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# Efficiency Gains of a European Banking Union

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**Abstract**

An anticipated benefit of the prospective European Banking Union is stronger supervision of European banks. Another benefit would be enhanced resolution of banks in distress. While national governments confine themselves to the domestic effects of a banking failure, a European Resolution Authority would follow a supranational approach, under which domestic and cross-border effects within Europe are incorporated. Using a model of recapitalising banks, this paper develops indicators to measure the efficiency improvement of resolution. Next, these efficiency indicators are applied to the hypothetical resolution of the top 25 European banks, which count for the vast majority of cross-border banking in Europe. Our cost-benefit analysis indicates that the UK, Spain, Sweden, and the Netherlands are the main beneficiaries and thus have the largest economic incentives to join Europe's Banking Union.

*JEL codes:* F33, G01, G28, H41.

*Keywords:* Financial Stability, Financial Crises, Public Good, International Banking

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## *1. Introduction*

The aim of the prospective Banking Union is to foster financial stability in Europe. The euro sovereign debt crisis has shown that financial stability cannot be managed effectively at the national level, because of the diabolic loop between national governments and banks (Brunnermeijer *et al*, 2011). The fiscal position of several European governments is vulnerable, because of the perceived need by the market to back up weakened national banking systems. In turn European banks are in distress because they hold large quantities of debt from these governments. Using daily credit default swaps (CDS) for several euro area countries for the period 2007-2010, Alter and Schüler (2012) provide evidence of interdependence between government and bank credit risk during the crisis.

A truly integrated European-level banking system can do much to stabilise the euro area by breaking this diabolic loop. Beyond this immediate concern, the broader case for the Banking Union is that national governments concentrate on the domestic effects of bank failures and ignore cross-border externalities (Schoenmaker, 2011). The supranational approach of the Banking Union incorporates these cross-border externalities. Next, some banks are too-big-to-safe, in particular for the smaller European countries. Demirguc-Kunt and Huizinga (2013) find evidence that a bank's market-to-book value is negatively related to its size compared to that of the country (measured by a bank's liabilities-to-GDP ratio). They suggest that systemic banks can increase their value by downsizing or splitting up, in particular if they are located in countries with a weak fiscal position. An alternative solution is to organise resolution at the supranational level. This paper explores the potential of a supranational approach within Europe's Banking Union.

While the Banking Union is scheduled to start with the Single Supervisory Mechanism, the real benefit from the Banking Union would come from the resolution of ailing banks at the European level. There is wide agreement among academics that this second stage is crucial to make the Banking Union effective (ASC, 2012). Recapitalisations of banks that should be closed down can be very expensive. The appropriate way to deal with banks' weakness is to apply a resolution regime, clean up their balance sheets by separating good assets from the bad, and to recapitalise the 'good' banks. While a resolution fund -fed by levying fees on banks- can act as a first line of defence, the European Stability Mechanism (ESM) is the fiscal backstop for recapitalising banks from participating countries (Schoenmaker and Gros, 2012). The costs of the ESM are shared among the participating countries.

What are the incentives for countries to join the Banking Union? While all euro area countries are required to join the Banking Union, the non-euro area countries (also called the 'outs') have the choice to opt in (see Hertig, Lee and McCahery (2010) for a discussion of a choice-based approach towards ECB banking

supervision). So far, politics is dominating the debate on participation. The UK and Sweden have declared that they want to stay out. But what are the economic benefits and costs of joining? The contribution of this paper is to provide a model for calculating the cost and benefits of participation. Following Schoenmaker and Siegmann (2012), we develop a model to compare the efficiency of different resolution mechanisms. Applying these resolution rules to the largest European banks, we find the UK and Sweden have much to gain from participation. The UK would reap 27 percent of the benefits from improved efficiency of resolution, while its share in the costs is only 15 percent. Similarly, Sweden would gain 11 percent of the benefits against a cost share of 2 percent. So the political calculus dominates the economic calculus.

The paper is organised as follows. Section 2 sketches the basic model for the resolution of failing banks. Section 3 provides the cost-benefit analysis of resolution. We first derive the decision rules for the various resolution mechanisms from the basis model. Next, we develop indicators to evaluate the efficiency of the resolution mechanisms. Section 4 provides the empirical results for our sample of top 25 European banks. Section 5 draws policy implications and concludes.

## *2. Basic model*

To measure efficiency gains of coordination, we apply the model of Schoenmaker and Siegmann (2012), which is inspired by the model of Freixas (2003) and Schoenmaker (2011) to formalise the systemic effects of bank failure.

Consider the ex post decision whether to recapitalise or to liquidate a bank in financial distress. The choice to close or to continue the bank is a variable $x$ with values in the space {0, 1}. $B$ denotes the social benefits of a recapitalisation and $C$ its costs. Among other things, the benefits of a recapitalisation may include those derived from maintaining financial stability and avoiding contagion (Allen and Gale, 2000; Acharya, 2009). An example is the Lehman collapse, which caused widespread contagion. A recapitalisation of Lehman may have prevented this outburst of financial instability. By contrast, a minor, idiosyncratic, bank failure (e.g. Barings) would pose no systemic problem. In such cases, an ailing bank should be closed. For each country, $\alpha_i$ denotes the fraction of benefits that accrue to country $i$.

We model bailout benefits as the financial stability benefits of recapitalisation and assume a linear relation with the size of the benefits. This implies that bailout benefits are additive, e.g., the bailout benefits of a cross-border bank with benefits of € 4 billion, distributed over two countries, is equal to the bailout benefits of a domestic bank with € 4 billion benefits. A potential lower (or higher) impact of a cross-border

banking failure relative to domestic banking failures is not taken into account. A lower impact could come from geographical diversification of banking activities. A higher impact could result from the international transmission of shocks.

### 2.1 Home country resolution

The current situation of the resolution of internationally active banks can be best described as a 'home country' solution. Under this mechanism, the home country solely decides whether or not a bank should be recapitalised, taking into account only domestic benefits with the prospect of paying all bailout costs. With $\alpha_h$ the fraction of benefits in the home country, the condition for a bailout boils down to

$$\alpha_h \cdot B > C, \tag{1}$$

i.e., the share of benefits that accrue to the home country should exceed the total costs. In the context of internationally active banks, this approach seems highly inefficient. However, it is representative of the current situation in most countries, whereby bank resolution is confined to the national level; see Freixas (2003) and Schoenmaker (2011) on the coordination failure between national governments. Examples are the bailout of RBS by the UK government, or the bailout of Commerzbank by the German government in 2008. In these cases, the financial institutions that were bailed out did have cross-border activities, but the social benefits of these activities were not taken into account, nor were foreign governments involved in sharing the costs of the bailout. The Fortis bailout in 2008 is slightly different. This Belgian-Dutch bank was first split on national lines and then rescued by the respective Belgian and Dutch governments.

### 2.2 Supranational resolution

A first best solution to internalise the externalities of a cross-border banking failure is to move from a national to a supranational approach for financial stability policies. Such a supranational approach requires fiscal powers at the supranational level to fund a possible bank rescue, but leads to economically efficient outcomes, see Obstfeld (2011) and Eatwell and Taylor (2000). In the second stage of the prospective Banking Union, a new European Deposit Insurance and Resolution Authority (EDIRA) would resolve bank failures in participating countries at the European level; see Schoenmaker and Gros (2012).

This new body, EDIRA, would be responsible for bank resolution in all countries of its jurisdiction (all countries participating in the Banking Union) and take a decision at the aggregate level with no regard for national interests. Under this supranational authority, a bailout takes place whenever benefits $B$ exceed

the costs $C$ of rescue, where benefits are measured as the summed benefits over all countries for the supranational body has authority. With $\alpha_i$ the fraction of benefits to country $i$, we have that a bank is recapitalised if and only if

$$\sum_{i \in A} \alpha_i \cdot B > C, \tag{2}$$

where $A$ is the set of countries over which the supranational authority has jurisdiction. To analyse our solutions in the European setting, we denote the home country of bank $j$ by $h$, all European countries participating in the European Banking Union by the set $EBU$, and all countries outside the participating European countries (the rest of the world) as the set $ROW$. The benefits in the home country, the rest of Europe and the rest of the world sum up to 1, i.e., we have that $\alpha_h + \alpha_{EBU \setminus \{h\}} + \alpha_{ROW} = 1$.

The supranational body maximises the net benefits within the EBU, so that a bank rescue is only done when $\alpha_{EBU} \cdot B > C$, i.e., the EBU-specific benefits exceed the costs. The decision $x^*$ to rescue a bank is given by

$$x^* = \begin{cases} 1 & if\ \alpha_{EBU} \cdot B - C \geq 0 \\ 0 & if\ \alpha_{EBU} \cdot B - C < 0. \end{cases} \tag{3}$$

A supranational approach is useful when banks' cross-border business within the European Banking Union, $\alpha_{EBU \setminus \{h\}}$, is non-negligible. In that case, the supranational approach will improve the efficiency of the recapitalisation policy as both the externalities in the home country $\alpha_h$ and other Banking Union countries, $\alpha_{EBU \setminus \{h\}}$, are incorporated in the decision-making: $\alpha_{EBU} > C/B$. Only truly international banks with sizeable business outside Europe ($\alpha_{EBU} \ll 1$) will pose a problem leading to socially insufficient recapitalisations.

Bailout decisions by a supranational authority are the most efficient that can be achieved for a given set of countries and banks. Decisions are taken without regard to the financing, or the division of costs over countries, and only with respect to the aggregate benefits and costs within the set of countries. Coordination between countries is not necessary, since the distribution of benefits over countries is not taken into account, by institutional design. An example of such a resolution authority is the Federal Deposit Insurance Corporation (FDIC) in the US, which winds down or recapitalises failed banks, regardless of the States in which the bank is active. The US Treasury provides the fiscal backstop to the FDIC. Similarly, EDIRA would run a European Deposit Insurance and Resolution Fund for winding down or recapitalising failing

banks. The ESM provides the fiscal backstop. The cost sharing in the ESM is built on the ECB capital key.[2] We model burden sharing in the European Banking Union ($EBU$) by a cost sharing key $k_i$ with $\sum_{i \in EBU} k_i = 1$, where $k_i$ is the share of the cost to be paid by country $i$.

Figure 1 visualises the efficiency of the home country and supranational approach. In terms of costs (x-axis) and benefits (y-axis), the supranational decision to a bailout is taken whenever total benefits exceed costs. Thus, in costs-benefits space, the line that separates bailout from no-bailouts has a slope of one. The solution under the home country approach is to have a bailout only when the home country benefits exceed the total costs, i.e., $\alpha_h \cdot B > C$, which leads to the line $B = C/\alpha_h$ above which a bailout takes place. The supranational approach improves to $B = C/\alpha_{EBU}$.

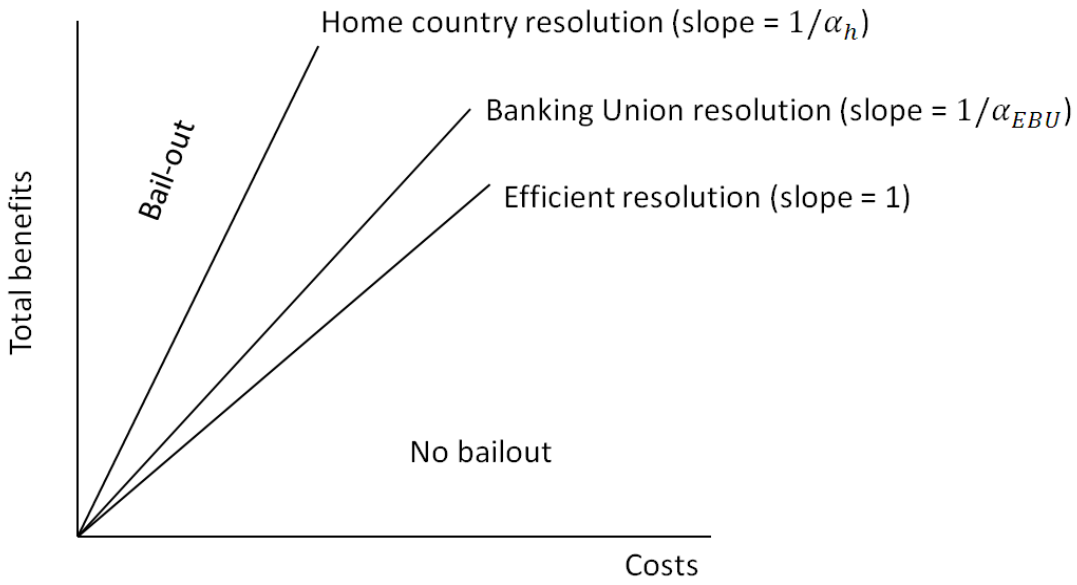


**Figure 1: Equilibrium outcomes for the different resolution mechanisms**

This figure gives the threshold level for benefits over costs above which a recapitalisation takes place. Under efficient resolution, a bailout takes place when the aggregate (world-wide) benefits exceed the total costs, so that the line is characterized by $B = C$, i.e., a slope of 1. Under a supranational authority in the European Banking Union (EBU), bailouts take place when EBU-specific benefits exceed total costs, i.e., $\alpha_{EBU} \cdot B > C$, so that the slope is $1/\alpha_{EBU}$. Under the home country approach, the equilibrium outcome is that the burden falls completely on the home country, which only takes the home share $\alpha_h$ into account. The area between the home country and Banking Union resolution lines identifies the area of improvement.

[2] See www.ecb.int.

## 3. Cost-benefit analysis

To conduct a cost-benefit analysis of bank recapitalisations, we use banks' equity as unit of calculation. For each bank $j$ in the sample we consider a loss $L_j$ of 2 times equity $E_j$: $L_j = 2 \cdot E_j$, which makes the bank insolvent. If the bank is recapitalised to its original (required) equity capital, 100% of equity becomes the new value of the bank. Thus, the total net costs of the bailout are 100% of the initial (pre-shock) equity of the bank: $C_j = 1 \cdot E_j$, see Goodhart and Schoenmaker (2009).[3] While our cost-benefit analysis is concerned with the cost of recapitalisation, Philippon and Schnabl (2013) analyse the efficiency of bank recapitalisation by the government. They find that capital injection against preferred stock with warrants provides for efficient recapitalisation, as this allows the government to extract the upside.

Choosing the value of equity as the cost of resolution is motivated by the fact that equity is a good indicator of a bank's unexpected losses that could arise and of the subsequent public bail out costs, see Dermine and Schoenmaker (2010). Also, under Pillar 2 of the Basel capital regulation, banks must plan economic capital large enough to cover unexpected losses. Although not a perfect indicator as some banks might choose to be more conservative, the book value of equity (Tier 1 capital) is likely to provide robust information on the relative magnitude of bank risk.

The purpose of our cost-benefit analysis is to assess the long-term benefits and costs of joining the Banking Union. We therefore assume that the probability of failure is equal among the banks in our sample (the veil of ignorance). This assumption can be relaxed, e.g. by deriving a bank's probability of failure from its current stand-alone credit rating.[4] Another element of redistribution among countries is differences in the all-in ratings, which reflect the implicit government guarantee. A European bank from a strongly rated country (e.g. triple A) has a stronger implicit government guarantee and thus will gain less from a European Resolution Authority (the fiscal backstop, the ESM, has a triple A rating) than banks from weakly rated countries; see also Demirguc-Kunt and Huizinga (2013).

Relaxing these assumptions allows us to calculate the benefits and costs at the point of entry. We can also use our methodology below to calculate the benefits and costs of a supranational approach in past episodes of multiple bank failures like the 2008-2009 global financial crisis or the 2010-2012 European sovereign debt crisis. In the former, mainly banks in the Northern countries needed government support,

[3] The introduction of bail-in debt (debt converting into equity after the value of equity drops below a certain trigger value) does not change the set-up. Bail-in debt provides only an extra layer of defence before recapitalisation may be needed.

[4] Rating agencies generally assign two different ratings to banks: a "stand-alone" and "all-in" rating (Packer and Tarashev, 2011). A stand-alone rating reflects the intrinsic financial strength of the institution and, thus, its likelihood of default, assuming that no external support is forthcoming. In addition to accounting for stand-alone financial strength, an all-in rating factors in the likelihood and magnitude of extraordinary external (government) support that the bank may receive if and when it is in distress.

making the Northern countries net benefiters of the Banking Union. In the latter, some Southern European countries as well as Ireland, the so-called GIPSI countries, would be the benefiters. Although policy-makers tend to be pre-occupied with the current situation, the differing geographic impact of the recent crises indicates that the veil of ignorance (Rawls, 1971) is an appropriate assumption.

Given a benefit parameter $\theta$, the total benefits $B_j$ of keeping bank $j$ open are $\theta$ times equity: $B_j = \theta \cdot E_j$, where we use the book value of equity of the bank. Having a benefit parameter $\theta$ enables us to analyse the efficiency of bailout over a range of benefits. Bailout benefits can be thought of as preventing a temporary reduction of credit availability (credit crunch) through shortening of balance sheets by a forced liquidation of the loan book in a particular country. Another source of benefits is the safeguarding of financial stability of the total banking system, which might be jeopardised by a fire sale of assets or other externalities. See Dell'Ariccia *et al*. (2008) for empirical evidence on the real effects of banking crises.

Thus, we take size and distribution of bank assets to represent the bailout benefits. This is in accordance with the "credit view" on the impact of bank failures on the economy, see Bernanke (1983). Using a dataset covering large international banks for the period 1995-2010, Brei, Gambacorta and Von Peter (2013) find evidence that banks during a crisis can turn additional capital into greater lending only once their capitalisations exceeds a certain threshold. This suggests that recapitalisations only translate into greater credit supply when bank balance sheets are sufficiently strengthened; see also Philippon and Schnabl (2013) on the debt overhang problem. That is consistent with our assumption of a sizeable recapitalisation to restore a bank's original (required) capital in full. An alternative proxy would be the distribution of liabilities, as the liability-holders bear the cost of a failure. But that does not take into account the loan channel as a source of macroeconomic risk. The relative share of the assets of bank $j$ in country $i$ is denoted as $\alpha_{i,j}$.

The basic notion of our model below is that authorities should be ready to let a bank fail if the benefits are not at least equal to the fiscal costs of recapitalisation. Closure is a much-needed device to reinforce market discipline. But the real political economy problem may be that in many cases governments perceive the benefits not as a function of assets invested in their country, but as a function of the liabilities of the bank held by politically important constituencies. In that case, the distribution of the liabilities (both geographically and by political importance) would matter as much as the distribution of assets.

### 3.1 Decision rules for resolution

Following Schoenmaker and Siegmann (2012), we derive the following rules for bank recapitalisation, based on the resolution arrangements that we considered in Section 2.

*Rule #1: Efficient benchmark*

The efficient benchmark is that a bank $j$ is saved if

$$B_j \geq C_j \tag{4}$$

This reflects the 45-degree line in Figure 1 for efficient resolution, where a bailout is conducted when the benefits exceed the cost. Next, we derive the threshold value of the benefit parameter $\theta$, beyond which a bailout takes place. The efficient outcome under rule #1 is that a bank $j$ is only rescued if the parameter $\theta$ is 1 or higher: $\frac{B_j}{C_j} = \frac{\theta \cdot E_j}{E_j} = \theta \geq 1$. In that case, the net benefits are non-negative $B \geq C$. So $\theta = 1$ is the efficient benchmark for bailout.

*Rule #2: Home country only*

Applying equation 1, a bank $j$ in home country $h$ is saved under the home country rule if and only if

$$\alpha_{h,j} \cdot B_j \geq C_j \tag{5}$$

It is up to the home country to assume all the costs, while incurring only the home country-specific benefits of rescuing the bank. The home rule can be rewritten as $B_j \geq 1/\alpha_{j,h} \cdot C_j$. The threshold benefit for the home rule is thus $\theta = 1/\alpha_h$.

*Rule #3: Supranational (EBU) arrangement*

Using equation 2, the supranational rule states that a bank $i$ is rescued only if the sum of benefit-shares over the EBU countries exceeds the total bailout costs, i.e., if

$$\sum_{i \in EBU} \alpha_{i,j} \cdot B_j \geq C_j \tag{6}$$

This rule assumes that there is a supranational entity with decision-power over the bailing out of banks. The benefits that lie within the Banking Union are taken into account, as well as total costs. The threshold benefit for the supranational rule is $\theta = 1/\alpha_{EBU}$.

### 3.2 Efficiency indicators

The aim of this paper is to measure the efficiency of the resolution mechanisms. The efficient benchmark with $\theta = 1$ is the benchmark for our analysis, against which we measure the efficiency of different institutional setups. We define the distance of the home rule resolution for bank $j$ as the difference between the home threshold and the efficient benchmark threshold:

$$D_j^{home} = \frac{1}{\alpha_{h,j}} - 1 \tag{7}$$

This index will be zero for domestic banks ($\alpha_h = 1$), indicating that resolution is efficient in the single country setting. The index is very large for banks with a very small home fraction. In practice, regulators require banks to have a certain presence in the home country. The lowest home fraction in our dataset below is for Standard Chartered with a small home presence in the UK ($\alpha_h = 0.15$) and the remainder of its activities mostly in Asia; see Table 1 below.

Similarly, we define the distance of the supranational rule for bank $j$ as follows:

$$D_j^{supra} = \frac{1}{\alpha_{EBU,j}} - 1 \tag{8}$$

Again this index will be zero for banks with all its business within the Banking Union ($\alpha_{EBU} = 1$), indicating that supranational resolution is efficient in the prospective Banking Union. The index is large for banks with a small fraction within Europe and thus sizeable business interests in the rest of the world.

The final step is to calculate the efficiency improvement moving from the home rule to the supranational rule in the Banking Union (the area between the home country resolution and the Banking Union resolution lines in Figure 1). The improvement can be measured in relative terms and absolute (monetary) terms. The relative efficiency improvement $EI$ for bank $j$ from country $i$ is measured as a percentage:

$$EI_{i,j}^{Rel} = \frac{D_j^{home} - D_j^{supra}}{D_j^{home}} \tag{9}$$

This indicator ranges from 0 to 100 percent. For domestic banks the improvement is zero as the home country rule is already fully efficient. Also for international banks without any other business in the rest of Europe ($\alpha_{EBU\setminus\{h\}} = 0$), the improvement is zero. The other extreme are European banks with business in the rest of Europe, but no business outside Europe ($\alpha_{ROW} = 0$). For this group of banks, the supranational approach under Banking Union is fully efficient, producing a relative improvement of 100 percent.

The absolute efficiency improvement $EI$ for bank $j$ from country $i$ is measured as follows:

$$EI_{i,j}^{Abs} = \left(D_j^{home} - D_j^{supra}\right) \cdot E_j \quad (10)$$

This absolute indicator multiplies the improvement in the threshold from home to supranational with the value of a bank's equity. Remember that we assume that the net cost of bailout is the bank's equity: $C_j = E_j$. This absolute indicator allows us to calculate the efficiency improvement (i.e. benefits) in euros for the countries participating in the Banking Union. The next step is to compare the country benefits of the supranational resolution mechanism and the country costs under the burden sharing rule. This yields the net result for each country in our cost-benefit analysis.

# *4 Results*

In this section we calculate the efficiency of the resolution mechanisms in the prospective Banking Union using the efficiency indicators in the previous section. The efficiency is calculated at the aggregate level for the European Banking Union and at the country level for the participating countries. Finally, we derive the policy implications of the results. For some non-euro area countries, it may be beneficial to make use of the option to join the Banking Union. In particular, the UK, that plans to stay out for political reasons, would be the largest benefiter of improved resolution in the Banking Union.

## 4.1 Data

To analyse countries' costs and benefits of participation in the Banking Union, we focus on the large banks, as small- and medium-sized banks are largely domestically oriented and do not suffer from the coordination problems in the event of a bailout. We select the top 25 European banks in 2011 by capital strength, as published by The Banker (2012) and report the values for capital and total assets in Table 1. The top 25 banks have average assets of € 985 billion and capital of € 40 billion. This top 25 provides a comprehensive coverage of the European banking system, as the European assets of the top 25 banks amounts to about half of total EU banking assets. Furthermore, the European cross-border assets of this top 25 counts for 71 percent of overall cross-border assets within the EU. The latter is more important for our cost-benefit analysis, as the resolution of cross-border banks leads to net receivers and net payers among the participating countries.[5]

*** INSERT TABLE 1 HERE ***

[5] While this paper focuses on cross-border banks, further analysis covering national and cross-border banks may be useful. In such a broader analysis, countries with a large national banking system may benefit from resolution at the European level.

The geographic segmentation of assets is taken as a proxy for the geographic spread of the benefits, and is also shown in Table 1. The assets are divided over the home country, the rest of Europe, and the rest of the world. The numbers for the assets are obtained from the annual reports of the banks and represent the geographical breakdown of assets, loans or credit risk as given in the annual report. Usually, banks report the breakdown for only one category of assets, loans, or credit risk, so we take the one that is given. In all, this gives a representation of where country-specific bailout benefits might be reasonably expected to materialise.

### 4.2 Aggregate results

We are interested in the efficiency of the resolution mechanisms. For each bank $j$ in our sample of 25 banks, we calculate the distance of the home and supranational resolution approach to the efficient benchmark. The indices $D_j^{home}$ and $D_j^{supra}$ are reported in the 3rd and 4th column of Table 2. International banks with large overseas activities, like HSBC, Banco Santander, Barclays, Deutsche Bank, Standard Chartered, and Nordea, have values for $D_j^{home}$ of more than 1.5, indicating a home country basis of less than 40 percent. Moving to $D_j^{supra}$, only HSBC and Standard Chartered report values of more than 1.0, illustrating their global reach with more than 50 percent of their business outside Europe. By contrast, domestic banks, like Lloyds, Credit Mutuel, and Caixabank, report very low values for both $D_j^{home}$ and $D_j^{supra}$.

*** INSERT TABLE 2 HERE ***

The interesting cases are the banks for which $D_j^{home}$ and $D_j^{supra}$ differ the most. These are the group of pan-European banks, for which we expect a large efficiency improvement from a move to the Banking Union. The relative efficiency improvement is reported in column 5 of Table 2. Prime examples of these European players are BNP Paribas (81 percent improvement), Banco Santander (83 percent), UniCredit (99 percent), ING Bank (81 percent), Nordea (94 percent), and Danske Bank (84 percent). Two other banks, Caixa Bank and Allied Irish Bank, also show a large relative efficiency improvement. But the absolute efficiency improvement (last column in Table 2) of the latter banks is minor, as these banks have very limited cross-border business concentrated in the rest of Europe. So the efficiency of the resolution improves for these latter banks, but the starting point was already favourable with little cross-border externalities.

The absolute efficiency indicator $EI_{i,j}^{Abs}$ in Equation (10) combines the efficiency improvement of a resolution regime with the size of a bank's equity. So banks with sizeable cross-border business in Europe and a high equity will report significant absolute improvements. The largest absolute improvements in Table 3 are for Banco Santander at € 138 billion due to its large operation in the UK (29 percent), Nordea at € 87 billion due to its large spread in Scandinavia (but excluding Norway which is outside the European Union) and the Baltics, and Barclays at € 81 billion. Other large improvements are for HSBC (€ 73 billion), Deutsche Bank (€ 70 billion), UniCredit (€ 59 billion), BNP Paribas (€ 59 billion), and ING Bank (€ 46 billion).

The average equity-weighted efficiency improvement is 63%. The total efficiency improvement for the top 25 banks amounts to € 766 billion. This is the cumulative efficiency improvement for the top 25 banks, assuming that all banks need to be resolved. In practice, it is not expected that all banks need to be resolved. If we assume, for example, a 5 percent probability of bank failure, the figure shrinks to € 38 billion.

### 4.3 Results at country level

All countries benefit from the enhanced stability of a supranational approach under the Banking Union. Host countries benefit as the resolution of the parent bank becomes more efficient. There is evidence that the viability of the host country branch and/or subsidiary is dependent on the performance of the parent bank (Bruno and Shin, 2012; Jeon, Olivero and Wu, 2013). Home countries also benefit from the improved efficiency of the resolution of their banks. Furthermore, the diabolic loop in which the solvency of countries and banks are intertwined (Alter and Schüler, 2012) is broken by the supranational approach.

The improvement from the home to the supra resolution mechanism is collectively paid by the participating countries in the Banking Union. Although financial stability is a public good (i.e. the producer cannot exclude anybody from consuming the good and consumption by one does not affect consumption by others), we can calculate the benefits and costs for each participating country. The home country has a direct benefit from the burden sharing for the bailouts of its (cross-border) banks, as it must pay only a part of the costs under burden sharing. To measure these benefits for each home country, we sum the absolute efficiency improvements of all banks $j$ in that country: $\sum_j EI_{i,j}^{Abs}$. Table 3 reports the results at country level in the second column. Only 10 out of the 27 EU countries have banks among the top 25. This reflects the fact that some countries are home to large banks that serve the domestic economy as well as foreign economies, while other countries rely on banking services from these countries (a few countries, like the Central and Eastern European (CEE) countries and Luxembourg, rely almost completely on foreign banks).

*** INSERT TABLE 3 HERE ***

Table 3 shows in the third column that the UK (with 5 large banks) and Spain (with two large banks) count for the vast majority of the benefits with 27 and 19 percent respectively. Other large countries, like Germany, France and Italy, have a more modest share ranging from 9 to 12 percent. Finally, some smaller countries, like Sweden with Nordea bank and the Netherlands with three banks (ING, Rabo, and ABN Amro), have a relatively large share with 11 and 7 percent respectively. Next, Table 3 reports the cost share for each country in the fourth column. Following the ESM Treaty, this cost share is based on the ECB capital key, which is an average of the relative GDP and relative population share of each country. The cost share is more evenly divided in proportion to a country's size.

Finally, the net effect is calculated in the fifth column of Table 3. Within the euro area, Spain and the Netherlands are the net benefiters with 11 and 3 percent respectively. Germany, France and Italy are net contributors with 7, 3 and 4 percent respectively. Although these three countries have large banks, these banks are smaller than the economic weight of these large countries would suggest. Overall, the euro area would be a net contributor with 10 percent and the non-euro area a net benefiter with 10 percent. From the non-euro area countries, the UK and Sweden are the key recipients with 13 and 9 percent. While all CEE countries are contributing, Poland is the main contributor from the non-euro area side with 5 percent due to its size.

It is interesting to note that the main non-euro area countries that do not wish to join the Banking Union for political reasons (i.e. the UK and Sweden)[6] would be the largest beneficiaries from the Banking Union. Referring to the paper's title, the UK and Sweden have a strong incentive to join and Denmark has a small, albeit positive, incentive to join the Banking Union. Not joining is very costly on the budgetary front. It would be very demanding for the Swedish government to bear the full cost of a possible recapitalisation of Nordea outside the Banking Union, while only 20 percent of the benefits accrue to Sweden. Similarly, the recapitalisation of some of the large UK banks during the great financial crisis put a severe strain on the UK government budget. The UK and Sweden thus preserve the expensive right to do potential rescues of their banks on their own. Political calculus dominates economic calculus.

[6] FT, Sweden joins UK outside European banking union, 11 December 2012.

### 4.4 Moving from the European Union to the Euro Area

The current political setting is that Banking Union membership is mandatory for euro area (EA) countries, while non-euro area countries (also called 'outs') have the option to join the Banking Union (European Commission, 2012). So the minimum case is that only the EA countries participate, while the maximum case is that all EU countries participate in the Banking Union. Table 4 reports the benefits of enhanced resolution in the EU setting and the EA setting. Starting with the first, the full benefits with all countries joining are € 766 billion, as calculated in the previous sub-section. Then, we subtract the bailout benefits coming from the banks head-quartered in the non-euro area countries: Denmark, Sweden and the UK. These are the countries with banks in the top 25 of European banks and not part of the euro area. Panel B. in Table 4 reports a reduction of € 308 billion, which is mainly counted for the by the UK banks.

*** INSERT FIGURE 4 HERE ***

The next step is to measure the reduction in benefits coming from the banks located in the EA countries, as the reach of cross-border business under the supranational resolution mechanism is reduced from the EU to the EA. So we have to calculate each non-euro area country's share in overall EU cross-border business. That share can then be deducted from the cross-border reach of the banks in the EA countries. The ECB (2012) provides the country breakdown of cross-border banking business within the EU on an inward base. For example, Poland's inflow of cross-border banking is 2.5 percent of total EU cross-border banking (through branches and subsidiaries). Banks' cross-border business into out countries moves from the fraction in the rest of Europe $\alpha_{EBU\setminus\{h\}}$ to the fraction in the rest of the world $\alpha_{ROW}$. Using Equation (8), we can see that $D_j^{supra}$ increases. From Equations (9) and (10), it then follows that the efficiency improvement decreases. Panel C reports the reduction due to the smaller geographic reach of a narrow Banking Union. The reduction for non-participation by Poland is 1.2 percent or € 8.9 billion. The total reduction from a smaller geographic reach is € 116 billion.

We can now calculate the combined effect. If only Denmark were to choose not to join, the overall reduction in benefits would be 2.8 percent (1.8 + 1.0 percent). Again the UK dominates. The overall reduction from the UK's decision not to join would amount to 37.7 percent (27.4 + 10.3 percent). This high figure reflects the dropout of 5 UK banks from our sample of 25 banks (27 percent decrease) as well as the exclusion of London as financial centre (10 percent decrease). All major European banks have a presence in London. The EDIRA would exclude the London business of European banks. That would diminish the effectiveness of the new resolution regime of the Banking Union. Our findings are consistent with Goodhart and Schoenmaker (2006), who also note that the UK may experience sizeable stability benefits from pre-

arranged recapitalisations. While 17.2 percent of banking assets in the EU are located in the UK,[7] the UK's share in the EU economy is lower at 13.3% of GDP or 14.5% of the ECB capital key.

Summing up, the reduction in benefits is mainly caused by the exclusion of banks from non-euro area countries (40 percent reduction) and only partly by the smaller geographic reach (15 percent reduction). As expected, a broad Banking Union would enhance the efficiency of supranational resolution.

## *5. Conclusion*

In the paper we have analysed the benefits of the prospective Banking Union for the European Union (EU). The most immediate driver behind the Banking Union is to break the 'diabolic loop' between the solvency of national governments and national banks. A weak banking system damages the sovereign fiscal position (by the potential need to rescue ailing banks) and, in the other direction, a risky sovereign position disproportionately threatens domestic banking stability (as domestic banks typically hold national government bonds). A truly integrated European-level banking system can do much to stabilise the euro area by breaking the nexus between banks and governments. Beyond this immediate concern, the broader case for the Banking Union is that national governments concentrate on the domestic effects of bank failures and ignore cross-border externalities. As the model in this paper shows, the supranational approach of the Banking Union would incorporate these cross-border externalities. That would be an argument to operate the Banking Union at the EU level, as the EU's Internal Market gives banks the freedom to operate cross-border throughout the EU. But the Banking Union is only mandatory for the euro area countries, and optional for non-euro area countries.

Our calculations show that the benefits of improving the efficiency of the resolution process can be large. Moving from a home country approach to supranational resolution leads to an average efficiency improvement of 63 percent for the top 25 European banks in a broad Banking Union. Assuming that the average cost of a recapitalisation amounts to a bank's equity, we further find that the total benefits of improved resolution amounts to € 766 billion in a hypothetical resolution of the top 25 banks. Of course, this is an overall figure, as not all banks would fail at the same time and need a full replacement of equity. Nevertheless, during the global financial crisis 9 out of these 25 banks received state aid, and some of them received amounts exceeding their pre-crisis equity. The results depend on assumptions on bailout costs and benefits, but they can be seen as indicative of large gains to be had.

[7] We only take here the share of European banking assets (domestic and cross-border from EU countries). For the UK, the share in European banking assets is 17 percent. The UK share in total banking assets (domestic and cross-border from EU and third countries) is 22 percent, due to the large presence of international banks in London.

We compute per-country net benefits when the ECB capital key is used for cost allocation and find that the highest benefits of the Banking Union accrue to countries with large cross-border banking activities, such as the UK, Spain, Sweden and the Netherlands. This confirms the intuition that countries with the largest cross-border banking systems stand to profit most from an improved resolution regime for internationally active banks. It also confirms our claim that the efficiency gains are related to the Internal Market rather than the Monetary Union. While non-euro area countries have an economic incentive to join Banking Union, some countries (notably the UK and Sweden) have decided not to join for political reasons.

Our results suggest that the current ECB capital key is not the most appropriate cost sharing key for a banking union. While the ECB capital key (based on an average of a country's share in GDP and population) may be appropriate for support of countries by the European Stability Mechanism (ESM), the cost sharing key for bank recapitalisation should be based on a mix of a country's share in GDP and European banking assets. Finally, restricting the analysis to euro area countries, sizeable efficiency benefits remain. They are, however, quite lower than for a full European Banking Union.

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# Appendix A: Tables

**Table 1: The top 25 European banks**

This table shows the top 25 European banks selected on the basis of capital strength ultimo 2011 (Tier 1 capital as published in The Banker). The figures for capital and total assets are from The Banker (July 2012). The last three columns show the geographic segmentation of the assets; the three columns do not necessarily add up to 100% due to rounding. Data on the segmentation of assets for 2011 are taken from the annual reports.

| Bank no. | Bank name | Capital | Total assets | Home country | Rest of Europe | Rest of world |
|---|---|---|---|---|---|---|
| | | in EUR billion | in EUR billion | In % | In % | In % |
| 1 | HSBC (UK) | 107.9 | 1975.1 | 35% | 11% | 54% |
| 2 | BNP Paribas (France) | 71.0 | 1965.3 | 49% | 34% | 17% |
| 3 | RBS (UK) | 68.1 | 1800.6 | 62% | 8% | 30% |
| 4 | Crédit Agricole (France) | 62.0 | 1879.5 | 81% | 11% | 8% |
| 5 | Banco Santander (Spain) | 61.8 | 1251.5 | 27% | 41% | 32% |
| 6 | Barclays (UK) | 60.3 | 1868.3 | 33% | 27% | 39% |
| 7 | Lloyds Banking Group (UK) | 52.6 | 1159.7 | 90% | 7% | 2% |
| 8 | Deutsche Bank (Germany) | 49.1 | 2164.1 | 34% | 33% | 33% |
| 9 | UniCredit (Italy) | 42.9 | 926.7 | 42% | 57% | 2% |
| 10 | Groupe BPCE (France) | 41.1 | 1138.4 | 71% | 14% | 15% |
| 11 | ING Bank (Netherlands) | 38.6 | 961.2 | 40% | 38% | 22% |
| 12 | Rabobank Group (Netherlands) | 37.9 | 731.7 | 74% | 9% | 17% |
| 13 | Société Générale (France) | 37.5 | 1181.4 | 79% | 12% | 9% |
| 14 | Intesa Sanpaolo (Italy) | 37.3 | 639.2 | 81% | 14% | 4% |
| 15 | BBVA (Spain) | 34.2 | 597.7 | 56% | 10% | 35% |
| 16 | Standard Chartered (UK) | 28.6 | 463.0 | 15% | 4% | 81% |
| 17 | Credit Mutuel (France) | 27.7 | 605.1 | 86% | 10% | 4% |
| 18 | Commerzbank (Germany) | 26.2 | 661.8 | 51% | 32% | 17% |
| 19 | Nordea Group (Sweden) | 22.6 | 716.2 | 20% | 62% | 18% |
| 20 | CaixaBank (Spain) | 20.3 | 282.4 | 98% | 2% | 0% |
| 21 | Danske Bank (Denmark) | 19.5 | 460.6 | 54% | 34% | 12% |
| 22 | KBC Group (Belgium) | 15.5 | 285.4 | 63% | 21% | 15% |
| 23 | ABN Amro Group (Netherlands) | 15.4 | 404.7 | 80% | 12% | 7% |
| 24 | Allied Irish Banks (Ireland) | 15.1 | 136.6 | 81% | 19% | 1% |
| 25 | Landesbank Baden-Württemb. (Germany) | 13.8 | 373.1 | 72% | 20% | 8% |
| | **Average (asset weighted)** | **40.0** | **985.2** | **55%** | **22%** | **23%** |

**Table 2: Efficiency of resolution mechanisms**

This table shows the efficiency of the resolution mechanisms for the top 25 European banks. The threshold level of benefits for which recapitalisation is efficient is 1. The distance from this efficient benchmark for bank $j$ under the home rule ($D_j^{home}$) and supra rule ($D_j^{supra}$) is reported in the 3rd and 4th column. The final two columns report the efficiency improvement moving from the home rule to the supranational rule, in percentages and in Euros, respectively.

| Bank name | Equity | Distance to 100% efficiency | | Efficiency improvement | |
|---|---|---|---|---|---|
| | in EUR billion | Home | Banking Union | in % | in EUR billion |
| HSBC (UK) | 107.9 | 1.85 | 1.17 | 37% | 73.3 |
| BNP Paribas (France) | 71.0 | 1.02 | 0.20 | 81% | 58.7 |
| RBS (UK) | 68.1 | 0.62 | 0.43 | 31% | 13.0 |
| Crédit Agricole (France) | 62.0 | 0.23 | 0.08 | 65% | 9.1 |
| Banco Santander (Spain) | 61.8 | 2.70 | 0.47 | 83% | 137.9 |
| Barclays (UK) | 60.3 | 1.99 | 0.65 | 68% | 81.2 |
| Lloyds Banking Group (UK) | 52.6 | 0.11 | 0.02 | 77% | 4.4 |
| Deutsche Bank (Germany) | 49.1 | 1.92 | 0.49 | 74% | 69.7 |
| UniCredit (Italy) | 42.9 | 1.40 | 0.02 | 99% | 59.2 |
| Groupe BPCE (France) | 41.1 | 0.41 | 0.17 | 58% | 9.7 |
| ING Bank (Netherlands) | 38.6 | 1.48 | 0.28 | 81% | 46.3 |
| Rabobank Group (Netherlands) | 37.9 | 0.35 | 0.20 | 42% | 5.6 |
| Société Générale (France) | 37.5 | 0.27 | 0.10 | 62% | 6.2 |
| Intesa Sanpaolo (Italy) | 37.3 | 0.23 | 0.04 | 80% | 6.9 |
| BBVA (Spain) | 34.2 | 0.80 | 0.53 | 33% | 9.0 |
| Standard Chartered (UK) | 28.6 | 5.49 | 4.15 | 24% | 38.3 |
| Credit Mutuel (France) | 27.7 | 0.16 | 0.04 | 76% | 3.4 |
| Commerzbank (Germany) | 26.2 | 0.97 | 0.21 | 78% | 19.9 |
| Nordea Group (Sweden) | 22.6 | 3.90 | 0.22 | 94% | 83.4 |
| CaixaBank (Spain) | 20.3 | 0.02 | 0.00 | 100% | 0.4 |
| Danske Bank (Denmark) | 19.5 | 0.85 | 0.14 | 84% | 13.9 |
| KBC Group (Belgium) | 15.5 | 0.58 | 0.18 | 69% | 6.2 |
| ABN Amro Group (Netherlands) | 15.4 | 0.24 | 0.08 | 67% | 2.5 |
| Allied Irish Banks (Ireland) | 15.1 | 0.24 | 0.01 | 96% | 3.5 |
| Landesbank Baden-Württemberg (Germany) | 13.8 | 0.40 | 0.09 | 77% | 4.3 |
| **Average (equity weighted)** | | **1.21** | **0.45** | **63%** | |
| **Total** | **1007.0** | | | | **766.0** |

**Table 3: Country breakdown of benefits and costs**

This table shows the efficiency improvement from supranational resolution in the Banking Union at the country level. For each country, the efficiency improvements for its banks (reported in Table 2) are aggregated and reported in EUR billion. The 3rd column reports the benefits, defined as a country's share in the total efficiency improvement. The 4th column reports the cost share of each country. The cost sharing is based on the ECB capital key (see www.ecb.int). The final column reports the net effect. Euro area and non-euro area countries are separately reported. In this table, it is assumed that all EU countries participate in the Banking Union.

| Country | Efficiency improvement | Benefits | Costs | Net effect |
|---|---|---|---|---|
| | in EUR billion | in % | in % | in % |
| **Euro area countries** | | | | |
| - Austria | - | 0% | 1.9% | -1.9% |
| - Belgium | 6.2 | 0.8% | 2.4% | -1.6% |
| - Cyprus | - | 0% | 0.1% | -0.1% |
| - Estonia | - | 0% | 0.2% | -0.2% |
| - Finland | - | 0% | 1.3% | -1.3% |
| - France | 87.2 | 11.4% | 14.2% | -2.8% |
| - Germany | 93.9 | 12.3% | 18.9% | -6.7% |
| - Greece | - | 0% | 2.0% | -2.0% |
| - Ireland | 3.5 | 0.5% | 1.1% | -0.7% |
| - Italy | 66.1 | 8.6% | 12.5% | -3.9% |
| - Luxembourg | - | 0% | 0.2% | -0.2% |
| - Malta | - | 0% | 0.1% | -0.1% |
| - Netherlands | 54.4 | 7.1% | 4.0% | 3.1% |
| - Portugal | - | 0% | 1.8% | -1.8% |
| - Slovakia | - | 0% | 0.7% | -0.7% |
| - Slovenia | - | 0% | 0.3% | -0.3% |
| - Spain | 147.3 | 19.2% | 8.3% | 10.9% |
| **Non-euro area countries** | | | | |
| - Bulgaria | - | 0% | 0.9% | -0.9% |
| - Czech Republic | - | 0% | 1.5% | -1.5% |
| - Denmark | 13.9 | 1.8% | 1.5% | 0.3% |
| - Hungary | - | 0% | 1.4% | -1.4% |
| - Latvia | - | 0% | 0.3% | -0.3% |
| - Lithuania | - | 0% | 0.4% | -0.4% |
| - Poland | - | 0% | 4.9% | -4.9% |
| - Romania | - | 0% | 2.5% | -2.5% |
| - Sweden | 83.4 | 10.9% | 2.3% | 8.6% |
| - United Kingdom | 210.1 | 27.4% | 14.5% | 12.9% |
| **Total euro area** | **458.5** | **59.9%** | **70.0%** | **-10.1%** |
| **Total non-euro area** | **307.5** | **40.1%** | **30.0%** | **10.1%** |
| **Total EU** | **766.0** | **100%** | **100%** | **0%** |

**Table 4: Benefits in EU and EA setting of Banking Union**

This table shows the benefits of Banking Union in a European Union (EU) setting and in a euro area (EA) setting. In the EU setting, all non-euro area countries make use of the opt-in clause to join the Banking Union. In the EA setting, only the euro area countries participate in the Banking Union, as membership is mandatory for them. Panel B. shows the reduction in benefits if the banks from the non-euro area countries are not included (data are from table 3). Note that only Denmark, Sweden and the UK have banks in the top 25. Panel C. shows the reduction in benefits for the banks from the euro area countries, as cross-border business in the non-euro area countries is no longer included. The reduction is based on a country's share in overall EU cross-border business, as reported by the ECB in the EU structural financial indicators.

| Breakdown | Efficiency potential | Efficiency reduction | |
|---|---|---|---|
| | in EUR billion | in EUR billion | in % |
| **A. Benefits in EU setting** | **766.0** | | |
| **B. No banks from non-euro area countries** | | | |
| - Denmark | | 13.9 | 1.8% |
| - Sweden | | 83.4 | 10.9% |
| - United Kingdom | | 210.1 | 27.4% |
| **Total no banks from non-euro area countries** | | **307.5** | **40.1%** |
| **C. Reach from EU to EA** | | | |
| - Bulgaria | | 1.4 | 0.2% |
| - Czech Republic | | 7.6 | 1.0% |
| - Denmark | | 7.7 | 1.0% |
| - Hungary | | 3.1 | 0.4% |
| - Latvia | | 0.6 | 0.1% |
| - Lithuania | | 0.8 | 0.1% |
| - Poland | | 8.9 | 1.2% |
| - Romania | | 3.1 | 0.4% |
| - Sweden | | 3.9 | 0.5% |
| - United Kingdom | | 78.9 | 10.3% |
| **Total reach from EU to EA** | | **116.1** | **15.2%** |
| **D. Total reduction in benefits** | | **423.6** | **55.3%** |
| **E. Benefits in EA setting** | **342.5** | | |