing banks, when another European agency has neglected its duty? With the implementation of De Larosière proposals some steps are set towards European supervision. We argue that the final step to full European supervision can only be set after adequate burden sharing arrangements are in place to enable a European resolution approach.

5 *Conclusions*

The management of a banking crisis is always difficult. Decisions, for example to close or to recapitalise an ailing bank, have to be taken under time pressure. Theory suggests that recapitalisation of a failing bank is only efficient if the expected benefits (prevention of a systemic crisis) exceed the costs of a recapitalisation. Crisis management is even more difficult in a cross-border setting, in which various countries have to co-ordinate. Applying the model of Freixas (2003), it can be shown that *ex post* negotiations on burden sharing lead to an underprovision of recapitalisations. Countries have an incentive to understate their share of the problem in order to have a smaller share in the costs. The model suggests that the home country would be left with the decision, including the funding, on the recapitalisation of a failing bank.

We doubt whether the home country supervisors, politicians and taxpayers would, in the event of a failure of a large cross-European bank, be prepared to meet the costs of recapitalising such a bank in its entirety (see, for example, the failure of the Icelandic banks and the lack of co-ordination between the Belgian and Dutch authorities in the case of Fortis). While depositors would be partly protected by national deposit insurance, the bank itself, perhaps outside its own country, would then probably be forced to close. Such abrupt closure could cause widespread concern and systemic effects.

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. This paper explores two sets of *ex ante* burden sharing mechanisms. The first is a general mechanism, based on full solidarity between EU member states. The underlying assumption is that financial stability is a truly public good. While general burden sharing has some attractive smoothing properties, it runs into problems of causing cross-border fiscal transfers and adverse selection (countries with a weak banking system are keen to join the burden sharing scheme). The second is a specific burden sharing mechanism. The assumption is that financial stability is only affected in the countries in which the bank is located. These countries contribute according to the geographical spread of that bank's business. Specific burden sharing has somewhat fewer problems. As a country's benefits (in the form of preserving systemic stability) and that country's contribution to the costs are better aligned in the specific burden scheme, this latter scheme is better able to overcome the co-ordination failure.

Burden sharing is politically very controversial [Pauly (2009)]. The recent financial crisis provides a (very small) window of opportunity to act. To get started, a proposal for burden sharing

could be incorporated in the resolution plan of Living Wills (a new concept to deal with too-big-to-fail). Living Wills may thus enable specific burden sharing institution by institution.

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APPENDIX

Country keys

Table A.1 contains several keys that can be used to share the costs in case of a general burden sharing mechanism for a banking crisis. 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 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 assets key is total assets of credit institutions (banks) in a country divided by total assets of EU-27 credit institutions. The banking assets key is a direct indicator of the size of a country's banking system.

COUNTRY KEYS (IN %, 2008 FIGURES)

TABLE A.1

COUNTRY	GDP	ECB CAPITAL KEY	ASSETS
Austria	2.3	1.9	2.5
Belgium	2.7	2.4	3.0
Bulgaria	0.3	0.9	0.1
Cyprus	0.1	0.1	0.3
Czech Republic	1.2	1.4	0.4
Denmark	1.9	1.5	2.6
Estonia	0.1	0.2	0.1
Finland	1.5	1.3	0.9
France	15.6	14.2	17.1
Germany	20.0	18.9	18.7
Greece	1.9	2.0	1.1
Hungary	0.8	1.4	0.3
Ireland	1.5	1.1	3.3
Italy	12.6	12.5	8.6
Latvia	0.2	0.3	0.1
Lithuania	0.3	0.4	0.1
Luxembourg	0.3	0.2	2.2
Malta	0.0	0.1	0.1
Netherlands	4.8	4.0	5.3
Poland	2.9	4.9	0.6
Portugal	1.3	1.8	1.1
Romania	1.1	2.5	0.2
Slovakia	0.5	0.7	0.2
Slovenia	0.3	0.3	0.1
Spain	8.8	8.3	8.0
Sweden	2.6	2.3	2.1
United Kingdom	14.5	14.5	20.9
Total EU-27	100	100	100

SOURCE: Website ECB (www.ecb.int) for ECB capital key. GDP and Assets are based on Structural Indicators for the EU Banking Sector, ECB (2010).