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**DSF Policy Paper Series**

# **Burden Sharing: From Theory To Practice**

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**October 2010**

**DSF Policy Paper, No. 6**

## **Burden Sharing: From Theory To Practice**

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### **Abstract**

The handling of cross-border banks in difficulties gives rise to coordination problems between home and host countries. Goodhart and Schoenmaker (2006, 2009) have suggested to implement an ex ante burden sharing mechanism to overcome the coordination failure of national authorities. While burden sharing is technically not very difficult, it requires political cooperation between sovereign nations. The financial crisis has provided some spectacular examples of coordination failure: the failures of Fortis, Lehman and the Icelandic banks illustrate how much damage the absence of an adequate cross-border framework can do to the stability of the global banking system. In the aftermath of the financial crisis, some burden sharing agreements are now being put in place.

This paper is forthcoming in *Revue d'économie financière*, December 2010.

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## 1. Introduction

The handling of cross-border banks in financial difficulties gives rise to coordination problems between home and host countries. The resolution of ailing cross-border banks is typically a rare event with high financial stakes for the authorities. The uncooperative equilibrium dominates for this type of non-repeated events.<sup>2</sup> Goodhart and Schoenmaker (2006, 2009) have suggested to implement an *ex ante* burden sharing mechanism to overcome the co-ordination failure of national authorities. While burden sharing is technically not very difficult, it requires political cooperation between sovereign nations. In a political analysis of international financial stability, Pauly (2009) illustrates that a pre-commitment to burden sharing is politically very controversial.

The experiences of the 2007-2009 banking crisis and the 2010 sovereign crisis have shown the limitations of crisis management if countries are not able to coordinate adequately during the crisis. On the banking side, the events surrounding the failures of Fortis, Lehman and the Icelandic banks illustrate how much damage the absence of an adequate cross-border framework can do to the stability of the global banking system (Claessens, Herring and Schoenmaker, 2010). On the sovereign side, the Greek saga illustrates the damage of ad hoc attempts to coordinate. Notwithstanding intensive coordination efforts of EMU countries in the first half of 2010, the spread on Greek government bonds kept on rising. Only the establishment of the European Financial Stability Facility, a burden sharing mechanism for euro area countries in financial difficulties, could stem the tide on financial markets (EFSF, 2010).

The aim of this paper is to explain the theory and practice of burden sharing mechanisms that can help to recapitalise ailing cross-border banks. 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. While the focus of this paper is on cross-border banks in difficulties, the analysis can also be applied to sovereign states in difficulties.

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 newly created European Financial Stability Facility for euro area countries is an example of general burden sharing (EFSF, 2010). The second relates the burden to the location of the assets of the bank to be recapitalised (specific burden sharing). The Nordic Baltic authorities have recently endorsed a specific burden sharing scheme for their banking system (Nordic Baltic Memorandum of Understanding, 2010).

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<sup>2</sup> The repeated game solution is not applicable for this coordination problem. While financial supervision is an ongoing exercise (repeated game), crisis management is a rare event (non-repeated game).

Enforcement of burden sharing mechanisms is important. While the European Financial Stability Facility is legally binding, the Nordic Baltic MoU is not legally binding. The Nordic Baltic arrangement can be strengthened by incorporating the burden sharing arrangement in the Living Wills of the Nordic banks. The Living Will is a new concept to deal with too-big-to-fail banks and consists of a recovery and resolution plan to be used when a bank may get into difficulties. Living Wills may enable specific burden sharing institution by institution.

This article is organised as follows. In section 2, we examine the scope for cross-border externalities and coordination failure. 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 exist 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<sup>3</sup> 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

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<sup>3</sup> Nevertheless, BCCI might have had some contagion in the so-called “ethnic bank” crisis in the UK.

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 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.

#### *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, 2010a). 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; Goodhart and Schoenmaker, 2009; and Gaspar and Schinasi, 2010). 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.<sup>4</sup> 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.

### *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 European 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.

**Table 1. Geographical spread of activities for top 60 banks (2005 figures)**

	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)

### **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

<sup>4</sup> 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 (Congressional Oversight Panel, 2010).

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 paper, 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 €8.7 bn. These banks conduct on average 57 percent of their business at home ( $h \approx 0.57$ ), 25 percent in the rest of Europe ( $e \approx 0.25$ ), and 18 percent in the rest of the world ( $w \approx 0.18$ ).

**Table 2. Top 25 European banks (2008 figures)**

<b>Bank (country)</b>	<b>Min capital</b>	<b>Assets</b>		
	<b>in €bn</b>	<b>in €bn</b>	<b>h (%)</b>	<b>e (%)</b>
1. Royal Bank of Scotland (UK)	70.7	2430.2	54	16
2. Deutsche Bank (Germany)*	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
<b>Average top 25 banks</b>	<b>28.7</b>	<b>1006.9</b>	<b>57</b>	<b>25</b>

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%.

\* 2006 figures.

### **3.1 General fund**

#### **3.1.1 Theory**

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)<sup>5</sup> to set up a general fund. There is no need to have a pre-funded (*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 financial system. Alternatively, the ECB capital key ( $c$ ) can be used when applying the ECB route (see the Appendix for the general keys). We illustrate the working of the general burden sharing scheme with an example. Although we discuss burden sharing for ailing banks, burden sharing has also been used to provide financial assistance to euro area states in financial difficulties.

#### *A numeric 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 €1.5 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.

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<sup>5</sup> 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.

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.

### 3.1.2 Practice

#### *General burden sharing for euro area member states*

An application of general burden sharing is the financial stability facility for Greece. The Greek tragedy reached its climax on 9 May 2010. In a historical declaration, euro area leaders have agreed to a package of IMF assistance and euro area burden sharing through a new European Financial Stability Facility (EFSF). As the credibility of the euro is at stake (and thus financial stability of the euro area), 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, we did some exploratory work on burden sharing in a banking crisis, not yet thinking of a government crisis (Goodhart and Schoenmaker, 2006). One of our 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 seigniorage. 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. It is nevertheless important to contain moral hazard. In parallel with the EFSF, an orderly procedure for sovereign debt restructuring may be useful.

How does the burden sharing system work? The EFSF is a special purpose vehicle agreed by the 27 member states of the European Union, aiming at preserving financial stability in Europe by providing financial assistance to euro area states in difficulty. In order to reach these goals the Facility is ready to issue bonds, notes or other debt instruments on the market and use the money so raised to make loans up to a maximum of €440 bn to euro area member states in need. Eventual emissions of bonds are backed by guarantees given by the euro area member states on a pro rata basis, in accordance with a burden sharing key.<sup>6</sup> The EFSF is able to be combined with loans up to €60 bn coming from the European financial stabilisation mechanism (reliant on funds raised by the European Commission using the EU budget as collateral) and up to €250 bn coming from the IMF in order to obtain a financial safety net up to €750 bn.

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. The contribution of each EMU member state is then:  $c_j / \sum_j c_j$  ( $j$  is EMU member countries). The resulting key for the burden sharing is given in Table 3.

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<sup>6</sup> The EFSF framework provides for the possibility that a country in financial difficulties can step out (“Stepping-Out Guarantor”). The remaining countries (“Guarantors”) share then the burden. At the set up of the Facility, Greece is deemed to be a Stepping-Out Guarantor.

**Table 3. Burden sharing key for euro area Member States (in %)**

Country	Key	Country	Key
1. Austria	2.8	9. Italy	17.9
2. Belgium	3.5	10. Luxembourg	0.3
3. Cyprus	0.2	11. Malta	0.1
4. Finland	1.8	12. Netherlands	5.7
5. France	20.4	13. Portugal	2.5
6. Germany	27.1	14. Slovakia	1.0
7. Greece	2.8	15. Slovenia	0.5
8. Ireland	1.6	16. Spain	11.9
		<b>Total euro area-16</b>	<b>100.0</b>

### *General burden sharing by the ECB as lender of last resort*

Another real life case of (implicit) burden sharing is the application of the lender of last resort (LOLR) function of the ECB during the financial crisis (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 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 €5.7 bn for the increased credit risk of its general LOLR operations in 2008. 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.

## **3.2 Specific sharing**

### **3.2.1 Theory**

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.

### *Numeric 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 €2.8 bn of bonds to rescue Nordea ( $E_i = 15.2$  bn). Nordea has 26% of its assets in Sweden and 74% of its assets in the rest of Europe. The rest of Europe is divided in 37% in Finland, 23% in Denmark, 10% in Norway<sup>7</sup> and 3% in Poland, Russia and the Baltic States. So Sweden needs to issue €3.9 bn of bonds ( $k_{ij} = 0.26$ ), Finland €3.5 bn ( $k_{ij} = 0.37$ ), Denmark €3.4 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.

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<sup>7</sup> 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.

The involved countries need to issue €9.3 bn of bonds to rescue HSBC ( $E_i = 66.2$  bn). HSBC has 36% of its assets in the UK and only 15% of 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.

### **3.2.2 Practice**

#### *Specific burden sharing in the Nordic Baltic region*

A few large banks, such as Nordea, Swedbank and Danske Bank, are operating throughout the Nordic Baltic region. The economies are very much interwoven through these banks. These connections are neither balanced nor diversified (Schoenmaker and Wagner, 2010). The contagion effects can therefore be strong. A shock can spread swiftly through the region. Rather than changing the structure of the banking system, the Nordic and Baltic authorities have chosen to share the costs of financial stability reflecting the joint exposure to externalities. In August 2010, they agreed to a burden sharing scheme to make up for lack of proper diversification (Nordic Baltic Memorandum of Understanding, 2010). Under this burden sharing scheme, the ministries of finance share the costs of a possible bank failure.

The burden sharing key is based on two components: a) the relative importance of the relevant bank in the countries as measured by asset shares (summing to 100%); and b) the supervisory responsibility for the same bank in the same countries (summing up to 100%). Both components get an equal weight. Relative importance is calculated on the basis of the amounts of assets in the countries concerned. Assets used are risk weighted and calculated using the latest official balance sheet figures of at least 12 months earlier (this would prevent gaming with the asset key during a crisis). Only the elements of credit risk that can be easily attached to customers in various countries are taken into account. The other risk factors, such as market and operational risks, are borne by the parent bank in the home country.

Supervisory responsibility depends on the factual supervisory powers. A home country with full and exclusive powers to supervise host country branches is given a 100% weight. If a

supervisory college is in operation for host country subsidiaries, the relative home country weight will be less than 100%. A Nordic Baltic Cross-Border Stability Group, in which the finance ministries, central banks and supervisors of the Nordic and Baltic countries participate, will on a regular basis establish preliminary burden sharing keys for the relevant banks in the Nordic Baltic region.

#### **4. Political economy of burden sharing**

There are some concerns surrounding both mechanisms. These concerns are not only an issue of economics but also of political feasibility (Pauly, 2009). First, burden 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.<sup>8</sup>

To address the free-rider problem, Hüpkes (2010) suggests that countries make a credible commitment to assume full responsibility for effective resolution of cross-border banks. We suggest that this commitment also comprises the joining of the burden sharing agreement. If a host country does not sign up, it can impose higher capital or liquidity surcharges or a greater degree of self-sufficiency to make sure that it could resolve the local operations in a separate local resolution procedure. In the extreme case, the home country could require the affiliates of banks in other jurisdictions to operate on a stand-alone basis if it was not assured that the host country would cooperate.

Second, 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.

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<sup>8</sup> 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.

Third, 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.

Finally and most importantly, a legal basis is needed to create binding *ex ante* burden sharing arrangements. The European Financial Stability Facility is agreed and signed by the euro area countries. It is thus legally binding. Moreover, the EFSF SA is established as a registered company in Luxembourg. We believe that a Memorandum of Understanding (MoU), such as used by the supervisors, central banks and finance ministries of the Nordic and Baltic states, will not be sufficient because MoUs (soft law) are not enforceable. To strengthen the legal basis of burden sharing arrangements, Avgouleas, Goodhart and Schoenmaker (2010) suggest to incorporate an arrangement 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 set up for the EU.

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.

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). The Nordic Baltic MoU is an excellent example of this regional 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. 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. 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 (both banking and sovereign), however, has provided some impetus to act. The sovereign crisis of Greece has led to a general burden sharing scheme for euro area countries. The newly created European Financial Stability Facility is up and running, and is also legally binding. On the banking side, the Nordic and Baltic authorities have agreed a special Memorandum of Understanding to facilitate specific burden sharing. But this MoU is not legally binding. To strengthen the legal basis, we propose to incorporate such burden sharing arrangements in the resolution plan of Living Wills (a new concept to deal with too-big-to-fail banks). Living Wills may thus enable specific burden sharing institution by institution.

### *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.

**Table A.1. Country keys (in %; 2008 figures)**

<b>Country</b>	<b>GDP</b>	<b>ECB capital key</b>	<b>Assets</b>
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
<b>Total EU-27</b>	<b>100</b>	<b>100</b>	<b>100</b>

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

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