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### ► To cite this version:

Carole Haritchabalet, Laetitia Lepetit, Kévin Spinassou, Frank Strobel. Bank capital regulation: a role for a supranational regulator?. 64th Annual Meeting of the French Economic Association, AFSE, Jun 2015, Rennes, France. hal-02440145

**HAL Id: hal-02440145**

**<https://univ-pau.hal.science/hal-02440145>**

Submitted on 15 Jan 2020

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# Bank capital regulation: a role for a supranational regulator?

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January 14, 2015

*Preliminary - do not quote without permission*

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## **Abstract**

Using a simple two-country model where national or supranational regulators can set capital requirements as either risk sensitive capital or leverage ratios, we examine which of these arrangements is best. Our results demonstrate the importance of capital requirements being set at a supranational level particularly when cross-country spillovers are large and national regulators suffer from substantial degrees of regulatory capture. We further highlight the importance of allowing for supervisory "remoteness" in this context, and show that national regulators may want to surrender regulatory power only when spillover effects are large but the degree of supervisory capture is relatively small.

*Keywords:* bank regulation; capital requirement; supranational; spillover; regulatory capture

*JEL Classification:* G21, G28

# 1 Introduction

The recent financial crisis has once more emphasized the importance of the structure and design of the international regulatory system for banks, and prompted or accelerated more general efforts to refine and enhance it. An interesting question in this context is the appropriate balance between the roles for national and supranational regulators in the setting of capital requirements, as exemplified by the increasing roles set out for national bank supervisors in the Basel II and III accords against the backdrop of otherwise harmonized capital requirements at the international level, or the political momentum in the Eurozone in moving towards a more concrete banking union.<sup>1</sup>

While there is an established theoretical literature examining the implications of capital requirements in single banking systems,<sup>2</sup> few papers so far examine issues relating to the interaction of banking regulators at either national or supranational levels. Acharya (2003) examines the merit of international convergence of bank capital requirements when different central banks have divergent closure policies; this is shown to give rise to a spillover from more forbearing to less forbearing countries so that, in equilibrium, a regression toward the worst closure policy may result. Dell’Ariccia and Marquez (2006), on the other hand, analyze the incentives for bank regulators in financially integrated countries to form a regulatory union; they find that centralized regulation is more likely to emerge among relatively homogeneous countries, and is unanimously preferred to independence only if its standards are higher than those of all countries individually.

In this paper, we adopt a slightly different focus to this existing literature in that we focus less on differences between national countries/regulators, and more on the, in our view at least as important, differences between national

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<sup>1</sup>See European Commission (2012) and Beck (2012) for guidelines and issues regarding the banking union debate.

<sup>2</sup>See e.g. Santos (2001) for a review of this literature.

and supranational regulators' objectives and their means to implement them. For this, we develop a simple two-country model where national regulators are concerned about expected costs of their banks failing and the opportunity cost of capital, but ignore cross-country spillovers associated with bank failures. A supranational regulator internalizes the positive spillover effects of higher capital ratios, but faces a potentially higher cost of observing bank types than national regulators due to its supervisory "remoteness"; it may furthermore attach less weight to banks' opportunity cost of capital if exposed to less regulatory capture than national regulators. Our results demonstrate the importance of capital requirements being determined at a supranational level particularly when cross-country spillovers are large and national regulators suffer from substantial degrees of regulatory capture. We further highlight the importance for such a supranational regulator to deal with the potential issues relating to supervisory "remoteness" in this context, and show that national regulators may be inclined to surrender regulatory power to a supranational regulator only when spillover effects are large but the degree of supervisory capture is relatively small.

The model is now developed in Section 2, our welfare results are derived and discussed in Section 3, and Section 4 concludes the paper.

## 2 Model

Banks in symmetric countries  $A, B$  have projects that pay  $x > 1$  with probability  $1 - p$  and  $x = 0$  otherwise. Expected bank profit is then  $\Pi = (1 - p)(x - (1 - k)) - kq$ , with cost of capital  $q > 1$  and capital ratio  $0 < k < 1$ . There is imperfect information about bank type such that  $p$  can be  $p^h = p + \kappa$  with probability 0.5 and  $p^l = p - \kappa$  otherwise, uncorrelated between countries. National regulators in countries  $A, B$  consider expected payouts to depositors (assuming full deposit insurance) and the opportunity cost of capital, but ignore positive spillover effects of higher capital ratios on

the other country. Regulators can observe bank type at a cost in which case they apply risk sensitive capital ratios, otherwise they simply impose a leverage ratio. A supranational regulator considers analogous objectives for the two countries jointly but internalizes the positive spillover effects of higher capital ratios between them. It faces a potentially higher cost of observing bank types than national regulators due to its supervisory "remoteness"; on the other hand, it may attach less weight to banks' opportunity cost of capital if it is exposed to less regulatory capture than national regulators.

The loss function faced by the supranational regulator is then

$$\begin{aligned} \Lambda^s = 2m_s + \frac{1}{4} \sum_{i \in \Theta} \sum_{j \in \Theta} (p_A^i (1 - k_A^i)^2 + \omega_s k_A^i (q - 1) + \phi p_B^j (1 - k_B^j) \\ + p_B^j (1 - k_B^j)^2 + \omega_s k_B^j (q - 1) + \phi p_A^i (1 - k_A^i)) \quad (1) \end{aligned}$$

where  $\omega_s > 0$  is its weight on the opportunity cost of capital,  $m_s > 0$  its cost of observing bank types in each country,  $\phi > 0$  the impact of spillovers arising from bank failures in the other country, and  $\Theta = \{h, l\}$  the set of bank types. The corresponding loss function considered by the national regulator in country  $A$  is

$$\Lambda_A^n = m_n + \frac{1}{4} \sum_{i \in \Theta} \sum_{j \in \Theta} (p_A^i (1 - k_A^i)^2 + \omega_n k_A^i (q - 1) + \phi p_B^j (1 - k_B^j)) \quad (2)$$

where  $\omega_n > \omega_s$  is its weight on the opportunity cost of capital, and  $0 < m_n < m_s$  its cost of observing the bank type; an analogous loss function applies to the national regulator in country  $B$ .

If the supranational regulator observes bank types at cost  $m_s$ , it solves for optimal risk sensitive capital requirements  $k_A^{sh}, k_A^{sl}, k_B^{sh}, k_B^{sl}$  through

$$\min_{k_A^h, k_A^l, k_B^h, k_B^l} \Lambda^s \quad (3)$$

Otherwise, it solves for the optimal leverage ratios  $k_A^s, k_B^s$  through

$$\min_{k_A, k_B} \Lambda^s \quad s.t. \quad k_A^h = k_A^l = k_A, \quad k_B^h = k_B^l = k_B, \quad m_s = 0 \quad (4)$$

Similarly, if the national regulator in country  $A$  observes the bank type at cost  $m_n$ , it solves for optimal risk sensitive capital requirements  $k_A^{nh}, k_A^{nl}$  through

$$\min_{k_A^h, k_A^l} \Lambda_A^n \quad (5)$$

Otherwise, it solves for the optimal leverage ratio  $k_A^n$  through

$$\min_{k_A} \Lambda_A^n \quad s.t. \quad k_A^h = k_A^l = k_A, \quad m_n = 0 \quad (6)$$

and analogously for the national regulator in country  $B$ .

We can summarize the resulting optimal risk sensitive capital and leverage requirements in

**Lemma 1.** *A supranational regulator would set risk sensitive capital or leverage ratios*

$$\begin{aligned} k_A^{sh} = k_B^{sh} &= 1 + \frac{\phi}{2} - \frac{\omega_s(q-1)}{2(p+\kappa)}, & k_A^{sl} = k_B^{sl} &= 1 + \frac{\phi}{2} - \frac{\omega_s(q-1)}{2(p-\kappa)} \\ k_A^s = k_B^s &= 1 + \frac{\phi}{2} - \frac{\omega_s(q-1)}{2p} \end{aligned}$$

*National regulators, on the other hand, would set risk sensitive capital or leverage ratios*

$$\begin{aligned} k_A^{nh} = k_B^{nh} &= 1 - \frac{\omega_n(q-1)}{2(p+\kappa)}, & k_A^{nl} = k_B^{nl} &= 1 - \frac{\omega_n(q-1)}{2(p-\kappa)} \\ k_A^n = k_B^n &= 1 - \frac{\omega_n(q-1)}{2p} \end{aligned}$$

*Proof.* Follows from solving the minimization problems eqs. (3)-(6)

We can further state

**Corollary 1.** *It holds that*

$$\begin{aligned}
& k_A^s > k_A^n \\
& k_A^{sh} > k_A^{nh} \quad , \quad k_A^{sl} > k_A^{nl} \\
& k_A^s > \frac{k_A^{sh} + k_A^{sl}}{2} \quad , \quad k_A^n > \frac{k_A^{nh} + k_A^{nl}}{2}
\end{aligned}$$

and analogously for country  $B$ .

We thus observe that supranational leverage ratios are set higher than national ones; the same holds true for the corresponding risk sensitive capital requirements. These results are driven by the spillover effects that are internalized by the supranational regulator, and reinforced by its potentially more limited focus on the opportunity cost of capital. Leverage ratios are higher than expected risk sensitive capital requirements at both national and supranational levels, a result driven by the convexity in regulators' loss functions.

Evaluating the national/supranational regulators' loss functions  $\Lambda^n, \Lambda^s$  using the respective optimal risk sensitive capital and leverage ratios given in Lemma 1, we can then state

**Proposition 1.** *The national/supranational regulators prefer risk sensitive capital ratios to leverage ratios if their costs of discovering bank type  $m_n, m_s$  are below the respective thresholds*

$$m'_i = \frac{(q-1)^2 \kappa^2 \omega_i^2}{4p(p^2 - \kappa^2)} > 0 \quad , \quad i = n, s$$

and the reverse holds otherwise. The relative benefits of risk sensitive capital ratios are increasing in regulators' respective weights on the opportunity cost of capital  $\omega_i$  and the difference in insolvency risk between bank types  $\kappa$ .

*Proof.* The supranational regulator's loss differential  $\Lambda^s(k_A^s, k_B^s) - \Lambda^s(k_A^{sh}, k_A^{sl}, k_B^{sh}, k_B^{sl})$  evaluates to

$$-2m_s + \frac{(q-1)^2 \kappa^2 \omega_s^2}{2p(p^2 - \kappa^2)}$$

while national regulator  $A$ 's loss differential  $\Lambda^n(k_A^n) - \Lambda^n(k_A^{nh}, k_A^{nl})$  evaluates to

$$-m_n + \frac{(q-1)^2 \kappa^2 \omega_n^2}{4p(p^2 - \kappa^2)}$$

for which the roots  $m'_s, m'_n$  are readily obtained; comparative statics are straightforward given assumptions.

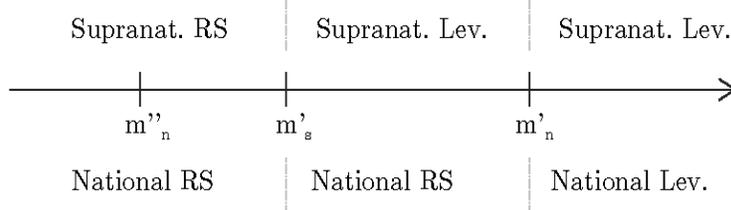
Regulators' loss functions are assumed to be convex in payouts to depositors in the case of bank failure, thus risk sensitive capital ratios improve on leverage ratios to a larger extent the greater the difference in insolvency risk between bank types. Discovering bank type is costly for regulators, however, giving rise to thresholds in the cost of bank type discovery above which the reduction in expected losses from bank failures associated with risk sensitive capital requirements is insufficient to be worthwhile. Furthermore, as leverage ratios are higher than expected risk sensitive capital ratios (see Corollary 1), both national and supranational regulators value the latter even more the greater their emphasis on the opportunity cost of capital.

Whether national and/or supranational regulators prefer risk sensitive capital ratios or leverage ratios thus depends on their respective costs of discovering bank type; the different possible combinations are sketched in Figure 1, and more formally summarized in

**Corollary 2.** *Both national and supranational regulators prefer risk sensitive capital ratios if  $m_s < m'_s$  or leverage ratios if  $m_n > m'_n$ ; otherwise, supranational regulators prefer leverage ratios while national regulators prefer risk sensitive capital ratios.*

*Proof.* Follows as  $m'_n > m'_s$  holds from Proposition 1.

Figure 1: Regulators' preference of risk-sensitive capital vs leverage ratios depending on cost of discovering bank type



### 3 Welfare analysis and discussion

#### 3.1 Supranational regulator as social planner

We now want to examine the welfare implications of setting risk sensitive capital or leverage requirements at either the national or supranational level. Assuming that the supranational regulator's preferences are identical to the social planner's, this can be achieved by evaluating the supranational regulator's loss function  $\Lambda^s$  using the respective optimal risk sensitive capital and leverage ratios given in Lemma 1. For this we define  $\omega_d \equiv \omega_n - \omega_s$  as regulators' weight differential on the opportunity cost of capital, and  $m_d \equiv m_s - 2m_n$  as regulators' cost differential of discovering bank type; we further assume  $\omega_d < \omega_s$  to avoid some counterintuitive results arising otherwise.

Comparing firstly supranational leverage ratios with national ones, we can state

**Lemma 2.** *Supranational leverage ratios are preferable to national ones throughout. Their relative benefit is increasing in the size of the spillover  $\phi$  and regulators' weight differential on the opportunity cost of capital  $\omega_d$ .*

*Proof.* The respective loss differential  $\Lambda^s(k_A^n, k_B^n) - \Lambda^s(k_A^s, k_B^s)$  evaluates to

$$\frac{(p\phi + (q - 1)\omega_d)^2}{2p}$$

which is positive; comparative statics are straightforward given assumptions.

The supranational leverage ratios internalize the effect of spillovers arising from bank failures in the other country, which are ignored by national regulators in their setting of the optimal leverage ratio. Additionally, national regulators are prone to be overly concerned by the opportunity cost of capital due to stronger regulatory capture, leading to capital requirements that are also too low from a supranational perspective.

We can similarly compare supranational risk sensitive capital ratios with national ones, and obtain

**Lemma 3.** *Supranational risk sensitive capital ratios are preferable to national ones if regulators' cost differential of discovering bank type  $m_d$  is below the threshold*

$$m'_d = \frac{1}{2} \left( (q-1)\phi\omega_d + \frac{p}{2} \left( \phi^2 + \frac{(q-1)^2\omega_d^2}{p^2 - \kappa^2} \right) \right) > 0$$

and the reverse holds otherwise. The supranational risk sensitive capital ratios' relative benefit is increasing in the size of the spillover  $\phi$ , regulators' weight differential on the opportunity cost of capital  $\omega_d$  and the difference in insolvency risk between bank types  $\kappa$ .

*Proof.* The respective loss differential  $\Lambda^s(k_A^{nh}, k_A^{nl}, k_B^{nh}, k_B^{nl}) - \Lambda^s(k_A^{sh}, k_A^{sl}, k_B^{sh}, k_B^{sl})$  evaluates to

$$\frac{1}{2} \left( -4m_d + 2(q-1)\phi\omega_d + p \left( \phi^2 + \frac{(q-1)^2\omega_d^2}{p^2 - \kappa^2} \right) \right)$$

for which the root  $m'_d$  is readily obtained; comparative statics are straightforward given assumptions.

As with leverage ratios, the supranational regulator internalizes the effect of cross-country spillovers in its setting of optimal risk sensitive capital ratios,

which are not taken into account by national regulators. Similarly, as national regulators overemphasize the opportunity cost of capital, they set risk sensitive capital requirements that are even further below what the supranational regulator would consider appropriate. These two benefits have, however, to be weighed against the greater cost faced by the supranational regulator in determining bank type, due to the increased supervisory "remoteness" it faces. This gives thus rise to a threshold in how large regulators' cost differential of discovering bank type can be before it negates the benefits brought by supranational risk sensitive capital ratios in terms of internalization of spillovers and reduced exposure to regulatory capture.

It is lastly interesting to compare supranational leverage ratios with national risk sensitive capital ratios; we obtain

**Lemma 4.** *Supranational leverage ratios are preferable to national risk sensitive capital ratios if national regulators' cost of discovering bank type  $m_n$  is above the threshold*

$$m_n'' = \frac{1}{4} \left( \frac{(q-1)^2(\kappa^2\omega_s^2 - p^2\omega_d^2)}{p(p^2 - \kappa^2)} - (p\phi^2 + 2\phi\omega_d(q-1)) \right)$$

whereas the reverse holds otherwise. The supranational leverage ratio's relative benefit is increasing in the size of the spillover  $\phi$  and regulators' weight differential on the opportunity cost of capital  $\omega_d$ , but decreasing in the difference in insolvency risk between bank types  $\kappa$ .

*Proof.* The respective loss differential  $\Lambda^s(k_A^{nh}, k_A^{nl}, k_B^{nh}, k_B^{nl}) - \Lambda^s(k_A^s, k_B^s)$  evaluates to

$$2m_n + \frac{1}{2}p\phi^2 + \phi\omega_d(q-1) + \frac{(q-1)^2(p^2\omega_d^2 - \kappa^2\omega_s^2)}{2p(p^2 - \kappa^2)}$$

for which the root  $m_n''$  is readily obtained; comparative statics are straightforward given assumptions.

When national regulators' cost of discovering bank type is larger than a given threshold, the potential advantage of risk sensitive capital ratios over leverage ratios, which stems from the convexity of regulators' loss functions, is outweighed by the fact that the supranational regulator internalizes the effect of cross-country spillovers in the setting of optimal capital ratios, and also may be less exposed to regulatory capture than national regulators. On the other hand, national risk sensitive capital ratios can dominate supranational leverage ratios when spillover effects, the degree of regulatory capture and the national regulators' cost of discovering bank type are sufficiently small or the difference in insolvency risk between bank types is relatively large.

We can now draw on the relative results obtained so far to characterize the conditions under which risk sensitive capital or leverage requirements determined at either the national or supranational level are best overall from the viewpoint of the supranational regulator, and thus, given our assumptions, the social planner. We obtain

**Proposition 2.** *The best type of capital requirement from an overall welfare perspective is given as follows:*

- *When the national regulator's cost of discovering bank type  $m_n$  is above the threshold  $m_n''$  given in Lemma 4, supranational risk sensitive capital ratios are preferable overall if the supranational regulator's cost of discovering bank type  $m_s$  is below the threshold  $m_s'$  given in Proposition 1, whereas supranational leverage ratios are most preferred otherwise.*
- *When the national regulator's cost of discovering bank type  $m_n$  is below the threshold  $m_n''$  given in Lemma 4, supranational risk sensitive capital ratios are preferable overall if regulators' cost differential of discovering bank type  $m_d$  is below the threshold  $m_d'$  given in Lemma 3, whereas national risk sensitive capital ratios are most preferred otherwise.*

*Proof.* Part 1 follows from Proposition 1 and Lemmas 2 and 4, resulting in the preference ordering  $SR \succ SL \succ NR \succ NL$  or  $SR \succ SL \succ NL \succ$

$NR$ , and  $SL \succ NR \succ NL$ ,  $SL \succ SR$  or  $SL \succ NL \succ NR$ ,  $SL \succ SR$ , respectively. Part 2 follows from Lemmas 2, 3 and 4, resulting in the preference ordering  $SR \succ NR \succ SL \succ NL$  and  $NR \succ SL \succ NL$ ,  $NR \succ SR$ , respectively.

Clearly, regulators' (relative) costs of discovering bank type are key in determining whether capital requirements set by national or supranational regulators are preferable, and whether these should be in the form of risk sensitive capital or leverage ratios. Capital requirements set by national regulators are best, in the form of risk sensitive capital ratios, only if their cost of discovering bank type is sufficiently small in a scenario where national and supranational regulators' cost differential of discovering bank type is sufficiently large. In all other scenarios, letting supranational regulators determine capital requirements emerges as best, generally in the form of risk sensitive capital requirements, but for the case where the supranational regulator's cost of discovering bank type is sufficiently large to warrant implementation of a supranational leverage ratio instead. Our results are thus strongly supportive of the important role a supranational regulator can play particularly when cross-country spillovers are large and national regulators are exposed to substantial degrees of regulatory capture. However, it also highlights the importance for such a supranational regulator to address potential issues relating to supervisory "remoteness" in this context, e.g. by delegating certain supervisory tasks to national supervisors that may be able to carry these out more cost-efficiently.

### **3.2 National regulators' perception of supranational regulation**

We now go one step further by examining how any such supranational regulation might be perceived by national regulators, to allow us to discuss whether national regulators might agree to surrender regulatory power to a suprana-

tional regulator, or whether such a transition would have to be imposed on them. For this we assume that national regulators assess different regulatory alternatives based only on their own cost of discovering bank type  $m_n$ , with the difference  $m_d$  being covered by the supranational regulator in the case of optimal regulation at that level.

Comparing supranational leverage ratios with national ones as above, but now from the perspective of national regulators, we can then state

**Lemma 5.** *National regulators perceive supranational leverage ratios as preferable to national ones if the spillover  $\phi$  is above the threshold*

$$\phi' = \frac{(q-1)\omega_d}{p} > 0$$

whereas the reverse holds otherwise. The supranational leverage ratios' relative benefit is decreasing in regulators' weight differential on the opportunity cost of capital  $\omega_d$ .

*Proof.* The respective loss differential  $\Lambda^n(k_A^n, k_B^n) - \Lambda^n(k_A^s, k_B^s)$  evaluates to

$$\frac{1}{4}p \left( \phi^2 - \frac{(q-1)^2\omega_d^2}{p^2} \right)$$

for which the (positive) root  $\phi'$  is readily obtained; comparative statics are straightforward given assumptions.

We can similarly compare supranational risk sensitive capital ratios with national ones, and obtain

**Lemma 6.** *National regulators perceive supranational risk sensitive capital ratios as preferable to national ones if the spillover  $\phi$  is above the threshold*

$$\phi'' = \frac{(q-1)\omega_d}{\sqrt{p^2 - \kappa^2}} > 0$$

whereas the reverse holds otherwise. The supranational risk sensitive capital ratios' relative benefit is decreasing in regulators' weight differential on the opportunity cost of capital  $\omega_d$  and the difference in insolvency risk between bank types  $\kappa$ .

*Proof.* The respective loss differential  $\Lambda^n(k_A^{nh}, k_A^{nl}, k_B^{nh}, k_B^{nl}) - \Lambda^n(k_A^{sh}, k_A^{sl}, k_B^{sh}, k_B^{sl})$  evaluates to

$$\frac{1}{4}p \left( \phi^2 - \frac{(q-1)^2 \omega_d^2}{p^2 - \kappa^2} \right)$$

for which the (positive) root  $\phi''$  is readily obtained; comparative statics are straightforward given assumptions.

As national regulators ignore positive spillover effects of higher capital ratios on the other country, supranational risk sensitive capital ratios or leverage ratios can nevertheless be perceived as preferable by national regulators as long as those spillover effects are substantial enough. This effect becomes weaker, however, the greater the weight differential on the opportunity cost of capital between national and supranational regulators: the higher capital ratios imposed by the supranational regulator are then perceived as being too costly by national regulators as they are facing greater regulatory capture.

Lastly, it is again helpful to compare supranational leverage ratios with national risk sensitive capital ratios; we obtain

**Lemma 7.** *National regulators perceive supranational leverage ratios as preferable to national risk sensitive capital ratios if the national regulator's cost of discovering bank type  $m_n$  is above the threshold*

$$m_n''' = \frac{(q-1)^2(p^2 \omega_d^2 + \kappa^2 \omega_s(2\omega_d + \omega_s))}{4p(p^2 - \kappa^2)} - \frac{1}{4}p\phi^2$$

whereas the reverse holds otherwise. The supranational leverage ratio's relative benefit is increasing in the size of the spillover  $\phi$ , but decreasing in regulators' weight differential on the opportunity cost of capital  $\omega_d$  and the difference in insolvency risk between bank types  $\kappa$ .

*Proof.* The respective loss differential  $\Lambda^n (k_A^{nh}, k_A^{nl}, k_B^{nh}, k_B^{nl}) - \Lambda^n (k_A^s, k_B^s)$  evaluates to

$$m_n + \frac{1}{4}p\phi^2 - \frac{(q-1)^2(p^2\omega_d^2 + \kappa^2\omega_s(2\omega_d + \omega_s))}{4p(p^2 - \kappa^2)}$$

for which the root  $m_n'''$  is readily obtained; comparative statics are straightforward given assumptions.

We observe that, even from national regulators' perspective, as long as their cost of discovering bank type is larger than a given threshold, the potential advantage of risk sensitive capital ratios over leverage ratios is outweighed by the fact that the supranational regulator internalizes the effect of cross-country spillovers in the setting of optimal capital ratios. This effect obviously becomes stronger the more substantial those spillover effects; it matters less, however, the greater the weight differential on the opportunity cost of capital between national/supranational regulators and the more sizeable the difference in insolvency risk between bank types.

We can now draw on the relative results obtained in this section to characterize the conditions under which risk sensitive capital or leverage requirements determined at the supranational level are also perceived as preferable from the viewpoint of national regulators. We obtain

**Proposition 3.** *National regulators perceive supranational regulation as preferable if*

- *the national regulator's cost of discovering bank type  $m_n$  is above the threshold  $m_n''$  and*
  - *the spillover  $\phi$  is above the threshold  $\phi''$  when the supranational regulator's cost of discovering bank type  $m_s$  is below the threshold  $m_s'$*
  - *the spillover  $\phi$  is above the threshold  $\phi'$  when the national regulator's cost of discovering bank type  $m_n$  is above the threshold  $m_n'$*

- the national regulator’s cost of discovering bank type  $m_n$  is above the threshold  $m_n'''$  but below the threshold  $m_n'$  and the supranational regulator’s cost of discovering bank type  $m_s$  is above the threshold  $m_s'$
- the national regulator’s cost of discovering bank type  $m_n$  is below the threshold  $m_n''$  and the spillover  $\phi$  is above the threshold  $\phi''$

whereas they would prefer to remain with national regulation otherwise.

*Proof.* It can be shown that  $m_n'' < m_s' < m_n'$  holds (see Figure 1). Then in line with Corollary 2, for  $m_n > m_n''$ , Lemma 6 applies if  $m_s < m_s'$ , Lemma 5 applies if  $m_n > m_n'$ , and Lemma 7 applies if  $m_s > m_s' \wedge m_n < m_n'$ . For  $m_n < m_n''$ , Lemma 6 applies throughout.

We thus observe that national regulators may generally be inclined to surrender regulatory power to a supranational regulator as long as the spillover effects at play are substantial enough. However, this effect needs to be strong enough to outweigh the perceived disadvantage of relatively higher supranational capital ratios, stemming from national supervisors greater concern about the cost of capital faced by banks, in line with their greater exposure to supervisory capture. Which of those two effects then gains the upper hand in practice is clearly an empirical question, and unfortunately lies largely outside the influence of supranational regulators or policymakers more generally.

## 4 Conclusion

We developed a simple two-country model where national regulators are concerned about expected costs of their banks failing and the opportunity cost of capital, but ignore cross-country spillovers associated with bank failures. A supranational regulator internalizes the positive spillover effects of higher capital ratios, but faces a potentially higher cost of observing bank types

than national regulators due to its supervisory "remoteness"; it may furthermore attach less weight to banks' opportunity cost of capital if exposed to less regulatory capture than national regulators. Our results demonstrated the importance of capital requirements being determined at a supranational level particularly when cross-country spillovers are large and national regulators suffer from substantial degrees of regulatory capture. We also stressed the importance for such a supranational regulator to address the potential issues relating to supervisory "remoteness" in this context, and showed that national regulators may be inclined to surrender regulatory power to a supranational regulator only when spillover effects are large but the degree of supervisory capture is relatively small.

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