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Bank Supervision Going Global? A Cost-Benefit Analysis

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Bank Supervision Going Global? A Cost-Benefit Analysis

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Abstract

This paper analyzes the distortions that banks' cross-border activities, such as assets, deposits and equity, can introduce in the regulatory process. We find that while each individual dimension of cross-border activities distorts the incentives of a domestic regulator, a balanced amount of cross-border activities does not necessarily cause inefficiencies. This is because the various distortions can offset each other. In the case of a imbalanced cross-border activities, a supranational regulator can improve outcomes. However, this is only the case if her realm matches the geographic activity of banks, her capacity of extracting information is not lower than that of national supervisors and the available resolution techniques do not cause higher external costs than under national resolution. We also discuss the implication of branch versus subsidiary structure for the regulatory process.

Keywords: Bank regulation, bank failure resolution, cross-border banking

JEL classification: G21, G28

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1   Introduction

The problematic resolution of failing cross-border banks in Europe during the current crisis has focused academics' and policy makers' attention alike on the misalignment of geographic boundaries of banks and their regulation and supervision. The resolution of Fortis on the national level, undertaken separately by Dutch, Belgian and Luxembourg authorities has confirmed Charles Goodhart's point that "banks are European in life and national in death." The failure of the Icelandic banks, with wide-ranging economic and political repercussions, has shed doubts on the viability of large multinational banks in small countries. The recent reform debate has - among other items - therefore focused on issues of national versus supra-national supervision, the responsibility, obligation and capacity of home country supervisor relative to host country supervisor to resolve large cross-border banks and, in general, the need to coordinate the resolution of large international banks across borders. On the political level, arguments over national sovereignty and the role of European institutions are being used to argue in favor or against the establishment of a European-level bank supervisory authority. Recent proposals by the European Commission and the IMF aim at establishing a Europe-wide supervision and resolution authority (Fonteyne et al, 2010; European Commission, 2010). But what are the distortions stemming from national supervision of international banks? What are the rationales behind national and supra-national supervisors; what are the trade-offs of national versus supra-national resolution authority?

   This paper presents a theoretical model to show both benefits and costs of national versus supra-national supervisors. Specifically, we highlight the distorted incentives that purely national supervisors face when deciding to intervene in failing banks with activity outside its borders. However, we also highlight potential problems that might arise from having a supranational supervisor, in terms of higher intervention costs and limited information on banks' performance. This simple model allows us to highlight the trade-offs between national and supranational supervision. It also helps explaining some of the recent intervention decisions by regulatory authorities in Europe.

   Our paper is related to a small but growing theoretical literature on the regulation of cross-border banks.[1] Loranth and Morrison (2007) discuss the implications of capital requirements and deposit insurance for cross-border banks. Dell'Arricia and Marquez (2006) show that competition between national regulators can lead to lower capital adequacy standards, since national regulators do not take into account the external benefits of higher capital adequacy standards in terms of higher stability in other countries. Acharya

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[1]For an early discussion, see White (1994).

(2003), however, shows that coordinating capital adequacy ratios across countries without coordinating on other dimensions of the regulatory framework, such as resolution policies, can have detrimental effects. Freixas (2003) and Goodhart and Schoenmaker (2009) show that ex-post negotiations on recapitalization of failing cross-border banks can lead to underprovision of the necessary resources and prove the advantage of ex-ante burden sharing agreements in helping overcome coordination problems between regulators. Our paper is most closely related to Calzolari and Loranth (2010) who show how the organization structure of multi-national banks can influence regulatory behavior. Specifically, organization of foreign presence through branches leads to higher incentives to intervene as the home country regulator can draw on all assets, while at the same time it reduces the incentives if the regulator is responsible for repaying all deposits, including in foreign branches. There is also a more institutionally oriented literature on legal differences across countries in the treatment of domestic and foreign creditors (e.g. Krimminger, 2007). Osterloo and Schoenmaker (2007) and Schoenmaker (2010) show the empirical relevance of regulation of cross-border banks within Europe, with an increasing trend.

The resolution of cross-border banks during the recent crisis informs our theoretical model. Intervention into large cross-border banks came often at a late stage and often with conflicts between home and host country supervisors. While the lack of effective bank resolution framework in most European countries was certainly an important factor in explaining the late and uncoordinated intervention into failing bank, incentives for domestic regulators facing weak international banks have certainly played a role (Claessens et al., 2010).

This paper contributes to the literature on regulation of cross-border banks by focusing on one specific aspect, the intervention decision of supervisors. While the previous literature has considered capital regulations and deposit insurance across borders, to our best knowledge, this paper is one of the first analyzing the implications of cross-border banking for the intervention into failing banks. In focusing on this specific aspect, we hold constant other elements, such as capital requirements and deposit insurance. We also abstract from endogenous risk decisions by banks and market discipline to thus focus exclusively on supervisory discipline. While the basic set-up of this model is similar to Calzolari and Loranth (2010), we differ along several dimensions, including the distinction between cross-border activities in terms of assets, deposits and equity, and discussing the merits of a supra-national supervisor.

The remainder of the paper is organized as follows. The next section presents the basic model. Section 3 analyzes the incentives of the national supervisor in the presence of

foreign deposits, assets and equity, while Section 4 analyzes the incentives and constraints of a global supervisor. In each case do we derive the welfare implications. Section 5 concludes.

2 The basic model

We present a simple model of bank supervision, with three periods, 0, 1 and 2. For ease of analysis, we assume that the discount factor and the deposit interest rate are zero. There is a single represenative bank whose balance sheet is normalized to 1 and that issues debt d and equity k, so that $d+k = 1$. In period 0, the bank invests its resources into an investment project whose success is random and outside the control of the bank. Specifically, with probability λ ($\lambda \in (0,1)$), the investment succeeds and yields a return $R > 1$ in period 2, and with probability $1 - \lambda$, the project fails and yields zero gross return in period 2.

While λ is unknown at date 0, it becomes known at date 1. Based on this information, a supervisor can decide whether to intervene in the bank or to allow it to continue. If the supervisor decides to intervene in the bank, she can recover the initial investment of one. This intervention can take different forms, ranging from liquidation to a purchase and assumption operation involving another bank. The intervention is assumed to cause in addition costs c_1 external to the bank, arising for example from the disruption that depositors and borrowers might experience during the intervention.[2] If the supervisor decides to not intervene and allows the bank to continue to period 2, with probability λ, the bank will be successful and be able to repay its debt and equity holders. With probability $1 - \lambda$, the bank will fail and there are again external costs of c_2, which can be lower or higher than c_1.

We assume that the supervisor maximizes domestic welfare, thus maximizing returns to domestic debt and equity minus domestic external costs, following - among others - Dell'Arricia and Marquez (2006). In the case of a purely domestic bank, her intervention decision will hence coincide with the one that maximizes (world) welfare. The intervention threshold is given by the λ which equates the expected returns from continuation with the return from immediate liquidation. We have

$$\lambda R - (1 - \lambda)c_2 = 1 - c_1. \tag{1}$$

Solving for λ gives

$$\lambda^* = \frac{1 + c_2 - c_1}{R + c_2}. \tag{2}$$

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[2]For a discussion on the external costs that bank failure can impose on the remaining financial system and the real economy, see Beck (2010).

Quite intuitively, we can see that intervention becomes less likely when the date 1 bank failure costs, c_1, increase but become more likely when date 2 bank failure costs, c_2, increase (the latter follows from $\lambda^{*\prime}(c_2) > 0$ for $\lambda < 1$).

We can use this model and different interpretations for c_1 and c_2 to understand intervention decisions by bank regulators. Higher external costs of intervention in period 1 can stem from an inefficient failure resolution framework that, e.g., does not allow for a purchase and assumption transaction, and where depositors loose temporarily access to their savings and borrowers are cut off from external financing. Similarly, the size of these external costs increases in the size of the institutions, as more depositors and borrowers are affected and the likelihood of contagion to other financial institutions increases. At the same time, the resolution of such an institution is made more difficult.[3] An increase to the same extent in external costs of both c_1 and c_2 will make intervention in period 1 more likely, while a larger increase in c_1 than in c_2 makes intervention in period 1 less likely.

While we assume throughout the paper that λ becomes perfectly known at date 1, we can easily introduce a noisy signal on λ. As long as the signal is symmetrically distributed around the true λ, the intervention threshold is the same. This can be seen by noting that the costs from intervening are linear in λ (left hand side of equation 1). Welfare, however, will decrease when there is uncertainty about λ at date 1, as the regulator will make more Type 1 and Type 2 mistakes, i.e. intervene when she should not, and not intervene when she should.

3 The incentives of a national supervisor with cross-border banking

We now introduce cross-border banking into our model. For this we allow the bank to be partially financed by foreign deposits and foreign equity, as well as having asset holdings abroad. More specifically we denote with γ_D the domestic share of deposits, with γ_E the domestic share of equity and with γ_A the share of domestic firms (assets) financed by the bank.

The introduction of cross-border banking obviously does not modify the efficient intervention threshold as it does not affect total payoffs in the world economy (thus including foreigners). It only affects the share of the payoffs that accrue to domestic agents. As such, it can change the intervention incentives for the domestic supervisor and drive a

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[3]See Beck (2010) and Wagner (2010) for discussions on the external costs of bank failures, including how these costs depend on the number and size of failing banks and the health of remaining surviving banks.

wedge between the socially efficient and the domestic intervention point.

The domestic intervention point can be derived as follows. If the domestic regulator intervenes at the intermediate date, the bank will be liquidated. Total (world) proceeds from this are $1 - c_1$. Domestic depositors obtain $\gamma_D d$ and domestic equity obtains $\gamma_E(1-d)$ of these proceeds. In addition, the domestic economy suffer its share of the external effects, which amount to $\gamma_A c_1$. Total payoff in the domestic economy is thus $\gamma_D d + \gamma_E(1-d) - \gamma_A c_1$. In case there is no intervention the bank succeeds with probability λ. In this case domestic depositors obtain $\gamma_D d$, while equity obtains $\gamma_E(R-d)$. With probability $1 - \lambda$ the bank fails. In this case both equity and debt holders do not obtain any return and the country in addition suffers $\gamma_A c_2$ due to bank failure costs. Total expected domestic payoff is hence $\lambda(\gamma_D d + \gamma_E(R-d)) - (1-\lambda)\gamma_A c_2$. The domestic intervention threshold is hence defined by

$$\lambda(\gamma_D d + \gamma_E(R-d)) - (1-\lambda)\gamma_A c_2 = \gamma_D d + \gamma_E(1-d) - \gamma_A c_1. \tag{3}$$

Rearranging for λ gives

$$\widehat{\lambda} = \frac{\gamma_D d + \gamma_E(1-d) + \gamma_A(c_2 - c_1)}{\gamma_D d + \gamma_E(R-d) + \gamma_A c_2}. \tag{4}$$

Note that for $\gamma_D = \gamma_E = \gamma_A = 1$ we obtain $\widehat{\lambda} = \lambda^*$.

3.1 The case of no external costs in period 1

We focus in the following on the case of $c_1 = 0$, i.e. the case of an efficient resolution scheme. We start with this somewhat simpler case, as for $c_1 > 0$ the comparative statics are more complex and generally depend on the entire set of parameters. At any rate, external costs from bank liquidations at date 1 are likely to be significantly smaller than in the case of project failure at date 2 ($c_1 < c_2$) because in the former case the supervisor can allow for an orderly intervention and resolution.

Proposition 1 *The intervention threshold of the domestic supervisor, λ^D, is*

i) increasing in the share of domestic deposits γ_D,

ii) decreasing in the share of domestic equity γ_E,

iii) increasing in the share of domestic assets γ_A.

Proof. *i) We have for the derivative of the intervention threshold with respect to γ_D:*

$$\widehat{\lambda}'(\gamma_D) = \frac{(R-1)d\gamma_E}{(\gamma_D d + \gamma_E(R-d) + \gamma_A c_2)^2} > 0 \tag{5}$$

ii) We have for the derivative of the intervention threshold with respect to γ_E

$$\widehat{\lambda}'(\gamma_E) = -\frac{(R-1)(\gamma_D d + \gamma_A c_2)}{(\gamma_D d + \gamma_E(R-d) + \gamma_A c_2)^2} < 0. \tag{6}$$

iii) We have for the derivative of the intervention threshold with respect to γ_A

$$\widehat{\lambda}'(\gamma_A) = \frac{(R-1)c_2\gamma_E}{(\gamma_D d + \gamma_E(R-d) + \gamma_A c_2)^2} > 0. \tag{7}$$

∎

The intuition behind these results is as follows.

Deposits. Since the national regulator only cares about domestic depositors, a higher share of foreign deposits will effectively reduce the costs for her in period 2 and thus make intervention in period 1 less likely. A higher share of domestic deposits, in turn, makes the domestic regulator less inclined to gamble on bank success in the second period. Hence, with a higher share of domestic deposits, the domestic regulator becomes less likely to intervene, that is, the range of $\lambda's$ where interventions takes place increases.

Equity. Shareholders have a relatively higher interest in continuing the bank due to the standard risk-shifting problems (the costs of bank failure are partly borne by debt holders and firms). A higher share of domestic shareholders aligns the interests of the regulator more with the one of shareholders. This makes interventions less likely, that is, the threshold decreases. If, on the other hand, the share of foreign equity holders is higher, the regulator is more likely to intervene in period 1.

Assets. The external costs of bank failures incur for $c_1 = 0$ only in period 2. When a higher share of bank assets is domestically invested, this raises the domestic external costs of bank failure. This, in turn, makes the domestic regulator more averse to continuation. As a result, he becomes stricter at date 1 (the minimum required success probability increases). On the other hand, a higher share of foreign assets involves that a higher share of external costs in period 2 are being borne by agents outside the home economy, which makes the regulator more reluctant to intervene in period 1..

Proposition 1 has straightforward welfare implications. We know that for $\gamma_D = \gamma_E = \gamma_A = 1$, domestic and efficient liquidation thresholds coincide. Since we also know, for example, that the domestic liquidation threshold is increasing in the share of domestic deposits, it follows that whenever $\gamma_D < 1$ (and $\gamma_E = \gamma_A = 1$) we have $\widehat{\lambda} < \lambda^*$. This implies that there is a range of λ ($\lambda \in [\widehat{\lambda}, \lambda^*]$) where it is efficient to liquidate but the domestic supervisor decides to let the bank continue to operate (the domestic regulator is then too lenient).

The following corollary summarizes this welfare result, alongside with the corresponding ones for foreign equity and assets.

Corollary 2 *When there is cross-border banking, domestic and efficient interventions generally do not coincide. In particular we have:*

i) If cross-border banking takes place only via deposits ($\gamma_D < 1$ and $\gamma_E = \gamma_A = 1$): there are ranges for λ where the domestic regulator lets the bank continue even though this is inefficient (the domestic regulator is too lenient);

i) If cross-border banking takes place only via equity ($\gamma_E < 1$ and $\gamma_D = \gamma_A = 1$): there are ranges for λ where the domestic regulator liquidates the bank even though this is inefficient (the domestic regulator is too strict)

iii) If cross-border banking takes place only via assets ($\gamma_A < 1$ and $\gamma_D = \gamma_E = 1$): there are ranges for λ where the domestic regulator lets the bank continue even though this is inefficient (the domestic regulator is too lenient)

Proof. *Follows directly from Proposition 1 and $\widehat{\lambda} = \lambda^*$ for $\gamma_D = \gamma_E = \gamma_A = 1$.* ∎

If cross-border banking takes place through more than one channel, the welfare results obviously depend on the strength of each channel. For example, if there are both cross-ownership of deposits and equity, the biases created by each channel go in opposite directions and hence tend to offset each other. If there is mainly foreign deposit-taking but little foreign share-ownership, we are then likely to end up with a too lenient domestic regulator, and vice versa. This implies that in order to evaluate the efficiency properties of cross-border banking, one has to look at all aspects of cross-border banking jointly, and not only at one channel in isolation

The following corollary establishes the precise conditions under which regulators are too lenient or too strict in the presence of cross-border banking.

Corollary 3 *Domestic interventions are*

i) always efficient if $\gamma_E = \frac{d\gamma_D + \gamma_A c_2 - Rd\gamma_D + R\gamma_A c_1 - R\gamma_A c_2 - d\gamma_D c_1}{d + c_2 + Rc_1 - Rc_2 - dc_1 - Rd}$,

ii) tend to be too lenient if $\gamma_E < \frac{d\gamma_D + \gamma_A c_2 - Rd\gamma_D + R\gamma_A c_1 - R\gamma_A c_2 - d\gamma_D c_1}{d + c_2 + Rc_1 - Rc_2 - dc_1 - Rd}$,

iii) tend to be too strict if $\gamma_E > \frac{d\gamma_D + \gamma_A c_2 - Rd\gamma_D + R\gamma_A c_1 - R\gamma_A c_2 - d\gamma_D c_1}{d + c_2 + Rc_1 - Rc_2 - dc_1 - Rd}$.

Proof. *Follows from setting $\lambda^* = \widehat{\lambda}$ in equations (2) and (4) and solving for γ_E.* ∎

There is thus a threshold value for γ_E below which there is excessive leniency but above which domestic regulation tends to be too tight. In the case when the cross-border shares of assets and deposits are identical ($\gamma_D = \gamma_A =: \gamma$), this threshold value can be easily determined: the efficiency condition in Corollary 3 then becomes $\gamma_E = \gamma$. Thus, if cross-border ownership equals the cross-border ownership of the other two dimensions, the domestic regulator always takes efficient decisions *regardless* the overall level of cross-border activities. The intuition for this is straightforward: if cross-border engagement is the same along all three dimensions, the domestic regulator will simply perceive a fraction of both benefits and costs of intervention. Since this fraction is the same for the costs and benefits, his decision will not be distorted.

3.2 The case of external costs in period 1

We now discuss the case that also liquidation at date 1 results in externalities ($c_1 > 0$). In this case it is easy to show that the first part of Proposition 1 (domestic deposits increase the intervention threshold) still holds. However, the other parts of the Proposition no longer hold generally. Take the case of cross-border banking through assets. Previously, higher foreign assets made the domestic supervisor too lenient as she does not internalize the externalities that arise abroad when the bank fails (due to $c_2 > 0$). When $c_1 > 0$, however, intervention at date 1 will also cause externalities, to be shared between the home and the host economy. As the domestic supervisor ignores this, she will be too strict. The overall efficient implications in the presence of foreign assets then depend on the relative size of c_1 and c_2. If it is reasonable to presume the c_2 is much larger than c_1, the part of Proposition 1 applying to foreign assets will still hold.

The intuition in the case of foreign equity is more of technical nature. Taking derivative of (4) with respect to γ_E and using (3) to substitute in $\widehat{\lambda}$ we obtain that

$$\widehat{\lambda}'(\gamma_E) = \frac{(1-d) - \widehat{\lambda}(R-d)}{\gamma_D d + \gamma_E(R-d) + \gamma_A c_2}. \tag{8}$$

The sign of the derivative thus depends on $(1-d) - \widehat{\lambda}(R-d)$. Only if $(1-d) < \widehat{\lambda}(R-d)$ does the third part of the Proposition $(\widehat{\lambda}'(\gamma_E) < 0)$ still hold. The intuition for this is the as follows: when the regulator intervenes at date 1, domestic equity holders obtain $1-d$ for sure, while if she does not, domestic equity obtains $\widehat{\lambda}(R-d)$ in expectation. Thus, if $\widehat{\lambda}(R-d) > 1-d$, gains from continuation are higher for equity. Hence, as the share of domestic equity increases, the regulator becomes more likely to not intervene and allow the bank to continue. Note now that the expected gains from continuation depend on the value of the critical threshold $(\widehat{\lambda})$ itself. And when c_1 becomes large, the threshold will be small (as can be verified from equation 3), making it possible that the first effect outweighs the second one. Again, however, when c_1 is sufficiently small, this will not be the case and Proposition 1 will continue to hold.

3.3 Branches versus subsidiaries

We can use the model so far to discuss regulatory implication of organizational forms for international banks in establishing their presence in host markets. Banks have two main ways to undertake foreign operations: through branches or by having a foreign subsidiary. The key difference between branches and subsidiaries is that in the case of a branch the supervisor in the country of the parent bank has responsibility (home supervisor), while

in the case of a subsidiary it is the regulator in the country where the supervisor is located (host supervisor). Our model can be used to understand the relative regulatory attractiveness of either mode of foreign entry in terms of their welfare properties.

Consider first the case of a subsidiary. From the perspective of the host regulator, the subsidiary has a large share of foreign equity as the profits of the subsidiary will return to the parent company (low γ_E). Since the subsidiary will typically lend largely domestically in the host economy, the share of domestic assets is, however, large (high γ_A). In addition, the subsidiary might also source deposits largely locally (high γ_D). Thus, applying our model, from the perspective of the host supervisor, cross-border banking largely takes place through foreign equity ownership. Corollary 2 thus tells us that regulation and supervision will hence tend to be too strict. On the other hand, intervention costs c_1 might be higher in the case of a foreign subsidiary than a domestically-owned bank, as even in the case of self-standing subsidiary, it might be hard to undertake a merger and acquisition or purchase and assumption operation in an efficient manner given the subsidiary's links with the parent bank .

Consider next branching. Under branching, the home country supervisor has responsibility for supervision and the intervention decision. This supervisor can decide to intervene in the foreign branch but only jointly with intervention at the parent bank. We distinguish in the following between two cases: i) the size of the branch is small relative to the parent bank and, ii), the size of the branch is large relative to the parent bank. To focus ideas, we also assume that the health of the parent and the foreign branch are fully correlated (in terms of the model: both have the same realization of λ at date 1), an assumption we relax below. In the case of the parent bank having more than one foreign operation (possibly in different countries), relative size is defined as the combined size of all foreign branches relative to the parent company.

Consider first the case where the foreign operations are small. From the perspective of the home regulator there is hence effectively no cross-border banking. His liquidation decision is hence unbiased and efficient. In the case of large foreign operations, things play out as follows. Due to presence of foreign lending by the foreign branches, there is a substantial part of foreign assets (γ_A low). In addition, there are also foreign deposits (γ_D low), while there is no foreign equity (γ_E high). Using corollary 2 we thus obtain that the domestic supervisor is too lenient. This leniency might be exacerbated if the share of investment that can be recovered in period 1 increases in γ_A, i.e. the recovery rate on foreign assets is less than one.

What does this imply for the regulatory desirability of branching versus representation through a subsidiary? In the case of a small foreign operation, branching is preferred as

this leads to unbiased intervention decisions. When the foreign operation is large, there is a trade-off. In the case of a subsidiary, intervention in the foreign operation (by the host country supervisor) might be too strict, especially in countries with effective resolution frameworks, i.e. low c_1. In the case of a branch, intervention (by the home country supervisor) is too lenient. In either case, this leads to inefficient liquidation decisions both domestically and abroad.

Conclusion 4 *When (total) foreign operations are small relative to the size of the parent bank, cross-border banking should take place through branching. When (total) foreign operations are large relative to the size of the parent bank, either branches or subsidiaries may be preferred.*

Relaxing the assumption of perfect correlation between λ in the home and the host countries complicates things somewhat in the case of large cross-border activity. If $(1 - \gamma_A)\lambda_F + \gamma_A\lambda_D < \widehat{\lambda}$, where F denotes foreign and D domestic, the home country supervisor will intervene. If the two λs are sufficiently different, this might imply that external costs of failure resolution are imposed on a country where the banking operation is perfectly healthy (i.e. high λ). As the home country supervisor internalizes only $\gamma_A\,c_2$, the supervisor is more lenient towards negative signals from the host countries. This can be further complicated if the home country supervisor receives only a noisy signal about λ in the host countries. While not affecting the intervention threshold, it will increase both type I and type II errors and thus reduce welfare.

Comparing the regulatory effects of branch versus subsidiary structure with the actual decision of international banks shows that banks with cross-border retail operations prefer indeed subsidiaries, while banks with small cross-border operations prefer branches (Cerutti et al., 2007). The recent expansion of some European banks (e.g. Icelandic banks and Nordea) in the form of branches, however, provides serious regulatory challenges, as we have shown in this sub-section.

3.4 Explaining actual events with the framework

We can use the model to explain the intervention decisions taken by supervisors across Europe in the recent crisis. The late intervention by the Icelandic supervisors can be explained by the high shares of both assets and deposits that Icelandic banks were holding, while equity was almost exclusively held by domestic agents. The fact that a large share of deposits were collected through branches rather than subsidiaries exacerbated the situation for host country supervisors as they had little information and even less powers to intervene in time. The case of Fortis is somewhat less clear-cut. Right before its intervention by the

Benelux governments, Fortis had high shares of foreign equity, deposits and assets, with primary supervisory responsibility for the Belgian regulator. One can argue that very high expected external costs for an early intervention (c_1), due to the lack of an effective failure resolution scheme in Belgium and uncertainty about the future development prevented the Belgian supervisor from an earlier intervention. The prompt intervention of the Dutch (and Luxembourgois) regulators, on the other hand, can be explained with the subsidiary structure with high shares of Dutch assets and deposits (especially in ABN Amro) but little if any Dutch equity.

4 Gains and losses from a supra-national supervisor

Until now, we have considered only a domestic supervisor and shown that the efficient and actual intervention threshold differ in the presence of foreign operations, be they in form of deposits, equity or assets. When domestic and efficient intervention thresholds differ, a supra-national supervisor could, in principle, always improve welfare because this supervisor would also take into account the effects that materialize outside the country. However, supra-national supervision might itself also be subject to imperfections.

First, the global supervisor may have imperfect knowledge about the success probability at date 1, receiving only a noisy signal.[4] Alternatively, we can assume that the domestic supervisor receives a less noisy signal about the success probability. This means that the supra-national supervisor, even though having the correct incentives, will make sometimes wrong decisions due to imperfect knowledge of the success probability. The benefits from delegation to a supra-national supervisor as it avoids the distorted incentives of domestic supervision have to be weighted against the costs arising because the global supervisor has an informational disadvantage. Without going into the formal argument, it is relatively easy to see that larger distortions due to higher shares of either foreign assets or deposits or due to a higher share of foreign equity tip the welfare balance towards the supra-national supervisor, while larger information disadvantages for the supra-national supervisor tip the welfare balance towards the national supervisor.

Second, the global supervisor may be less efficient in intervening in either period 1 or in period 2 (in terms of the model: c_1 and c_2 are higher when the global supervisor is in charge), implying higher external costs for the affected economies. Such higher costs could arise from being farther away from the relevant market and thus being disadvantaged - relative to a national supervisor - in terms of arranging for a merger and acquisition or

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[4]See Holthausen and Ronde (2002) for a similar argumentation.

purchase and assumption operation. In addition, intervening and resolving a bank that is present in markets with different legal frameworks can result in extended and costly resolution, raising the external costs for the economies in question. However, there is one countervailing effect; a supra-national supervisor might be in a better position to resolve a financial institution that dominates its home country when operating in a supra-national banking market.[5]

The comparison between national and supra-national supervision has clear implications for the current debate on establishing a European-level failure resolution framework. First, such a regime can only improve the failure resolution for banks that have larger shares of either foreign assets and deposits or foreign equity, for which the intervention decision is thus distorted. However, such a supra-national framework also has to relate to the appropriate geographic area. As shown by Osterloo and Schoenmaker (2007) and Schoenmaker (2010), the largest 25 European have, on average, 25% of their assets outside their home country in other European countries. This share ranges, however, from two percent in the case of BBVA (which has 31% of assets outside Europe) to the Nordea Group, with 74% of assets outside its home countries in other European countries (and no assets outside Europe). Second, such a regime can only improve on a purely national resolution framework, if equipped with the necessary means and resources to resolve a bank efficiently. Third, such resolution powers have to come with the necessary supervision and monitoring tools; a close relationship with national supervisors is therefore critical.

5 Conclusions

This paper has used a very simple model to discuss the trade-offs in bank resolution frameworks when dealing with cross-border banking. We show that foreign assets and deposits, on the one hand, and foreign equity, on the other hand, have different implications for the intervention decisions of home country regulators. Critically, a mix of the three can lead to the same intervention threshold as a purely domestic bank. We also show that a supra-national supervisor can improve on the efficiency of the intervention decision, but only if equipped with the necessary mechanisms and sufficient information. Our model can inform both the discussion on national versus. supra-national bank supervision and the discussion on the optimal organization of cross-border activity from the regulator's viewpoint.

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[5]What is too big-to-resolve for one country might not be the too-big-to-resolve on the European level.

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