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## ABSTRACT

### Level Playing Fields in International Financial Regulation\*

We model the interaction between two economies where banks exhibit both adverse selection and moral hazard and bank regulators try to resolve these problems. We find that liberalizing bank capital flows between economies reduces total welfare by reducing the average size and efficiency of the banking sector. This effect can be countered by adopting a 'level playing field' forcing international harmonization of capital requirements and deposit rates across economies. Such a policy is good for weaker regulators whereas a laissez-faire policy under which each country chooses its own capital requirement is better for the higher quality regulator. We find that imposing a level playing field among countries is globally optimal provided regulators' abilities are not too different, and comment on how shocks will be transmitted differently across the two policy regimes. We extend the model to allow for multinational banks, licensed by both regulators, showing that the same considerations arise in this context. Allowing multinationals improves welfare when bank capital can flow across borders, despite the negative impact on local banks.

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## **I. Introduction**

An important theme in recent discussions of financial regulation has been the desirability of an internationally level playing field.<sup>1</sup> Under a level playing field, institutions in different countries are subject to the same regulations. Advocates of the level playing field argue that it allows internationally active financial institutions to compete on an equal footing, and hence that it is likely to result in efficiency gains as more efficient institutions gain a larger market share. In this paper we examine the costs and benefits of imposing a level playing field. We draw attention to an externality between financial regulators that can be corrected by agreeing on a level playing field, but we argue that such an agreement comes at a cost: it requires participating countries to adopt lowest common denominator regulations, and hence it penalises countries with better regulators.

The problem with level playing fields that we highlight is that tighter capital regulation can be viewed as a substitute for regulatory ability to screen and monitor banks. Therefore it is efficient to allow better regulators to employ looser capital regulation. On the other hand, we show that when economies are open, and bank capital is mobile, local regulators may impose important externalities upon one another unless there is international regulatory coordination on common capital requirements and deposit rates. This is despite the fact that we employ a model where banks from different countries do not directly compete with one another, and we abstract away from possible career concerns or selfish preferences on the regulator's part and assume that her only concern is to maximise welfare in the economy for which she is responsible. We show in this simple setting that when there is no international coordination of regulatory decisions, local regulatory decisions may impose *cherry-picking externalities* upon foreign banks. These externalities reduce foreign country welfare, and they may give rise to financial contagion. We show that these problems can be resolved by imposing a level playing field. The optimal international regulatory regime trades-off the costs of avoiding these problems against the benefits of doing so.

We consider a setting in which the banking sector exhibits both moral hazard and adverse selection. In particular, some, but not all, bankers are able to perform welfare-increasing monitoring of their investments. Monitoring is costly and depositors will commit their funds only if monitoring is incentive compatible. Monitoring will be incentive compatible only if bankers hold enough capital relative to deposits and if deposit rates are low enough (i.e., the margin which bankers earn on deposits is high enough). The lower the bank's capital level, the greater the payment which depositors must make to provide the bank with incentives. Depositors are reluctant to deposit even though monitoring generates a surplus, because some bankers are incapable of monitoring and will accept the depositors' fees without providing anything in return. The possibility that depositors will encounter such a banker limits the size of the payment which they are willing to make, and this in turn limits the size of the bank. Regulators can reduce the severity of the adverse selection problem by screening potential bankers: this increases depositor confidence and allows the banking sector to expand. The better the regulator's screening technology, the larger the banking system and hence the looser capital requirements should be when the economy is closed.

We use this model to analyse a two-economy world where regulators differ in their screening abilities. The intuition for our results is widely applicable and can be easily communicated using the following simple

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<sup>1</sup>The desire to establish a level playing field was one of the driving forces behind the 1988 Basel Accord. In its early discussions of the new Accord, the Basle Committee on Banking Supervision (1999, p.10) stresses its continuing commitment to the concept of a level playing field for banks operating in international markets.

story. Consider a world in which students select their university on the basis of the quality of the signal which it sends to the labour market. There are two universities, which are distinguished only by their respective abilities to identify talent. In this situation, every candidate will apply firstly to the elite institution; unsuccessful applicants will then apply to the other one. After the elite university has employed its superior screening technology, the pool from which the other one samples will be of lower average quality. This is inefficient: it would be better for the second-tier school to make the first choice, so that the subsequent harder decision problem is faced by the elite school, which is better equipped to deal with it. Allowing the candidates to apply to both schools has minimal effect upon the desirability of an elite school education, but serves to weaken the signal provided by the second-tier school, and hence to diminish its value.

Precisely the same effect is at work in our model. We consider two open economies in which one regulator (the “Northern” one) is better at screening licence applicants than the other (the “Southern” regulator). Possession of a Northern banking licence therefore sends a better signal to the capital markets and hence results in cheaper finance and higher profits. It follows that when bank capital is mobile, every institution will apply in the first instance for a Northern licence. Southern licences in an open economy will therefore send a weaker signal than they would in a closed economy. This will reduce the size of the Southern banking sector and with it Southern welfare levels. Opening the economies leaves Northern welfare unchanged, but imposes a *cherry-picking externality* upon the South.

Cherry-picking externalities arise because all bankers apply in the first instance for a licence to operate in the North, where they will be more profitable. It follows that such externalities do not arise if regulators manage to coordinate upon an international regulatory framework that makes licence application equally attractive in every country. This is our formal definition of a level playing field. It requires that banks be subject to the same capital requirements, and also that they charge the same deposit rates (and hence earn the same profits on their deposits). In our model, then, level playing fields require capital requirements in the North to increase to their minimum level in the South, and deposit rates in the North to increase to the level of the South. In other words, a *lowest common denominator effect* prevails. Regulators are therefore faced with two options: international coordination upon a level playing field which will disadvantage the North, and a *laissez-faire* policy of no international regulation of the playing field, in which case the cherry-picking effect will adversely affect the South.

We compare welfare across the two policy regimes to analyse the appropriate trade-off between the cherry-picking externality and the lowest common denominator effect. For a given Northern regulator ability, the cherry-picking effect is unaffected by the Southern regulator’s ability, while the lowest common denominator effect is decreasing in Southern regulator ability. It is therefore better to adopt a level playing field, and hence to experience the lowest common denominator effect, when Northern and Southern regulator abilities are similar; when they are very different, the cherry-picking externality is the lesser of the two evils and an unregulated playing field dominates.

We believe that our results cast some light upon recent controversies surrounding the welfare effects of financial liberalisation. Several authors have argued that opening an economy increases welfare when there are insufficient local funds to cover all of the available productive investments, or when international diversification increases investors’ risk-bearing capabilities (see for example Obstfeld and Rogoff, 1996, and Obstfeld, 1998). The South East Asian crisis of 1997 challenged this consensus (Radelet and Sachs, 1998): several countries which had opened their economies experienced severe problems as a result of a rapid

capital withdrawals by foreign investors. Many of the difficulties may be attributable to foreign currency borrowings: Stiglitz (2004) and Sachs (1998) have argued that they could have been avoided by restricting capital flows, or substantially increasing capital requirements for developing country banks. However, the latter recommendation runs against the grain of the Basle Committee (1988) capital adequacy regulations, and its theoretical basis is unclear.

In contrast to the earlier literature on financial liberalisation, our work identifies a reputational link between open economies, and it highlights a previously unrecognised *reputational* form of contagion. Consider firstly a world without international regulatory cooperation and hence with an unregulated playing field. Suppose that in this world the Northern regulator's reputation is exogenously shocked upwards and hence that the Northern adverse selection problem is somewhat diminished. This will allow lower Northern capital requirements, larger Northern banks and an increased level of economic activity in the North. There will however be a knock-on effect in the South. Strengthening the Northern regulator's ability to identify able bankers will exacerbate the cherry-picking externality: the pool from which the Southern regulator selects will be of lower average quality and adverse selection will become a greater problem in the South just as it diminishes in the North. As a result Southern capital requirements will necessarily increase: an improvement in Northern credit markets will cause a credit contraction in the South.

The contagion effect runs in the opposite direction when there is international coordination on a level playing field. This case is easier to understand: because the size of Northern banks is determined by the maximum size of Southern banks, changes in the Southern credit markets must be mirrored in the North.

Reputational contagion occurs in our model after banking licences have been allocated. It arises because depositors' assessments of bank quality change and with them, the maximum size of the bank changes. As a result, capital flows into or out of the banking sector in each country, but it does not cross borders. The international contagion which we identify is not therefore *triggered* by capital flows, but occurs rather because bankers are able to set up shop abroad. After they have done so, neither exchange nor capital controls seem likely to attenuate this effect.

In our model, financial liberalisation without international coordination on capital requirements must ultimately raise Southern bank capital requirements. This result is in accordance with Hellman, Murdock, and Stiglitz (2000), who argue that South East Asian financial fragility in the wake of financial liberalisation is attributable to the failure of local regulators to raise capital requirements. However, Hellman *et al*'s results are driven by the deleterious effects of bank competition when depositors are insured. There is no deposit insurance in our model and banks can compete only until their monitoring incentive constraint binds: higher deposit rates would be inconsistent with monitoring and would fail to attract depositors, who thereby exert market discipline. Our results are driven instead by an adverse selection effect.

We extend our model to allow bankers to apply for licences to operate in more than one country. We call a bank with several licences a multinational bank. When Northern and Southern regulators receive independent signals, the multiple certification which multinational banks receive renders them more attractive to depositors. As a result they can pay lower deposit rates and operate on a larger scale without violating their monitoring constraint. When bankers must first apply for a licence in their home country before applying for a foreign licence there is no cherry-picking effect, and we show that allowing multinational banking is strictly welfare-increasing in both countries. In this circumstance a level playing field is never optimal. When, on the other hand, bankers can apply anywhere for their first licences the cherry-picking

effect re-appears.

The regulators in our model do not compete: they simply try to maximise welfare by selecting the most able bankers. In our simple framework with only national banks, the cherry-picking externality which the Northern regulator imposes upon the Southern one does not benefit Northern institutions. This distinguishes our work from some recent papers examining regulatory interaction. Acharya (2003) considers a model in which regulators maximise national bank value rather than social welfare *per se* and argues that when closure policies are heterogeneous, level playing fields can result in a welfare-reducing race to the bottom. Similarly, Dell’Ariccia and Marquez (2005) analyse incentives for international regulatory cooperation in a world in which regulators care only about national welfare, and are to some extent actuated by a concern for shareholders of domestic banks.

Our analysis is consonant with recent literature stressing the importance of institutions in emerging markets. If weak institutions are synonymous with low regulator ability then our model demonstrates that financial liberalisation is potentially welfare-decreasing when institutions are weak because it worsens the adverse selection problem in the local market. The central role of local institutions has also been stressed by Prasad, Rogoff, Wei, and Kose (2003), Stiglitz (2004), Demirgüç-Kunt and Detragiache (1998), and Demirgüç-Kunt and Kane (2002).

The paper is organised as follows. Section II presents a simple model of unregulated banking in which there is adverse selection of and moral hazard by banks. Section III shows how a regulator can increase value in a closed economy by screening licence applicants, and section IV examines the effect of opening the economy to foreign bankers with both level and unregulated playing fields for capital requirements. We examine the operation of multinational banks in section V. Section VI discusses the empirical implications of our work, and relates it to the existing empirical literature. Section VII considers a number of extensions to our model. Section VIII concludes. The more complex proofs appear in the appendix.

## II. The Model

We consider in world in which there are two countries, “the North” and “the South”, each of which has a population of  $N$  risk-neutral agents. The inhabitants of each country are endowed with \$1 and with a project which will return  $R$  in case it succeeds and 0 otherwise. The probability that a project succeeds is  $p_L$ .<sup>2</sup>

We assume in addition that there exist in each country  $B$  risk-neutral agents whom we refer to as *bankers*. Each banker is also endowed with \$1 (his *capital*) and with a constant returns to scale project, which will also return  $R$  or 0. Bankers’ projects succeed with probability  $p_L$  if unmonitored. A proportion of each country’s bankers is also endowed with a *monitoring technology*: we will refer to these bankers as *sound*. The monitoring technology increases the probability of project success to  $p_H = p_L + \Delta p > p_L$ . Monitoring is neither observable nor verifiable and its cost to the banker per dollar invested in his project is  $\$C > 0$ .

We assume that only  $\mu < B$  bankers in each country are sound and we write  $g \equiv \frac{\mu}{B}$  for the probability that a banker chosen at random will be sound:  $g$  is therefore a measure of the licence applicant *pool quality*.

Because bankers’ projects are scaleable they can augment their funds with deposits from other agents and manage them on their behalf. A banker who accepts deposits and manages funds in this fashion is said to be running a *bank*. We assume that the returns from bank investments are verifiable and hence contractible,

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<sup>2</sup>This project will serve as depositors’ outside option to investing in a bank. The fact that it is risky is immaterial here since all agents are risk-neutral. In other work (Morrison and White, 2005a) we endogenise the choice to become a banker.

so that *ex post* theft is outside the scope of our model.

We assume in this section that unregulated banks are able to commit to a particular bank size,  $k$ . In the remainder of the paper we examine regulated economies, where a regulator could enforce such a commitment to a given bank size through setting and enforcing capital requirements. So this assumption will not be crucial to our later results.

The relationship between a banker and his depositors is governed by a deposit contract under which the depositor receives a payment of  $R - Q$  per dollar invested if the project of the bank in which he invested is successful, and nothing otherwise. A banker who runs a bank of size  $k$  therefore receives a payment of  $R + (k - 1)Q$  in the event that his project succeeds (equal to  $R$  on his own capital and  $R - (R - Q) = Q$  left from the investment of the depositors' money).

We assume that it is efficient for bankers to monitor their investments if they can:

$$R\Delta p > C.$$

The return on deposits is therefore at least as great as that on self-managed funds. It follows that the social optimum is attained when all agents deposit their funds in banks and sound bankers monitor their investments. The greater the proportion of sound bankers, the greater will be the welfare gain from banking, and the higher will be the incentive of agents to deposit.

In this paper we are mainly concerned with examining the welfare effects of competition between national banking regulators upon social welfare when bank capital is internationally mobile. However, as a benchmark, we begin in this section by describing the constraints which the banking contract must satisfy with closed economies and in the absence of regulation. In the next section we will introduce a banking regulator into the model.

Firstly, sound bankers running a bank of size  $k$  must elect to monitor. This will be the case if the returns to a bank from a monitored investment exceed those on an unmonitored investment:

$$\begin{aligned} (R + (k - 1)Q)p_H - Ck &\geq (R + (k - 1)Q)p_L, \text{ or} \\ Q &\geq \frac{Ck - R\Delta p}{(k - 1)\Delta p}. \end{aligned} \quad (1)$$

Secondly, banking will not occur unless the deposit contract satisfies the bankers' participation constraint. Sound bankers are willing to accept deposits as long as  $(R + (k - 1)Q)p_H - Ck \geq Rp_H - C$ , or

$$Q \geq \frac{C}{p_H}. \quad (2)$$

Unsound bankers cannot monitor and so take the fee  $Q$  without working for it: their participation constraint is always satisfied when the sound bankers are willing to participate. When the banking incentive compatibility constraint (2) is satisfied, and in the absence of regulation which restricts bank entry or the number of banking licences, sound bankers will be unable to separate themselves from unsound bankers and so there will be  $B$  banks in each economy. The unconditional probability that a depositor's investment will yield a non-zero return is therefore

$$\pi(g) \equiv p_L + g\Delta p. \quad (3)$$

Because all depositors are *ex ante* identical and are faced with incentives which do not depend upon the actions of other depositors, we can without loss of generality consider only symmetric equilibria. We further restrict ourselves to pure strategy equilibria.

Depositing must satisfy the following individual rationality constraint:

$$(R - Q) \pi(g) \geq Rp_L, \text{ or} \\ Q \leq \frac{gR\Delta p}{\pi(g)}. \quad (4)$$

The left hand side of the first line above is the expected return to depositors from depositing when the probability of a payout is  $\pi(g)$ ; this must exceed the outside option  $Rp_L$  which they could earn by managing their own projects.

The monitoring IC constraint (1) is plotted in figure 1 with the banker's and depositor's participation constraints (2) and (4) in the case where the monitoring IC constraint crosses the depositors' IR constraint. This happens when

$$\pi(g) < \frac{Rp_L\Delta p}{R\Delta p - C}.$$

Sound bankers will wish to provide monitoring services only when the fee  $Q$  which they receive from depositors is sufficiently high to compensate them for their delegated monitoring activities and also to ensure that monitoring is incentive-compatible. This is the case above the lines labelled *MIC* and *BIC* in figure 1. Depositors will elect to monitor only when the deposit rate  $(R - Q)$  is sufficiently high: in the absence of regulation, this occurs for values of  $Q$  below the line labelled *UDIR*. Unregulated banking is therefore possible for  $(k, Q)$  pairs which lie within the shaded region on the figure and the largest possible bank size is  $k(g)$ . Note that when  $\pi(g) > \frac{Rp_L\Delta p}{R\Delta p - C}$  so that equations (1) and (4) never intersect, the shaded region is unbounded and banks of any size are possible.

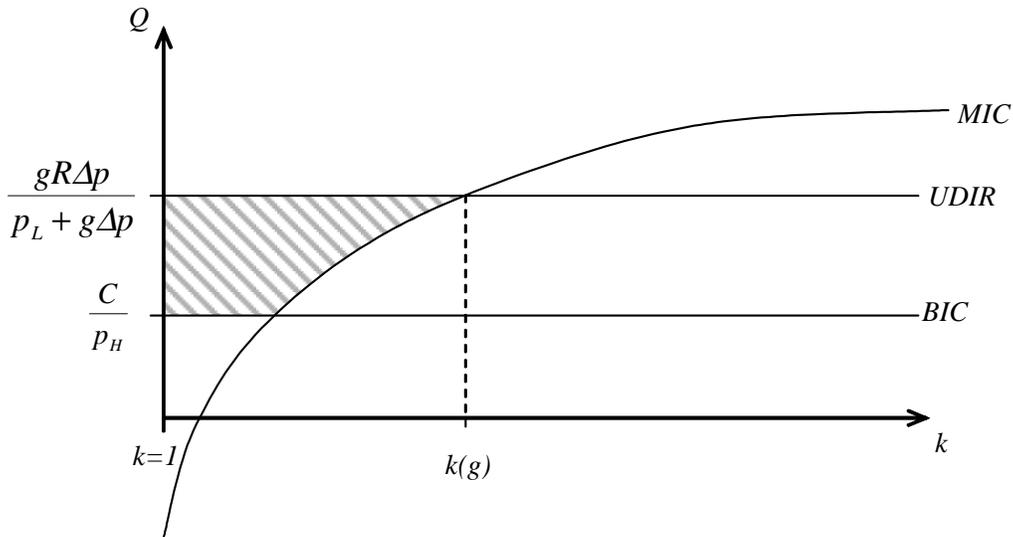


Figure 1: **Banking in Unregulated Closed Economies.** The monitoring IC constraint (1) and the banker's and depositors' respective IR constraints (2) and (4) and labelled *MIC*, *BIC* and *UDIR*. Banks in the unregulated economy are possible at  $(k, Q)$  pairs in the shaded region. The maximum bank size is  $k^U$ .

The following result sets out the properties of unregulated closed economies.

PROPOSITION 1 *In unregulated closed economies:*

1. Banking is possible if and only if

$$\pi(g) \geq \frac{Rp_L p_H}{Rp_H - C}; \quad (5)$$

2. When condition (5) is satisfied, the largest possible bank size is  $\min(k(g), \frac{N}{B})$  for  $\pi(g) < \frac{Rp_L \Delta p}{R\Delta p - C}$ , where

$$k(g) \equiv \frac{Rp_L \Delta p}{Rp_L \Delta p - \pi(g)(R\Delta p - C)}, \quad (6)$$

and it is  $\frac{N}{B}$  for larger values of  $g$ .

3. When condition (5) is satisfied, the volume of funds deposited with sound bankers is  $\mu \times \min(k(g), \frac{N}{B})$ .

*Proof.* Banking is possible precisely when the depositor's IR constraint (4) lies above the banker's participation constraint (2): this reduces to equation (5). The largest possible bank occurs when  $(k, Q)$  lies at the intersection between equations (1) and (4): this occurs when  $k = k(g)$ . Part 3 follows immediately from the fact that there are  $\mu$  sound bankers in each country.  $\square$

When equation (5) is satisfied banks can exist in the absence of regulation and some deposits will be managed by sound agents. At the productive optimum depositors are indifferent between their own projects and banks, while bankers are strictly better off than they are in autarky. Although unregulated banking is a Pareto-improvement upon autarky, it does not follow that assets are allocated in the most productive fashion: welfare would be increased by denying unsound bankers licences to accept deposits. When equation (5) is not satisfied, restricting access to licences will be a necessary precondition for depositing to occur at all. In the next section we show how a regulator can increase both bank size and social welfare by screening banking licence applicants.

### III. Bank Regulation in Closed Economies

In this section, we introduce to each economy a banking regulator whose aim is to maximise domestic welfare. Since all agents are risk-neutral and the regulator is unconcerned with questions of distribution, this amounts to maximising the expected output of agents' investments, which will be divided between bankers and depositors. We now assume that deposit-taking is illegal without a banking licence, and that only the regulator can award banking licences. By allocating licences appropriately, the regulator can affect the proportion of sound and unsound bankers that depositors will encounter.<sup>3</sup> As in section II we assume that bankers can commit to a particular bank size  $k$ , and that they extract all of the surplus which their monitoring brings.

The regulator has a screening technology for distinguishing between sound and unsound bankers when awarding licences. Suppose that the regulator is required to assign  $m$  licences from a population of  $P$  bankers

<sup>3</sup>In our model, we neglect closure policy and allow regulators to influence banking sector quality only at the ex ante stage by influencing the quality of successful licence applicants. In practice, of course, regulators can also influence bank quality by forcing bank exit. We do not believe that the qualitative results of our analysis would be altered by allowing the regulator to close unsound banks at the interim stage with some probability (see Morrison and White, 2005a), so we abstract from this possibility in the interests of simplicity. One can also reinterpret the current model as a model of closure policy by supposing that each country currently has  $N$  banks with average quality  $g$  operating, and that the regulator's role is to consider which  $\mu$  banks should have their licences renewed. In principle, we could also model the process of entry and exit by running our economy for several periods and allowing our regulators to consider whether to renew licences at the beginning of each period, but this would introduce other complications relating to regulatory management of reputation (Morrison and White, 2005b).

of whom a proportion  $\gamma$  is sound.<sup>4</sup> When she applies the technology it will randomise between the following two outcomes:

1. *Random assignment.* In this case the technology will allocate licences randomly in such a way as to allocate precisely  $\gamma m$  licences to sound bankers and  $(1 - \gamma)m$  licences to unsound bankers;
2. *Correct assignment.* In this case the technology will allocate licences to  $\min(m, \gamma P)$  sound bankers, and if  $m > \gamma P$  it will randomly assign the remaining  $m - \gamma P$  licences to unsound bankers.

We refer to the probability that the licences are correctly assigned to sound bankers as the regulator's *ability*. Regulator ability is a technological parameter; the Northern regulator's ability is  $a^N$  and the Southern regulator has ability  $a^S < a^N$ . In this section we continue to analyse closed economies and so we will typically drop the country superscript and refer to abilities as  $a$ .<sup>5,6</sup>

We assume that the regulator allocates precisely  $\mu$  banking licences. This simplifying assumption is actually the first best policy for sufficiently high ability. To see this, note that if the regulator's ability was 1 it would clearly be optimal to allocate  $\mu$  licences, since allocating more licences would serve only to diminish the quality of the banker pool. This would reduce depositors' confidence in the banking sector and so would increase the minimum deposit rate which they would accept; this in turn would lower the maximum bank size compatible with monitoring. This size effect would reduce welfare. For lower abilities the size effect would still obtain, but its welfare consequences would to some extent be countered by a quality effect: increasing the number of licences raises the likelihood that all sound bankers receive a licence when the technology randomises. For sufficiently high  $a$ , the size effect outweighs the quality effect and the first best policy is to allocate  $\mu$  licences.<sup>7</sup>

The banker monitoring incentive compatibility and participation conditions (1) and (2) are unchanged by the introduction of the regulator.

With  $\mu$  banks the probability  $\gamma$  that depositors invest in a sound bank depends upon the regulator's ability and the applicant pool quality  $g$  as follows:

$$\gamma_a(g) \equiv a + (1 - a)g. \tag{7}$$

The probability  $\pi_a(g)$  of positive bank returns is therefore

$$\pi_a(g) \equiv p_L + \gamma_a(g)\Delta p. \tag{8}$$

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<sup>4</sup>Throughout the paper we consider only equilibria in which  $P \geq m$  so that there are sufficient licence applicants for all licences to be awarded. Our off the equilibrium path assumption is that in the event that fewer than  $m$  applications are received, the regulator holds all the applicants in reserve until more applicants arrive and the total pool size exceeds  $m$ .

<sup>5</sup>For much of the paper, this technology could be alternatively presented in terms of regulator reputation. Suppose that good regulators are able perfectly to distinguish sound from unsound bankers, while bad ones do so with probability  $\frac{1}{2}$ , and interpret the regulator's ability as the probability which depositors assign to the event that she is good. Then the technology in the text is equivalent in a one-shot game with more than  $m$  sound bankers to licence allocation by a regulator who repeatedly samples the applicant pool with replacement until  $m$  licences have been awarded. We do not adopt this approach for two reasons. Firstly, when  $a$  is a reputational parameter rather than a technological one regulators may in some circumstances attempt to signal their types. Secondly, the reputational approach causes unnecessary complication when there are fewer than  $m$  sound bankers in the economy.

<sup>6</sup>In our model, we will assume that the regulator always tries to maximise social welfare, but that she does not always have a good technology for doing so. One could imagine a variation of the model where rather than being potentially incompetent, the regulator is corrupt or influenced by political concerns with some probability. If a corrupt regulator allocates licences to applicant types in proportion to their population in the applicant pool, then the probability of random assignment can simply be reinterpreted as the probability that the regulator is corrupt.

<sup>7</sup>Under the reputational screening model of footnote 5 it is always optimal to allocate  $\mu$  licences since to do otherwise would signal low quality and would reduce the size of the banking sector and with it welfare levels.

It follows immediately that the depositors' individual rationality constraint in this case is

$$\begin{aligned} (R - Q) \pi_a(g) &\geq R p_L, \text{ or} \\ Q &\leq \frac{\gamma_a(g) R \Delta p}{\pi_a(g)}. \end{aligned} \quad (9)$$

Note that the maximum fee  $Q$  which the depositor is prepared to pay is equal to the fee in the unregulated case when  $a = 0$  and that it is increasing in the regulator's ability.

Proposition 2 describes the properties of regulated closed economies.

PROPOSITION 2 *In regulated closed economies with regulator ability  $a$ :*

1. *Banking is possible if and only if*

$$\pi_a(g) \geq \frac{R p_L p_H}{R p_H - C}; \quad (10)$$

2. *There exists a continuously decreasing function  $\bar{a}(g)$  such that when condition (10) is satisfied, the maximum possible bank size is  $k_a(g)$ , where*

$$k_a(g) \equiv \begin{cases} \frac{R p_L \Delta p}{R p_L \Delta p - \pi_a(g)(R \Delta p - C)}, & a \leq \bar{a}(g); \\ \frac{N}{\mu}, & a > \bar{a}(g). \end{cases} \quad (11)$$

3. *When condition (10) is satisfied, the expected volume of funds deposited with sound bankers is*

$$\gamma_a(g) \mu \times k_a(g). \quad (12)$$

*Proof.* Banking is possible precisely when the depositors' IR constraint (9) lies above the banker's IR constraint (2), which yields equation (10). When  $a < a^*(g) \equiv \frac{C p_L - (R \Delta p - C) g \Delta p}{(R \Delta p - C) \Delta p (1 - g)}$ , the monitoring IC constraint (1) crosses the depositors' participation constraint (9) at  $f(g) \equiv \frac{R p_L \Delta p}{R p_L \Delta p - \pi_a(g)(R \Delta p - C)}$  and  $k_a(g)$  is therefore the minimum of this term and  $\frac{N}{\mu}$ ; for  $a > a^*(g)$ , equations (1) and (9) never cross and  $k_a(g)$  is  $\frac{N}{\mu}$ . The existence of  $\bar{a}(g)$  follows immediately from the monotonicity of  $f(g)$ . The first term in equation 12 is the expected number of sound bankers: this is multiplied by bank size to obtain the expected volume of funds deposited with sound bankers.  $\square$

It will be convenient to assume that when the regulator is never wrong ( $a = 1$ ), there will be no rationing of deposits and that it will be possible to run banks of maximum size  $\frac{N}{\mu}$ . A sufficient condition for this to be the case is  $a^*(g) < 1$ , or

$$C p_L < (R \Delta p - C) \Delta p. \quad (13)$$

Note that  $k_a(g)$  is strictly increasing in  $a$  with  $k_0(g) = k(g)$ : as a consequence of the regulator's screening activities, the maximum bank size  $k_a(g)$  in closed regulated economies is strictly greater than the maximum size  $k(g)$  without regulation. Since each bank has an endowment of \$1, we can regard  $\frac{1}{k}$  as a capital adequacy ratio (enforced in this model by the market rather than the regulator: see Morrison and White, 2005a, for a detailed discussion of optimal capital requirements). The effect of the regulator's screening activities is to allow banks to operate with slacker capital requirements. Note however that the regulator need not necessarily increase social welfare: although she increases the size of individual banks, she reduces the number of banks to  $\mu$ . The former effect will outweigh the latter only for sufficiently high  $a$  (so that the

expected number of sound regulated banks is high), or for sufficiently high  $B$  (so that the size of unregulated banks is very small). In what follows we will assume that  $a^N$  and  $a^S$  are sufficiently large to ensure that regulation increases welfare in both the North and the South.<sup>8</sup>

To avoid notational clutter, when it is possible to do so without confusion, we will write  $\gamma_N$  and  $\gamma_S$  for  $\gamma_{a^N}$  and  $\gamma_{a^S}$  respectively, and we will adopt similar conventions for  $\pi_a(\cdot)$  and  $k_a(\cdot)$ . Note that, since  $k_N(g) > k_S(g)$ , depositing and welfare are greater in the North than in the South. In the following section, we consider the welfare consequences of cross-border banking in our model.

#### IV. Bank Regulation in Open Economies

In this section we allow bankers to seek licences abroad.<sup>9</sup> For simplicity, we assume that depositors must continue to place their funds with an institution which is locally regulated.<sup>10</sup> We model the licence allocation procedure in two stages. In the first stage, all bankers apply to their first choice regulator for a banking licence. If they are indifferent between the two regulators we assume that they apply to their home regulator. Licences are allocated using the technology of section III. We continue to assume that  $\mu$  licences are awarded in each country.<sup>11</sup> Then there is a second stage in which bankers who have not been awarded a licence by their first choice regulator can apply for a licence in their second choice country. In this section we allow bankers to hold only one licence; we relax this assumption in section V, where we analyse multinational banks.

We compare two possible regulatory environments: first, an *unregulated playing field*, in which there is no international cooperation on regulation, and each country's regulator sets domestic regulations to maximise domestic welfare; and second, a *level playing field* approach, in which international conformity of financial regulations is enforced by international agreement.

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<sup>8</sup>When  $k_a(g) < \frac{N}{\mu}$  it is easy to show that a necessary and sufficient condition for this to be the case is  $a > \frac{Cp_L - (R\Delta p - C)g\Delta p}{Cp_L + (R\Delta p - C)g\Delta p}$ .

<sup>9</sup>In our stylised model where every individual holds one unit of capital, there is no real distinction between mobility of labour (bankers) and mobility of capital (bank equity capital). It is tempting to reinterpret our model as one where it is talented bankers that are mobile, and the important asset which moves with them is their human capital. The intuition would be that talented people may expect to earn higher rents in better regimes, providing an intuitive model of the so-called "brain drain". We thank the associate editor for drawing our attention to this possible reinterpretation. We leave this as a topic for future research.

<sup>10</sup>When deposits are rationed in both countries, this assumption is without loss of generality. Relaxing it would introduce additional complications if the northern regulator had ability  $a > \bar{a}(g)$ : in this case, movement of depositor funds would improve asset allocation and hence would mitigate in favour of open economies. A complete analysis of the effects of foreign exchange controls is however outside the scope of this paper.

<sup>11</sup>Several comments are in order here. First, we are assuming that, although the Northern regulator is stronger, the Southern regulator does not delegate the screening of applicants in the South to the Northern regulator. The Southern regulator continues to apply her own regulatory technology. We make this assumption for two reasons. First, it seems realistic that no national regulator will be permitted by her government to delegate to a foreign institution all responsibility for bank licensing (although in some economies such as New Zealand this has de facto occurred). Second, we wish to model the effects of regulator competition, and the most direct way to do this is to continue to assume, as in our benchmark closed economy, that there are  $\mu$  banks in each country. In fact, when there is deposit rationing in the North, the Northern regulator might wish to allocate *more* than  $\mu$  licences once the economy is opened and the number of sound applicants to the North increases. Intuitively, this would only worsen the negative cherry-picking externality on the South by further reducing the quality of the pool which will subsequently apply there. This will become clear when we discuss cherry-picking externalities below. We do not pursue this extension because the joint analysis of the optimal number of licences and the optimal choice of capital requirements has proved intractable.

A. Unregulated Playing Field

With an unregulated playing field the higher ability Northern regulator is able to run larger banks than the Southern regulator. Moreover, since Northern banks have a higher probability of success, depositors accept lower deposit rates and the Northern bankers therefore earn higher per-depositor profits than the Southern bankers. It follows that every banker applies in the first instance for a Northern banking licence.<sup>12</sup> The Northern regulator therefore selects bankers from a pool of size  $2B$ , of whom  $2\mu$  are sound; in other words, the proportion of sound licence applicants in the North is

$$g^N \equiv \frac{2\mu}{2B} = g.$$

If the Northern regulator allocates licences randomly then the Southern regulator selects from a pool whose expected proportion of sound bankers is  $g$ ; if the Northern regulator allocates correctly then the Southern regulator's pool of  $2B - \mu$  licence applicants contains precisely  $\mu$  sound applicants. The expected proportion of sound licence applicants in the South is therefore

$$g^S \equiv a^N \frac{\mu}{2B - \mu} + (1 - a^N) \frac{\mu}{B} = g - a^N \frac{g(1 - g)}{2 - g}. \quad (14)$$

An identical argument to that of section III implies that the size of a bank in an economy with regulator quality  $a$  and proportion  $\tilde{g}$  of sound licence applicants is given by the expression  $k_a(\tilde{g})$  defined in equation (11).

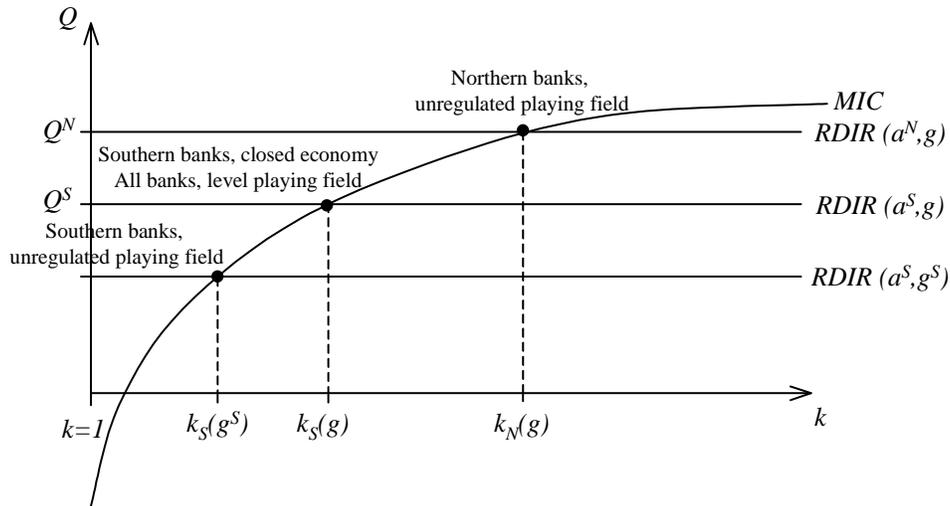


Figure 2: **Bank Size and Deposit Rates in Open Economies.** The banker's monitoring incentive compatibility constraint (1) is labelled  $MIC$ ; the depositor participation constraint (9) is labelled  $RDIR$ , and is indexed by ability  $a$  and pool quality  $g$ .

Figure 2 illustrates the position of Northern and Southern banks on the monitoring incentive compatibility constraint (1) in  $(k, Q)$  space, in the case of an unregulated playing field. Since the applicant pool

<sup>12</sup>For some parameter values, there may be another equilibrium in which depositors anticipate that all bankers apply first to the South. However, numerical calculations indicate that this equilibrium is always Pareto-dominated by the equilibrium in which bankers apply firstly to the North. In the case where welfare would be higher if bankers could be persuaded to apply first in the South, this is not equilibrium behaviour because profits are higher in the North.

from which the Northern regulator selects bankers has a proportion  $g$  of sound applicants in open and closed economies, bank size in both cases will be  $k_N(g)$ . The proportion of sound applicants in the Southern regulator's pool is  $g$  in closed economies and  $g^S$  in open economies with no international restrictions on capital requirements. The corresponding bank sizes are therefore  $k_S(g)$  and  $k_S(g^S)$ .

We again measure welfare within each country by the productivity of its banking sector. When a regulator of ability  $a$  selects bankers from a pool containing a proportion  $\tilde{g}$  of sound applicants and runs banks of size  $k$  the appropriate welfare measure is therefore

$$W(a, \tilde{g}, k) \equiv \mu \times \gamma_a(\tilde{g}) \times k. \quad (15)$$

It is clear from figure 2 that the welfare of the Northern economy is unaffected by international capital flows. This follows because bankers prefer to operate in the North and hence apply there first. They therefore open a Southern bank only if they are turned away by the Northern regulator. Opening the Southern economy therefore lowers the quality of the licence applicant pool:  $g^S < g$ . As a result the expected quality of Southern banks is reduced, and depositors in the South demand a higher deposit rate. Monitoring with the higher deposit rate is incentive compatible only if the Southern bank size is reduced:  $k_S(g^S) < k(g)$ . This lowers production levels and hence welfare in the South.

Note that we have assumed that the productivity of banks' investment projects *per se* is the same in the North as in the South, so the only reason why bankers prefer to operate in the North is that in this economy the strength of the regulator's reputation is such that they can extract more rent from depositors while the latter are still willing to deposit. (This in turn allows bankers in the North to run larger banks.) The South would be better off imposing capital controls to prevent the flight of bank capital to the North; moreover, imposing such controls would not harm the North.

The welfare reduction which the South experiences from opening its economy arises in our model because the Northern bank cherry-picks the best of the Southern bankers. Clearly, increases in the Northern regulator's ability will increase the impact of this effect. Our model therefore identifies a form of "reputational contagion": a positive shock to the Northern regulator's reputation will shrink Southern bank size. Conversely, improvements in the quality of the Southern regulator will not transmit shocks to the Northern economy, so poorly regulated economies are much more vulnerable to such shocks.

We summarise this discussion in the following proposition:

**PROPOSITION 3** *In an open economy with an unregulated regulatory playing field:*

1. *The welfare of the Northern economy is the same in the open and the closed economies, while the welfare of the Southern economy is lower in the open than the closed economy. Hence, allowing international capital flows reduces welfare;*
2. *Southern bank size is a decreasing function of Northern regulator quality; Northern bank size is unaffected by Southern bank quality.*

*Proof.* The first part of the result follows from examination of figure 2. For a formal demonstration of the second, note that  $\frac{\partial k_S(g^S)}{\partial a^N} = -\frac{k_S(g^S)^2}{R p_L \Delta p} \frac{(R \Delta p - C) \Delta p (1-a) g (1-g)}{2-g} < 0$ , while  $k_N(g)$  is not affected by  $a^S$ .  $\square$

The reputational contagion identified in proposition 3 operates through two channels. Firstly, an increase in  $a^N$  will have a *quality effect*. The expected proportion of sound bankers in the North will increase. As a

result, the proportion of sound bankers in the pool available to the Southern banker will drop. The Northern banker’s ability to “cherry pick” from the available pool of bankers will therefore cause a worsening of the expected quality of Southern bankers. Secondly, the increase in average banker quality in the North will reduce the level of capital required to make depositing incentive compatible and Northern banks will therefore become larger: in other words, there will be a *size effect*. Since confidence in Southern banks will be reduced by the quality effect, the size effect will have the opposite sign in the South.

Without international capital adequacy regulation, we would expect increases in Northern economy reputation to increase inequality between the North and the South. The effect of reputational contagion is to exacerbate this effect: the increase in Northern economy welfare is accompanied by a *reduction* in Southern economy welfare. The aggregate international consequence of improved Northern regulator reputation is therefore not immediately clear, since the welfare changes in the North and South have opposite signs. With an unregulated playing field, the respective Northern and Southern welfares (as defined by equation 15) are given by the following expressions:

$$W_U^N \equiv W(a^N, g, k_N(g)) = \begin{cases} \mu \frac{R_{PL}\Delta p \gamma_N(g)}{R_{PL}\Delta p - \pi_N(g)(R\Delta p - C)}, & a^N \leq \bar{a}(g); \\ N\gamma_N(g), & a^N > \bar{a}(g). \end{cases} \quad (16)$$

$$W_U^S \equiv W(a^S, g^S, k_S(g^S)) = \begin{cases} \mu \frac{R_{PL}\Delta p \gamma_S(g^S)}{R_{PL}\Delta p - \pi_S(g^S)}, & a^S \leq \bar{a}(g^S); \\ N\gamma_S(g^S), & a^S > \bar{a}(g^S). \end{cases} \quad (17)$$

The function  $\bar{a}(\cdot)$  is defined in part 2 of proposition 2. The space partition implied by equations (16) and (17) reflects the fact that bank size cannot increase past the maximum level  $\frac{N}{\mu}$ . It is illustrated in figure 3. Admissible  $(a^N, a^S)$  values lie below the leading diagonal in the figure. In the lower left region  $a^S < a^N < \bar{a}(g)$  so that neither bank’s maximum size constraint binds; in the middle region  $a^N > \bar{a}(g)$  and  $a^S < \bar{a}(g^S)$  so that only the Northern bank’s size constraint binds; and in the top region  $\bar{a}(g) < \bar{a}(g^S) < a^S < a^N$  so that both constraints bind.

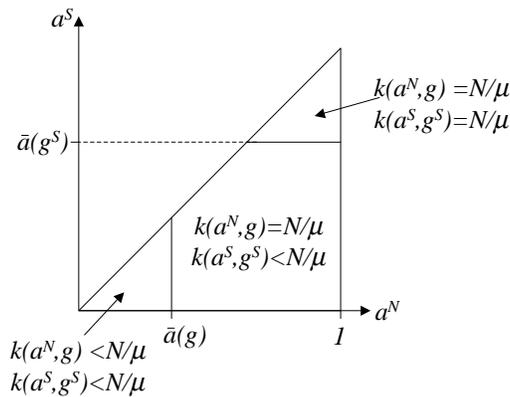


Figure 3: Bank sizes in open economies with unregulated playing field.

We define international welfare to be the unweighted sum of national welfares: in other words, to be the total productivity of the international economy. Proposition 4 relates the partition of figure 3 to the welfare implications of an increase in  $a^N$ :

PROPOSITION 4 *In an open economy with an unregulated playing field for capital requirements:*

1. *When  $a^N < \bar{a}(g)$ , international welfare is increasing in  $a^N$ ;*
2. *When  $a^N > \bar{a}(g)$  and  $a^S < \bar{a}(g^S)$ , international welfare is increasing in  $a^N$  if and only if*

$$k_S(g^S)^2 < \left( \frac{N(2-g)}{g\mu} - k_S(g^S) \right) \frac{Rp_L}{\gamma_S(g^S)(R\Delta p - C)};$$

3. *When  $a^S > \bar{a}(g^S)$ , international welfare is increasing in  $a^N$ .*

To understand this result, recall that a change in  $a^N$  will have a size effect and a quality effect. Since the Northern bank is larger than the Southern bank, the welfare consequences of the quality effect will apply on a larger scale in the North than in the South and its aggregate welfare consequence will therefore be positive. The size effect arises because a change in the rate  $R - Q$  required to induce depositing changes the intersection point of the depositors' IR constraint (9) with the bank's monitoring IC constraint (1). Since the monitoring IC constraint is concave, a given movement in the depositors' IR constraint will have a greater effect upon the size of the larger Northern bank than the smaller Southern one, so that the aggregate welfare consequence of the size effect will be positive.

Now consider the three regions identified in figure 3. Part (1) of the proposition refers to the bottom left region in which neither size constraint binds: the size and the quality effect therefore apply in both the North and the South. Since each has a positive aggregate effect upon welfare, increases in  $a^N$  must increase total welfare. Part (3) of the proposition refers to the top right region in the figure, where both size constraints bind and only the quality effect applies in each region. Once again, welfare is increasing in  $a^N$  because the aggregate quality effect is positive. Part (2) of the proposition refers to the middle region, within which the Northern size constraint binds but the Southern one does not. The size effect in this region therefore applies only in the South and is therefore welfare-reducing. This effect dominates only when the size difference between Northern and Southern banks is sufficiently small to render the positive quality effect insignificant: this happens for high enough  $k_S(g^S)$  as in the statement of the proposition.

>From an efficiency point of view the phenomena identified in this section are the opposite of what is desirable. In open economies with an unregulated international playing field for capital regulation, bankers would prefer to obtain a licence from the more competent regulator, as this would provide them with a better signal and allow them to run a more profitable bank. The more talented regulator therefore gets the pick of the crop: it may be preferable to allow the Southern regulator to cherry pick and then to let the Northern regulator to sort the wheat out from the remaining chaff, since the Northern regulator is better equipped to do this.<sup>13</sup> This leads to the idea that it might be efficient from the point of view of total (international) social welfare to enforce a level playing field, so that the Southern regulator picks from a pool that is no worse than that enjoyed by the Northern Regulator. We now turn to the analysis of this policy.

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<sup>13</sup>It might seem that our result relies on the fact that the screening technology employed by our regulators is an ex ante one, and that because in reality regulators also perform ex post auditing, it is in practice implausible that *all* banks, including unsound ones, would prefer to be regulated by the better regulator as they do in our model. A moment's reflection, however, reveals that allowing for the Northern regulator to be better at ex post as well as ex ante auditing would only *strengthen* our results by further improving the pool of applicants to the Northern regulator and worsening that available to the Southern regulator as unsound banks are deterred from applying in the North. It might even be desirable to prevent the Northern regulator from extensive ex post audits on the grounds that this would simply force marginal banks to relocate in economies where they would be audited by a less competent regulator. We leave this as a topic for future research.

*B. Level Playing Field*

Under the level playing field approach, regulators agree upon international regulations which make banking in the North and the South equally attractive. In this case bankers apply for licences only in their home jurisdiction and the cherry-picking effects underlying proposition 3 do not arise.

A level playing field must render banking equally attractive in the North and in the South. This involves two policies. First, both banks must have the same size: in other words, there must be *common capital adequacy requirements*. It is clear from figure 2 that this is most efficiently accomplished by setting the size of both banks equal to  $k_S(g)$ : this is equal to the closed economy bank size in the South, but is less than  $k_N(g)$ , the closed economy Northern bank size.

Common capital requirements on their own will not achieve a level playing field, however. To see this, note that, absent any further regulation, banks regulated in the North could charge up to  $Q^N > Q^S$ , and hence would be more profitable than banks regulated in the South. The North would therefore continue to attract *all* of the stage one licence applicants. In short, agreeing a common capital requirement without implementing a deposit rate floor in the North would reduce Northern welfare without resolving the problems identified in section IV.A. A level playing field therefore requires both *common capital requirements* and *deposit rate floors*.

Under a level playing field, therefore, Northern banks have the same size and also the same deposit rates as Southern banks. This regime therefore does not affect the welfare of the Southern economy, but it clearly reduces the welfare of the Northern economy.

Moreover, since the size of the Northern economy's banking sector is determined under a level playing field by the quality of the Southern economy's regulator, changes in the Southern regulator's ability are reflected in the North. Reputational contagion therefore arises with level playing fields, but is less complex than with unregulated playing fields.

With a level playing field, the respective welfares as defined by equation (15) of the North and the South are given by the following expressions:

$$W_L^N \equiv W(a^N, g, k(a^S, g)) = \begin{cases} \mu \frac{R_{PL}\Delta p \gamma_N(g)}{R_{PL}\Delta p - \pi_S(g)(R\Delta p - C)}, & a^N \leq \bar{a}(g) \\ N\gamma_N(g), & a^N > \bar{a}(g) \end{cases} \quad (18)$$

$$W_L^S \equiv W(a^S, g, k(a^S, g)) = \begin{cases} \mu \frac{R_{PL}\Delta p \gamma_S(g)}{R_{PL}\Delta p - \pi_S(g)(R\Delta p - C)}, & a^S \leq \bar{a}(g) \\ N\gamma_S(g), & a^S > \bar{a}(g) \end{cases} \quad (19)$$

Reputational spillover occurs with level playing fields simply because all banks are constrained to the size of the weakest closed economy bank. The welfare effects of changes to the Southern regulator's ability therefore have the same sign in the North and the South: international welfare with level playing fields is therefore increasing in  $a^S$ .

We summarise the results of this subsection in the following proposition.

**PROPOSITION 5** *In open economies with a level international regulatory playing field:*

1. *The welfare of the Southern economy is the same as in the closed economy, while the welfare of the Northern economy is lower than in the closed economy. Allowing capital flows therefore reduces welfare;*

2. Northern bank size is increasing in Southern regulator quality, and Southern bank size is unaffected by Northern regulator quality;
3. International welfare is increasing in  $a^S$ .

We now examine the choice of international capital regulation regime.

### C. Optimal International Capital Regulation

In this section, we determine the circumstances under which a level playing field is preferred to an unregulated one. The discussion in sections IV.A and IV.B indicated that international welfare with a level playing field depends upon the ability of the Southern regulator, and that with an unregulated playing field, it depends upon the ability of the Northern regulator. It is therefore intuitive that the level playing field will be preferred when the Southern regulator's ability is sufficiently high; equivalently, when  $a^N - a^S$  is sufficiently low. We show below that this is indeed the case.

Total welfare with an unregulated playing field exceeds that with a level playing field precisely when

$$\Delta W \equiv (W_U^N + W_U^S) - (W_L^N + W_L^S) > 0.$$

For convenience of exposition, we break the welfare difference  $\Delta W$  between the unregulated and the level playing field into the differences  $N(a^N, a^S, g) \equiv W_U^N - W_L^N$  and  $S(a^N, a^S, g) \equiv W_U^S - W_L^S$  in the North and the South respectively. Straightforward manipulations yield the following expressions:

$$N(a^N, a^S, g) = \begin{cases} \mu \frac{(a^N - a^S) \gamma_N(g) (1-g)(R\Delta p - C)}{R_{pL}} k_N(g) k_S(g), & a^N < \bar{a}(g); \\ \mu \gamma_N(g) \left( \frac{N}{\mu} - k_S(g) \right), & a^S < \bar{a}(g) < a^N; \\ 0, & \bar{a}(g) < a^S. \end{cases}$$

$$S(a^N, a^S, g) = \begin{cases} -\mu \frac{a^N (1-a^S) g (1-g) C_{pL}}{(2-g) R_{pL} \Delta p} k_S(g^S) k_S(g), & a^S < \bar{a}(g); \\ \mu \frac{\gamma_S(g^S) R_{pL} \Delta p}{R_{pL} \Delta p - \pi_S(g^S) (R\Delta p - C)} - \gamma_S(g) N, & \bar{a}(g) < a^S < \bar{a}(g^S); \\ -\frac{(1-a^S) a^N g (1-g) N}{2-g}, & \bar{a}(g^S) < a^S. \end{cases}$$

These expressions partition  $(a^N, a^S)$  space as illustrated in figure 4. Since  $a^N > a^S$ , possible parameter values are those below the diagonal line. In the shaded region,  $a^N > a^S > \bar{a}(g)$  and  $N(a^N, a^S, g)$  is therefore equal to 0. Since  $S(a^N, a^S, g) < 0$  it follows that  $\Delta W < 0$  in this region and hence that level playing fields are preferred to unregulated ones. Along the leading diagonal for  $a^N < \bar{a}(g)$ ,  $N$  is again zero (since  $(a^N - a^S)$  is a factor) and  $\Delta W$  is again negative.

A detailed discussion of the properties of figure 4 appears in the appendix, where the following result is proved:

**PROPOSITION 6** *There exists a function  $\lambda(a) < \min(a, \bar{a}(g))$  (possibly negative) with  $\lambda'(a) \geq 0$  such that for every  $a^N \in [0, 1]$ , a level playing field for capital requirements is preferred to an unregulated playing field precisely when  $a^S > \lambda(a^N)$ .*

The function  $\lambda(a^N)$  is illustrated in figure 4. Unregulated capital requirements are optimal in the region below this line and level requirements are optimal in the region above it. To understand the intuition behind

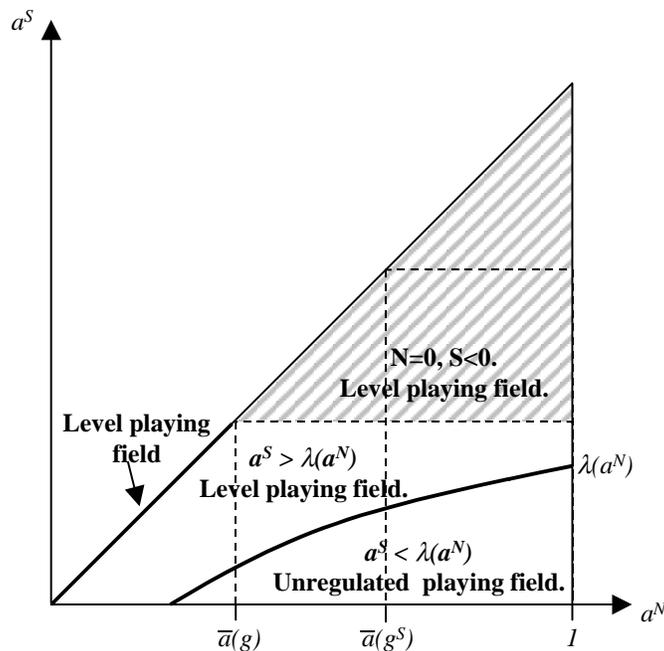


Figure 4: Optimal capital regimes for open economies in  $(a^N, a^S)$  space.

the result, recall that a “lowest common denominator” effect causes the Northern economy’s welfare to be reduced to that of the South with level playing fields, while with unregulated playing fields the Northern regulator inflicts a “cherry-picking externality” upon the South, whose welfare is thereby reduced. The former effect is more important when the Northern regulator is significantly better than the Southern one so that the loss caused by standardization is high. This is the case for high  $a^N - a^S$ : in other words, when  $a^S < \lambda(a^N)$ .

Proposition 6 is illustrated in figure 5, which shows for given parameter values the welfare gains  $N$  and  $S$  from unregulated as opposed to level playing fields for the North and the South respectively, and the aggregate effect  $\Delta W$  upon the international economy. Note that  $S$  is always negative: the size and quality effects of giving the Northern bank first choice from the pool of bankers are both welfare reductive in the South. Conversely,  $N$  is always positive, due to the lowest common denominator effect with level playing fields. The dominance of the lowest common denominator effect for high  $a^N - a^S$  and of the cherry-picking effect for small  $a^N - a^S$  is clear from the final table.

## V. Multinational Banks

We have concentrated so far upon the choice between level and unregulated playing fields when all banks are locally regulated. In this section we extend our work to multinational banks. We suppose as above that would-be bankers can apply to the two regulators, but we now allow an applicant to accept licences from more than one regulator. It is natural to call a bank with a licence to operate in more than one country a *multinational bank*, and a bank that operates in only one country a local or stand-alone bank.

Intuitively, acceptance by two regulators is a better signal of quality than acceptance by only one, and

Level Playing Fields in International Financial Regulation

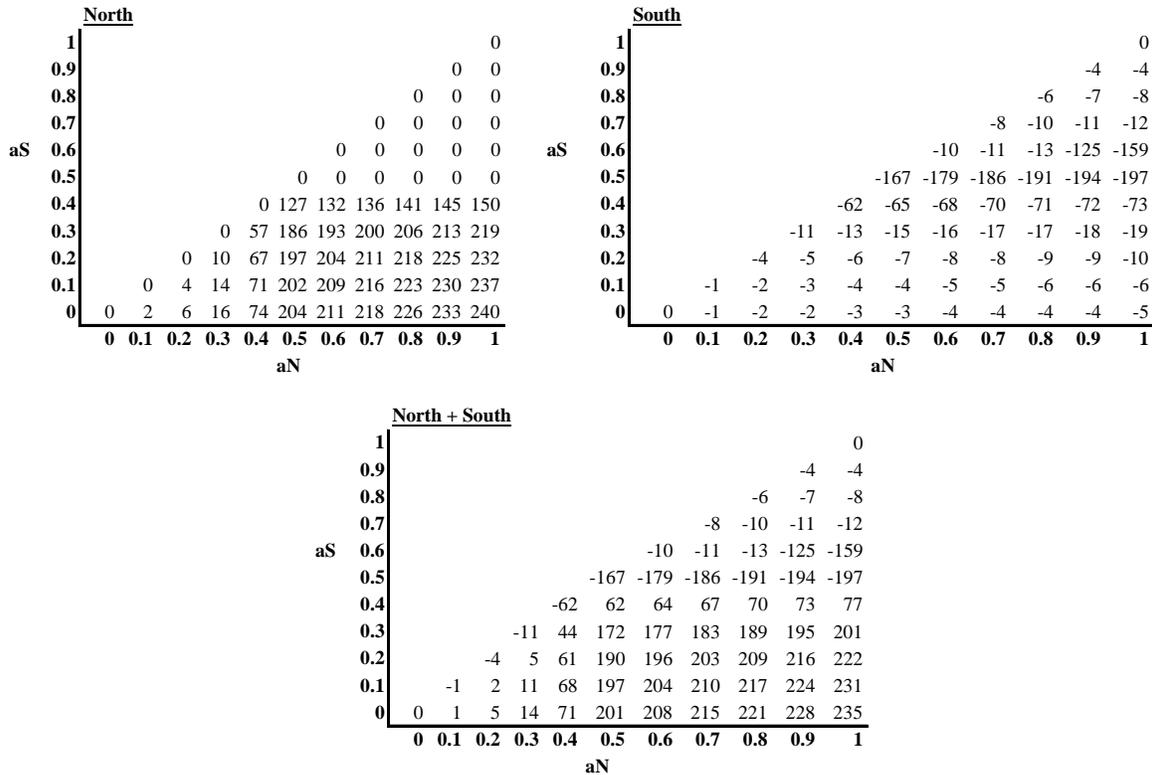


Figure 5: Welfare gain from unregulated as opposed to level playing fields in the North, the South, and internationally. Level playing fields are preferred in the respective regions when the number in the grid is negative. Figures presented for  $R = 2$ ,  $p_L = 0.2$ ,  $\Delta p = 0.4$ ,  $C = 0.5$ ,  $\mu = 12$ ,  $B = 50$ ,  $N = 3000$ .

multinational banks are therefore more likely to be sound than banks which operate in only one country. At a given deposit rate multinational banks can therefore operate with looser capital requirements than their nationally based rivals, and the public would still be willing to deposit in them. Conversely, if multinational and local banks had the same capital requirements, the multinational banks would be able to offer lower deposit rates while still attracting savers.

It follows from this argument that if regulation does allow multinational banks to exploit their reputational advantage by accepting more deposits or offering lower deposit rates, all licence applicants would prefer to be multinationals. The fact that a bank is only local then becomes a negative signal: multinational banks exert a negative externality upon locally regulated banks, which shrink accordingly. This result is consistent with the empirical work of Claessens, Demirgüç-Kunt, and Huizinga (2001) which suggests that the entry of foreign banks squeezes domestic competition (see also Demirgüç-Kunt and Huizinga, 1999, who show that foreign banks earn higher margins than domestic banks in developing countries). We comment further on the empirical relevance of our results in section VI below.

In this section we examine two different licence allocation procedures: one in which borders are opened after licences have been assigned to local banks, at which stage they can apply for a foreign licence; and one in which borders are open initially and banks can choose where to make their initial licence applications: in this second case all banks will apply first in the North and then in the South.

The first of these games accurately reflects the way in which international banking networks are formed. When local bankers apply for local banking licences before attempting to expand overseas there is no cherry-picking effect. In this case foreign charters are valuable because they supply additional certification for the local bank and hence allow it to operate with looser capital requirements. In this case, opening borders to international capital flows is unambiguously welfare-increasing.

The second of these games is not observed in practice. Nevertheless, we believe that it may represent a more long-term picture of an equilibrium where banks can enter and exit. After borders are opened, any new licence applicants will in the first instance elect as in our analysis of section IV.A to apply for Northern regulator certification. Over time, therefore, one might expect some cherry-picking externalities to manifest themselves in the Southern economy. We demonstrate that, as before, financial liberalisation harms the Southern economy with unregulated playing fields.<sup>14</sup> However, in contrast to the single-licence case, financial liberalisation strictly increases Southern welfare when it is combined with a level playing field. This is because of the extra certification which attaches in this case to Southern multinational banks.

#### *A. Borders Opened After Local Licence Allocation*

In this section we assume that bankers apply for local licences in closed economies as in section III, after which the economies are opened and successful bankers can if they wish apply for foreign licences. We further assume that applicants who were unsuccessful in their home economies cannot apply for foreign licences.<sup>15</sup> Thus banks must apply first to their local regulator and, if successful, may then choose to apply for another licence abroad. When a multinational bank's *first* licence was in the North (respectively, the South), we say that it is *based in the North* (respectively, the South). We will also assume that although a multinational bank is licensed to accept deposits in both economies, it will nevertheless raise its deposits in its home country.<sup>16</sup> As in section III, we assume that each regulator will allocate  $\mu$  local licences. We write  $m_N$  and  $m_S$  for the number of *multinational* banks based in the North and the South, respectively.

Note that in equilibrium, every banker would prefer to have two charters, as this would send a better signal to depositors and so would reduce rates, which would lower capital requirements. It follows that every bank will apply for two charters: local banks have therefore made an unsuccessful licence application with the foreign regulator.

Consider an arbitrary bank (local or multinational) operating in country  $l \in \{N, S\}$ . Denote by  $f \in \{N, S\}$  the foreign country. Let  $q$  be the probability that this bank is sound, conditional upon random licence allocation by the country  $l$  regulator, and correct licence allocation the country  $f$  regulator. Then the unconditional probability  $\gamma_l^f(g)$  that the bank is sound depends upon  $q$ , the proportion  $g$  of sound licence applicants, and the respective abilities  $a^l$  and  $a^f$  of the local and foreign regulators as follows:

$$\gamma_l^f(g) \equiv a^l + (1 - a^l) (a^f q + (1 - a^f) g), \quad (20)$$

<sup>14</sup>Interestingly, in the World Bank survey of banking regulators (Barth, Caprio, and Levine (2001)), the Fijian regulator noted that the main reason for its rejection of one particular foreign licence application was that "The applicant did not own a bank in their own country" - perhaps they were wary of the adverse selection issue that we highlight in this paper! We will examine this survey in more detail in section VI below.

<sup>15</sup>This assumption will be relaxed in the next section.

<sup>16</sup>The multinational banks themselves will be indifferent about where they raise their deposits, but the allocation of deposits across countries will matter for the calculation of welfare in the North and in the South. Assuming that multinational banks raise most of their deposits at home seems the most natural and realistic assumption to make about the way deposits are distributed, as well as being algebraically the simplest to deal with.

If the local regulator assigns licences correctly (probability  $a^l$ ) then the bank will certainly be sound. Otherwise (with probability  $1 - a^l$ ) the probability that the bank is sound is given by the applicant pool quality  $g$  if the foreign regulator randomly assigns licences (probability  $1 - a^f$ ) and by  $q$  otherwise (probability  $a^f$ ).

To derive an expression for  $q$ , note that a total of  $g\mu$  sound bankers will apply for multinational banking licences when the local regulator randomly assigns licences. If the foreign regulator correctly assigns  $m$  licences to multinational banks, it will therefore license  $\min(g\mu, m)$  sound multinational banks, and this will leave  $\max(g\mu - m, 0)$  sound local bankers. It follows that

$$q = \begin{cases} M_g \equiv \min\left(\frac{g\mu}{m}, 1\right), & \text{for multinational banks;} \\ L_g \equiv \max\left(\frac{g\mu - m}{\mu - m}, 0\right), & \text{for local banks.} \end{cases}$$

We will reduce notational clutter by writing  $M_N, M_S$  for  $M_{g^N}$  and  $M_{g^S}$  respectively, and  $L_N, L_S$  for  $L_{g^N}$  and  $L_{g^S}$ .

The probability that a randomly selected bank in country  $l$  generates positive returns is

$$\pi_l^q(g) \equiv p_L + \gamma_l^q(g) \Delta p, \quad (21)$$

where again  $q = M$  if the bank is a multinational, and  $q = L$  if it is a local bank. The depositor's individual rationality constraint is therefore

$$\begin{aligned} (R - Q) \pi_l^q(g) &\geq R p_L, \text{ or} \\ Q &\leq \frac{\gamma_l^q(g) R \Delta p}{\pi_l^q(g)}. \end{aligned} \quad (22)$$

Local banking ( $q = L$ ) and multinational banking ( $q = M$ ) are possible if and only if the depositor IR constraint (22) lies above the banker participation constraint (2), which is true precisely when condition (23) is satisfied:

$$\pi_l^q(g) \geq \frac{R p_L p_H}{R p_H - C}. \quad (23)$$

For  $q \in \{M, L\}$ , let  $k_l^q(g)$  be the size of country  $l$  banks. Precise expressions for  $k_l^q(g)$  are derived in the appendix (proposition 9). When  $a^l$  is low enough, deposits will be rationed, in which case,  $k_l^q(g)$  is given by an expression analogous to equation (11). For higher  $a^l$ , deposits are not rationed. We assume in this case that the regulator will allow multinational banks to expand at the expense of local banks, which are of lower expected quality, in such a way that the total capacity of the banking sector is precisely  $N$ . In the situation where foreign deposits are rationed and local ones are not,<sup>17</sup> this nationally-interested regulator behaviour is second best: it would be better from the perspective of total welfare to allow the multinational bank to meet some of the foreign demand for deposits, while its local competitors met residual domestic demand.

Note that, although in the open economy all banks are screened twice, multinational banks which are based in the North are weakly larger than those in the South (strictly larger when each country issues the same number of multinational licences, at least equal to  $g\mu$ : see Lemma 4 in the appendix). This is because the higher quality of Northern regulator is less useful if the pool of applicants which the Southern regulator sends her contains few sound banks relative to the number of multinational licences he must allocate.

<sup>17</sup>Note that in this case, "local" must refer to the North, and "foreign" to the South.

We now examine welfare levels in the open economy, and we derive the optimal numbers of Northern- and Southern- domiciled multinational banks. When Northern and Southern regulators each issue  $m$  multinational licences, the welfare of the open economy is defined to be the expected volume of funds under management in sound banks:

$$W_i^{\text{Op}} \equiv \gamma_i^M(g) m k_i^M(g) + \gamma_i^L(g) (\mu - m) k_i^L(g). \quad (24)$$

**PROPOSITION 7** *The welfare of an open economy is increasing in  $m$  for  $m \leq g\mu$ , and decreasing for  $m > g\mu$ . Hence welfare is maximised when  $m = g\mu$ , at which point  $M = 1$  and  $L = 0$ .*

The simplest way to understand proposition 7 is as follows. When a foreign regulator chooses to allocate multinational licences among domestic banks, the set of domestic banks accepting deposits in the economy has not changed, and so the overall quality of the banking system has not changed. However, the additional signal provided by the foreign regulator helps depositors reallocate their capital among domestic banks from those with lower expected quality to those with higher expected quality. Thus multinational banks will grow and local banks will shrink, and in this way, the overall size-weighted quality of the banking system improves. Since overall quality improves, intuitively, the size of the banking sector improves too, raising overall welfare even though local banks will be made worse off.

To see why the turning point is at  $m = g\mu$ , note that the extra certification provided by the foreign regulator is useful only in the case where the local regulator uses random allocation and the foreign regulator uses correct allocation. In that case, the number of sound multinational bank applicants will be precisely  $g\mu$  and the foreign regulator will certify as many of these as it is able to. Hence issuing up to  $m = g\mu$  licences improves the allocation of depositor funds. Issuing additional licences will in the relevant case (random home and correct foreign allocation) result in some unsound multinational licences. This will reduce the effectiveness of the multinational bank sector in allocating depositor funds.

Note that the case where  $m = 0$  collapses to the closed economy case. Proposition 7 therefore has the following obvious corollary:

**COROLLARY 1** *Welfare in both the North and the South is strictly increased by liberalisation which allows existing local banks to apply for foreign licences.*

In the absence of the cherry-picking effects of section IV, financial liberalisation does not impose a negative externality upon the Southern economy. Hence, while levelling the international regulatory playing field would still damage the Northern economy, it is not necessary to protect the Southern one:

**COROLLARY 2** *Level playing fields are unambiguously welfare-reductive in open economies formed by liberalisation which allows existing local banks to apply for foreign licences.*

### *B. Borders Opened Before Local Licence Allocation*

In this section we use an extension of the model of section IV to model the process of multinational bank licence allocation. This reintroduces the cherry-picking externality which was absent in the previous subsection. In the first stage of the licence allocation game bankers start to operate in an open economy, and may apply to any country for their first banking licence. If bankers are indifferent between licences in the

North and the South then they apply to their local regulator for a licence. In the second stage of the game, bankers with licences may apply for a second licence, and unsuccessful applicants may apply to the other country for a banking licence. Bankers with two licences operate as multinational banks, while bankers with only one operate as local bankers. We again assume that multinational banks collect deposits at home.

We know from section V.A that in the absence of international playing field regulation, Northern-domiciled multinational banks are larger than Southern-domiciled multinationals (see lemma 4 in the appendix). Moreover, a bank which is accepted in the North and rejected in the South will be more attractive to depositors, and hence more profitable, than one which is accepted in the South and rejected in the North. If a banker applies first to the North, and is accepted there, he may end up either as a Northern multinational, or a Northern local bank; if he is rejected in the first stage, he may become a Southern local bank in the second stage. Conversely, a banker applying first in the South will become either a Southern multinational, a Southern local bank or a Northern local bank. One can show that, as in previous sections, the expected profits to applying in the North first are higher than those from applying in the South first, so all bankers apply first for a Northern licence, and then apply to the South for a multinational licence if they were successful in the North, or for a local licence if they were unsuccessful in the North. Because of this, there will be no Southern multinational banks in an equilibrium with unregulated playing fields.

As in section V.A, we continue to assume that precisely  $\mu$  banking licences will be allocated in the North and in the South. Since the quality of the initial applicant pool in the North under the game of this section is  $g$ , the welfare properties of the Northern economy without a level playing field will be the same as those of section V.A. This means that opening the borders without a level playing field will have a positive welfare effect in the North because of the benefits of certification for Northern multinational banks. (This compares with the case of section IV.A where opening borders without levelling the playing field had no effect in the North.) At the same time, bankers who apply for Southern licences will all have been rejected by the Northern bank, and their expected quality will therefore be  $g^S$ , as in equation (14). The negative welfare effect in the South of opening the borders without a level playing field will therefore equal that of section IV.A, as there are no Southern multinational banks.

As in section IV.B, the negative impact of opening borders on the South can be mitigated by international coordination on a level playing field which makes licence application equally attractive in the North and the South. As before, a level playing field requires that bank size and the deposit rates must be the same for Northern and Southern local banks, *and* that multinational banks offer the same deposit rates and be subject to the same capital requirements in both countries. (Note however that multinationals can be subject to looser regulation than local banks). The most efficient way to accomplish this is to set capital requirements and deposit rates for local and multinational banks to be the same as those for the Southern banks in section V.A.

Under these conditions, bankers will be indifferent as to where to apply for their first licence, so we assume that they apply at home. Thus with a level playing field, there will be  $m$  Southern multinational banks; the presence of these multinational banks has the effect in this case of making the South unambiguously better off with an open economy and level playing fields than it would be with a closed economy. Simultaneously opening the borders and levelling the playing field has two countervailing effects on welfare in the North. First, Northern welfare is reduced by the local bank shrinkage which occurs when playing fields are levelled. Second, Northern welfare is increased by the introduction of multinational banks. Intuitively,

the first of these effects is of least importance for  $a^S$  close to  $a^N$ , in which case certification from the South is most valuable. Hence the net effect of opening the Northern economy while maintaining a level playing field is positive for sufficiently small  $a^N - a^S$ .<sup>18</sup>

We summarise the results of this section in the following proposition.

PROPOSITION 8 *When economies are opened before initial bank licence allocation:*

1. *With unregulated playing fields, multinationals increase Northern welfare relative to the case without multinational banks, and leave Southern welfare unchanged;*
2. *Relative to the closed economy case, open borders and level playing fields always increase Southern welfare, and they increase Northern welfare when  $a^N - a^S$  is sufficiently small.*

It follows immediately that welfare when borders are opened before licence allocation is increased by the presence of multinational banks, just as it is when borders are opened after licence allocation. In other words, allowing multinational banks always improves welfare in open economies.

## VI. Empirical Discussion

Foreign banks are becoming an increasingly important presence around the world. In many emerging economies, foreign banks now hold more than half of all banking assets.<sup>19</sup> Foreign banks are also an important presence in many developed economies. In the US, for example, foreign banking institutions hold over \$923 billion in assets, approximately 19% of the total commercial banking assets in the United States.<sup>20</sup> Peek and Rosengren (2000) document the importance of Japanese banks for commercial real estate markets in New York, California and Illinois. In 2002, the New York State Banking Department was supervising 175 foreign branches, agencies and representative offices with assets of more than \$800bn as well as 21 subsidiaries of foreign banks with assets of over \$100 bn.<sup>21</sup> Thus the quality of foreign banks relative to domestic ones is becoming an increasingly important issue for domestic regulators.

A burgeoning new literature attempts to assess the reasons for foreign bank entry and the impact that such entry has on local banks and local economies.<sup>22</sup> Up until now, however, the literature assessing the impact of foreign bank entry has been almost entirely empirical.<sup>23</sup> Several papers have attempted to assess whether the credit provided by foreign banks contributes to or detracts from banking sector stability (e.g.,

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<sup>18</sup>This result can be established formally by computing the difference between open and closed Northern economy welfares, and setting  $a^N = a^S$ , in which case the resulting expression is positive.

<sup>19</sup>See, e.g., Giannetti and Ongena (2005), and Clarke, Cull, Martinez Peria, and Sánchez (2001). Barth, Caprio, and Levine (2001, figure 5) illustrate the large variation in the extent of foreign ownership of banking assets for 91 countries. Our calculations using the data they provide at [http://www.worldbank.org/research/projects/bank\\_regulation.htm](http://www.worldbank.org/research/projects/bank_regulation.htm) suggest that of the countries reporting the extent of foreign bank ownership, on average 45% of banking assets were accounted for by banks which are more than 50% foreign owned.

<sup>20</sup>See <http://www.ny.frb.org/aboutthefed/fedpoint/fed26.html>.

<sup>21</sup>See the State of New York Banking Department Annual Report, 2002 at <http://www.banking.state.ny.us/report02/Narratives/1b-foreign.html>

<sup>22</sup>See Clarke, Cull, Martinez Peria, and Sánchez (2001) for an excellent survey of the literature.

<sup>23</sup>A notable exception is Dell'Araccia and Marquez (2004). Their focus, however, is completely different from ours. Rather than model the consequences of differential regulatory abilities, they neglect the regulator and consider the consequences of competition between banks with different abilities to screen borrowers. They interpret local banks as having an informational advantage over the foreign banks that enter after liberalisation and use this to derive predictions about which sectors foreign banks will choose to enter.

de Haas and van Lelyveld (2003) for the CEE, Martinez Peria, Powell, and Vladkova Hollar (2002) for Latin America). At a more micro-economic level, Giannetti and Ongena (2005) find that foreign bank lending increases industry turnover and stimulates firm growth. They suggest that these effects reflect a reduction in connected lending and an improvement in capital allocation.<sup>24</sup> Other papers argue that foreign banks differ from domestic banks in the type of activities that they undertake, with foreign banks favouring wholesale banking and lending to large firms, manufacturing and real estate. This has raised concerns that lending to small and medium sized firms might be reduced by foreign bank entry, though the significance of this finding has been disputed for some emerging economies (e.g., Clarke et al, 2003). Moreover, foreign banks tend to be *less* profitable and *less* efficient than local banks in developed economies, but *more* profitable and *more* efficient than local banks in developing economies. These observations have led empiricists to conclude that “the reasons for foreign entry [...] differ significantly between developed and developing countries” (Claessens et al, 2001). Our theory can help us to understand these apparently contradictory findings, as we now explain.

Both of our models of multinational bank regulation (sections V.A and V.B) predict that opening the South to competition from Northern bankers will cause the Southern banks to suffer, because Northern banks are perceived to be safer. Other things being equal, the higher ability of their home regulator allows Northern banks to offer Southern depositors a lower interest rate than local banks and still raise deposits. If we consider that developed country regulators have a better ability to screen banks than developing country regulators, we should therefore expect foreign (typically, developed country) banks which enter the developing world to be more profitable than local banks. On the other hand, Southern banks which enter the North outperform local Southern banks and under perform Northern banks which enter the South. Whether they do better or worse than the “representative” Northern bank is ambiguous, since in our model Southern multinationals should, other things being equal, do better than Northern local banks but worse than Northern multinationals. If the fraction of Northern multinationals is large enough, it may appear that Southern multinationals under perform the “representative” Northern bank. Again, this can help us to understand the empirical finding that foreign (often, developing country) banks seem to be less profitable than local banks when they enter developed economy markets, without needing to suppose that the reasons for foreign bank entry are necessarily different in developed and developing countries: in our model entry is driven in both cases by the benefits of foreign certification. This is not to say that we believe that the desire for foreign certification is the only thing, or even the most important thing, that drives foreign bank entry, but it is an effect which most likely arises when entry occurs for other reasons, and which the empirical literature has so far ignored.<sup>25</sup> Thus the relevant benchmark for assessing the profitability of foreign bank entry might be to consider how multinational Southern banks’ profits compare to those of local Southern banks, rather than comparing them to Northern banks’ profits.

The relevance of the cherry-picking externality identified by our theory depends not only on the *stock* of foreign banks in any given economy, alluded to above, but also on the ability of regulators to influence the quality of this stock by making appropriate licensing decisions. This in turn depends both on the extent

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<sup>24</sup>On connected lending, see also Laeven (2001), La Porta, López-de Silanes, and Zamarripa (2003), and Mian (2005).

<sup>25</sup>The addition of a fixed cost of foreign entry to our model would generate the plausible result that Northern entry in the South for pure certification reasons is much less likely than Southern entry for certification in the North, since Northern certification adds relatively more value for Southern banks than vice versa. This could help explain why Southern banks might enter Northern markets even if they anticipate low or negative profits there, since such entry will improve their reputation with depositors at home.

of the flow in and out of the banking sector, and on the ability and willingness of regulators to influence average bank quality by exercising control over this flow.<sup>26</sup> There is in fact a surprising amount of turnover in foreign bank representation in many countries, including the US. In California in 2003, for example, of 19 banks with representative offices, one representative office was opened, and five closed, leaving 15 banks; while of the 49 agencies and branch offices of foreign (other nation) banks (representing 43 banks), two branch offices opened, and three agencies and two branch offices closed, leaving 46 agencies and branch offices (representing 40 banks).<sup>27</sup>

Barth, Caprio, and Levine (2001, figures 21, 22, 23 and table 6) provide some evidence on bank applications and acceptances in the five years prior to their survey of central banks in 2001. A rough treatment of their data suggests that the average reporting country in their sample received just over 10 domestic and 8 foreign applications for banking licences in the last 5 years.<sup>28</sup> They show that a significant fraction of these bank entry applications are denied, with the fraction of foreign bank applications denied ranging from 6.3% in Europe and Central Asia to 56.92% in South Asia. These numbers almost certainly understate the true influence of regulators on bank entry, since when it becomes clear that a licence application will fail, many applicants withdraw rather than wait to be formally denied a licence. Fifty eight regulators reported denying at least one licence. The primary reasons reported for denial were the “reputation” of the prospective bank (40), followed by “incomplete application” (39), “inadequate capital amount or quality” (32) and “banking skills” (29). These data suggest that, over time, regulators have significant scope to influence the quality of their banking system through appropriate screening of licence applicants, particularly in economies where the foreign bank presence is large. Barth et al. also ask regulators about the information that they require to determine the acceptance or rejection of licence applications, which typically includes draft by-laws; the intended organisation chart; three-year financial projections; financial information on the main potential shareholders; background/experience of future directors and managers; and the source of the funds to be used to capitalise the new bank. Whilst these survey responses are to a large extent “cheap talk,” and many rejections may in fact occur for corrupt or political reasons, these answers are at least consistent with the view that regulators try to screen out unsound applicants.<sup>29</sup>

This evidence suggests that regulators can at least potentially exert the kind of influence over the quality of banks which they licence that we assume in this model. But is there any evidence that following a liberalisation banks might choose to locate abroad in order to obtain “certification” from a foreign regulator? There is a vast literature concerned with the benefits and costs of firms listing their securities abroad for precisely such certification reasons (see for example Reese and Weisbach (2002), and the references cited

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<sup>26</sup>In our model, regulatory influence on bank quality occurs purely at the ex ante stage. In practice, of course, regulators can also influence bank quality by forcing bank exit. Our model can be modified to allow for this extension: see footnotes 3 and 13.

<sup>27</sup>In New York State in 2003, among the 87 state-licensed foreign branches operating, 3 new ones were authorised and 3 voluntarily liquidations were concluded; among the 22 foreign agencies, 1 new foreign agency was opened and 2 voluntarily liquidations were concluded. These numbers are ldown from those at the height of foreign bank activity in the United States which occurred around a decade ago.

<sup>28</sup>These figures are not very meaningful because there is large variation across countries and, despite the best efforts of the survey designers, reporting is unlikely to be consistent across countries. (For example, we have excluded Germany, which claims to have received 139 applications, from this calculation because it does not report domestic and foreign applications separately; we have included Italy although it does not report applications from within the EU.) Also, these data probably understate the extent to which regulators can exercise control over banking sector composition, since regulators which would be hostile to foreign entry probably receive very few applications from foreign banks. Nevertheless, these rough numbers are sufficient to illustrate the fact that there is substantial entry into domestic banking industries, and hence substantial scope for regulators to apply screening technologies.

<sup>29</sup>For a reinterpretation of our theory in terms of a regulator that may be corrupt with some probability, see footnote 6.

therein), but, as far as we are aware, no similar evidence concerning the location decisions of banks.<sup>30</sup> As in the ADR literature, such evidence must necessarily be indirect, since just as firms will rarely declare publicly that they prefer to list abroad because regulation on the local stock exchange is inadequate, banks will avoid the controversy attendant upon a statement that a foreign licence is a response to the regulatory environment at home: such a statement might be interpreted as a negative comment on the competence of the home regulator or the bank itself. Nevertheless, as noted above, the empirical literature has found that in developed economies foreign banks often fail to have much impact on domestic markets. Banks sometimes appear to open foreign offices merely for “prestige” purposes, without much likelihood of making significant profits from these foreign operations. Representative offices provide the paradigm example of this since they typically employ very few people (sometimes only one or two: see Mandaro, 1999) and are unable to make loans or accept deposits in the host country. Though it is not the only possible rationalisation, this type of activity can be understood as opening an office merely for the purposes of certification by the foreign regulator. In other words, the purpose of locating abroad may be to improve one’s reputation with depositors at home, rather than to make profits abroad.<sup>31</sup>

To pursue this point further in the context of a particular liberalisation, consider the entry of Japanese Regional Banks into the US in the late 1980s. In the mid-1970s the Ministry of Finance began slowly to deregulate the Japanese banking system (McCall Rosenbluth, 1989). The Japanese regulatory authorities had traditionally administered the banking sector by issuing “administrative guidance” (*gyōsei shidō*), which was used to prevent the large City Banks from opening branches in the regions. This was relaxed as part of the deregulation, culminating in full branch-opening deregulation in the early 1990s. Combined with the slowing growth of the Japanese economy (and accompanying reduction in demand for loans by firms that were willing to supply cheap deposits in exchange), this brought the City Banks into closer competition for both deposits and loans with the typically smaller but better-branched Regional Banks. Now that firms and depositors in the regions had a choice of bank, it may have become more important for Regional Banks to demonstrate their soundness as a way to compete with the City Banks which were encroaching their territory. Under the revised Foreign Exchange and Financial Transactions Control Law (FEFTCL) of 1980, any commercial bank could in principle engage in foreign exchange transactions, and City Banks which were not already operating abroad quickly began to do so (Suzuki, 1987). The Regional Banks had to wait until the Ministry of Finance began to give them, too, leave to do so, starting around 1985. By this time the City Banks were already becoming an important presence in the US (Peek and Rosengren, 2000).

Apparently the Regional Banks aimed to show that they were as good as their City Bank rivals by also locating abroad, especially in the United States. For them, having a branch in New York was seen as a “status symbol.”<sup>32</sup> Eventually, 26 of the 64 tier I Regional Banks received licences to open branches in the US, mostly in New York State. This was despite the fact that very few of these Regional Banks ever did any serious amount of business in the US,<sup>33</sup> and indeed, it is not clear to what extent they ever had any

<sup>30</sup>For a survey of the empirical literature investigating the reasons why banks may choose to locate abroad, see Clarke, Cull, Martinez Peria, and Sánchez (2001).

<sup>31</sup>Typical reasons cited for opening representative offices include gathering “information and financial know how”, see e.g., “Iyo Bank eyes London office,” 30 March 1984 and “Iyo Bank to open New York representative office,” 25 April 1986, both from the Jiji Press Ticker Service.

<sup>32</sup>See “Small Japanese banks carving large niche in New York; Riding a wave of internationalization, regional institutions island-hop to Manhattan”, Hitoshi Sugimoto, United Press International, 3 January 1988.

<sup>33</sup>Because of consolidated reporting, data on the amount of business done by Japanese Regional Banks abroad is difficult to

realistic expectation of doing so. Why then, did the Regional Banks open these branches in the first place? They may have been overly optimistic about their business prospects, but much of the evidence does not support this view.<sup>34</sup> As they were well aware, they lacked international business experience, sophisticated risk management systems, an understanding of American business and legal practices and even confidence in English.<sup>35,36</sup> Only three of these Regional Banks still maintain branches in the US today (five have converted their branches to representative offices). Other banks closed their branches in the US and Europe, since these “were not profitable enough” (Mandaró, 1999) and “could not be financially justified”<sup>37</sup> and instead concentrated their efforts in Asia, where they do more business. Thus, either we can view the rapid expansion of Regional Bank branches in the United States as an extreme example of managerial moral hazard, or else take the more charitable interpretation that setting up these branches also enabled the banks to obtain international certification and recognition that was useful to them and which they could not have obtained if they had stayed at home.<sup>38</sup>

On a normative level, our theory suggests that the optimal regulation of multinational banks should allow them to hold less capital against their deposits and other liabilities than local banks. Few regulators adopt this regulation, however.<sup>39</sup> Presumably, political constraints make it difficult to ease the capital regulation

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obtain. However, comparisons of Bank of Japan data on aggregate overseas loans for the sector with data on gross profits and margins in overseas operations reported in the top 5 regional banks’ annual kessan tanshin suggests that in 1995 and 1996, 5 years after the 26 regional banks entered the US, these 5 banks accounted for virtually all of the Regional Banks’ overseas activity. We thank Ken Okamura for suggesting and performing this calculation. In their study of Japanese bank activity in US real estate markets, Peek and Rosengren (2000) eliminate the Regional Banks from their data set because although the City Banks were important players in the US real estate market, the Regional Banks, despite their numbers, held less than 4% of the real estate loans.

<sup>34</sup>Consider the following example, drawn from the Financial Times (Feb 21, 1991): “More typical is the Hokuriku Bank, which is based in western Japan and which held a reception late last year in London for 400 City folk to celebrate the opening of the first Japanese regional bank branch [there]. Mr Masayuki Naruto, general manager of the bank’s foreign department, said that, even before the London party began, the bank had frozen foreign asset growth.

“ ‘We have to look after the interests of our old Japanese clients and we can’t afford to lend to foreign companies and foreign governments. We are getting requests for loans to US companies, but we do not want to make that kind of loan,’ Mr Naruto said. ‘I have told our foreign offices not to increase assets.’ . . . Japanese regional banks originally opened representative offices abroad as a means of helping local companies conduct their foreign business. But their ambitions were broadened by Japan’s expanding international role and partly because a New York or London office had become a fashionable banking accessory.”

<sup>35</sup>See “Nikko, Yamaichi to get UK banking licence eventually”, Jiji Press Ticker Service, 9 February 1987; “Japanese banks take new look at loans to sovereign borrowers”, Financial Times, 8 March 1983 (Section II, p. 22); and “Wanted: Japanese-speaking lawyers,” United Press International, 27 February 1989, respectively.

<sup>36</sup>“In addition to services for Japanese clients, those [regional] banks see their participation in syndicated financing – by way of their international departments in Tokyo while the New York operations are representative offices, and then by their U.S. units when upgraded to branches – as fairly profitable.

“Their participation, however, has so far remained moderate, because of their limited ability of risk assessment and their lower credit ratings than big Japanese banks.

“Their activities are called “silent” participation, because their names, which would lower the syndicates’ credit, never appear on the list of loan providers or guarantors, they said. . . .

“Another important function of branches is to play a role as a center for 24-hour-a-day financial transactions, including foreign exchange and Treasury bond dealings, although the regional banks admitted they have yet to begin full-scale transactions due to lack of personnel.” (op. cit., fn 32).

<sup>37</sup>See “Regional banks shifting resources to Asia”, Katsuhide Takahashi, *The Nikkei Weekly*, 16 May 1994.

<sup>38</sup>For example, Tadaaki Takamizawa, general manager of the New York Branch of the Hachijuni Bank, based in northwestern Japan, which opened a representative office in New York during 1984 and upgraded it to branch in April 1987, said that in the era of internationalization, his bank needed to be known not only within Japan, but also in the rest of the world (op. cit., fn 32). A direct example of the value that the regional banks placed on certification services *per se* is provided by the Shizuoka Bank’s reaction to Moody’s rating of its convertible bond issue in 1988 (the first time that the ratings agency had rated any regional bank’s long term debt): the bank commented that “backed by the higher international credibility obtained from these ratings, the bank aims to raise funds...at low costs” (“Bank CB Rated AA3”, Jiji Press Ticker Service, 22 April 1988).

<sup>39</sup>It is interesting to note that, according to the Barth et al survey data, Aruba requires local banks to hold 10% capital whereas multinationals need to hold only 8%. Japan, on the other hand, adopts the opposite approach, requiring internationally active banks

of (mostly foreign) multinationals relative to that of domestic banks, even if the former are thought to have lower probability of failure. However, it has been argued that the implementation of Basle II will have this effect. This agreement will allow banks to elect whether to opt out of standardised capital regulation similar to Basle I and instead implement an internal ratings-based approach. Since adoption of the latter in practice requires the bank to incur hefty fixed costs, it is thought that only large (typically multinational) banks will benefit from the looser capital requirements which it will allow. Our theory suggests that, if we believe that large multinationals are in fact less likely to fail, this asymmetric impact is in fact a good thing.<sup>40</sup>

## **VII. Extensions and Directions for Future Research**

### *A. Banking Crises, Liberalisation and Regulator Reputation*

We can interpret a spate of bank failures (i.e., 0 outcomes instead of  $R$  outcomes) as a banking crisis. Clearly, banking crises are more likely in the South than in the North in our model, since the pool of banks selected in the South will on average contain more unsound banks. Consistent with this, Demirgüç-Kunt and Detragiache (1998) show that "... high values of the 'law and order' index, which should measure [...] the ability to carry out effective prudential supervision, tend to reduce the likelihood of a crisis." If banking capital is mobile, then the cherry-picking externality imposed by the Northern Regulator increases further the likelihood of banking crises in the South. With mobile bank capital, an improvement in the quality of the Northern Regulator will all else equal cause more crises in the South and fewer in the North, whereas an improvement in the Southern Regulator's reputation will reduce Southern crises and have no impact in the North. An international agreement on a level playing field which raises capital requirements and deposit rates in the North and reduces capital requirements in the South will reduce the likelihood of Southern Banking crises, and leave the probability of Northern crises unchanged.

As regulator quality declines, the fraction of the economy's funds deposited in banks must also decline, so the ratio of deposits to GDP will decline. Hence bank failures are more likely when the ratio of deposits to GDP is low. This effect may explain why Demirgüç-Kunt and Detragiache (1998) find an inconsistent sign on the effect of credit to GDP ratios in predicting banking crises. Although they anticipated that credit *growth* would be associated with financial liberalisation and would cause banking crises (see for example Hellman *et al*, 2000), our model shows that credit *contractions* signal poor regulator reputation and hence a greater likelihood of crisis.

Our model may also help us to see the link between capital account liberalisation and financial crises in a new light. Opening the economy to bank capital flows when cherry picking externalities are present leaves weakly-regulated economies vulnerable to shocks from well-regulated economies from which they would otherwise be insulated. In our model, with unregulated playing fields (section IV.A), a shock to the reputation of the Northern regulator will affect the Southern banking system. The impact in the South could be even larger than in the North, where the affected regulator actually operates. For example, the adverse shock to the US regulator's reputation in the wake of the savings and loan scandal should have been beneficial for emerging economies, whereas the gradual recovery in reputation thereafter may have led to

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to hold 8% capital but local banks to hold only 4%.

<sup>40</sup>For alternative views on the benefits and costs of the asymmetric impact of Basle II, see Berger (2004), Repullo and Suarez (2004), and Hakenes and Schnabel (2005).

reduced confidence in them. If we take our model literally, confidence in all of these economies banking systems is intimately bound up with confidence in the developed country regulators' ability to screen out unsound banks.

Our model also points to a potential problem with some standard responses to financial crises. Contagion arises in our model because depositors update their beliefs about the quality of their local banking sector. To be sure, this problem arises because international capital mobility gives rise to a cherry-picking externality, but instances of contagion *do not themselves involve capital flows across borders*. Crises in our model involve capital flight from the banks, but they do not cause, and nor are they caused by, cross-border capital flows: the money which leaves the banking sector is hoarded locally. Responding to a crisis by restricting international capital flows or by imposing exchange controls is in our model akin to closing the stable door after the horse's departure.

### *B. Regulatory Unions and the Benefits of Local Regulators*

We have assumed that bank regulators in the North and the South operate independently. However, in the context of our simple model, unifying the regulatory framework would clearly be beneficial. A simple welfare improvement could be achieved by having the more skilled Northern regulator assess applications for Southern Banking licences as well as Northern ones. Moreover, in contrast to work by Dell'Ariccia and Marquez (2005) and Acharya (2003), the Southern regulator would be happy to agree to this change. Even if the Northern regulator cares primarily about Northern welfare and only lexicographically about welfare in the South, the South will be better off under either unilateral or multilateral capital requirements if the more talented regulator chooses the banks. An even better outcome for both countries can be achieved if both regulators continue to screen licence applicants before pooling information and jointly allocating licences. Arguably, this is achieved to some extent by the multinational banks which we study in section V. This observation holds even when regulators are concerned primarily about national welfare: given either immobility of depositor capital or deposit rationing, Northern and Southern banks do not compete with one another and so there is no conflict of regulatory interest.<sup>41</sup>

When would a regulatory union or regulation by a remote regulator fail to deliver welfare improvements? One plausible circumstance is when local regulators have superior information about local banks: in other words, when regulator screening ability is not the one-dimensional object which we have analysed, but differs according to the geographical proximity of the bank being screened. For a model along these lines, see Holthausen and Rønde (2002). It might in this case be desirable to keep the two economies as separate regulatory jurisdictions, as we have assumed in this paper. In practice, of course, there are also strong political reasons why an economy may not wish to delegate power over its banking sector to a foreign regulator.

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<sup>41</sup>This seems to be a reasonable approximation to reality in many cases. US Banks are not in strong competition with most African Banks, for example, so it seems that there should be few political economy barriers to cooperation in screening banks between American and African regulators. There will of course be conflict of interest in the setting of capital requirements, however.

*C. Deposit Insurance*

It would also be interesting to investigate the optimal deposit insurance policy in the economies studied in this paper. Elsewhere, we show that *subsidised* deposit insurance schemes are welfare increasing in this environment - and that weaker regulators should provide more deposit insurance (Morrison and White, 2004). Could more generous deposit insurance schemes be used by weaker regulators as an alternative way of levelling the playing field and making their economy a more attractive location for banks?

It would also be interesting to investigate how the presence of multinational banks should interact with the domestic provision of domestic deposit insurance. A scheme under which all banks operating in a country (whether national or multinational) must contribute to and benefit from the national deposit insurance scheme on an equal basis will tend to level the playing field between national and international banks for two reasons.<sup>42</sup> Firstly, note that insured depositors are indifferent to the failure risk of their banks. As a result, with deposit insurance the sounder multinational banks will no longer be able to borrow at a lower rate than local banks. Secondly, if all banks pay the same deposit insurance premium the insurance scheme constitutes a subsidy from the sounder multinational banks to the riskier local banks. We conjecture that this net subsidy is most likely inefficient since the multinational investments are of higher average quality.

*D. Free Movement of Depositor Funds and Exchange Controls*

Throughout this paper we have implicitly assumed that depositors may deposit only in their home country. When - as is the case for most of our analysis - deposits are rationed, this assumption is without loss of generality: it would not be possible for the foreign banking system to absorb any more deposits even if depositors were allowed to deposit across national boundaries. Similarly when deposits are not rationed in either country there is no benefit to depositors from depositing across boundaries if, as we have assumed, they continue to receive their outside option. The ability to deposit overseas is of interest mainly when deposits in one country (i.e., the South, since it has the weaker regulator) are rationed, whereas those in the North are not. It seems clear that in this case, the adverse welfare impact of policies which shrink the Southern banking sector is likely to be smaller, because depositors can reallocate their funds to the North instead. Thus we conjecture the disadvantages of free movement of bank capital and the benefits of level playing fields are both reduced when Southern residents' funds are more mobile. Further, in the simple model presented here, there are no costs to allowing free movement of depositor funds, so we suggest that if capital requirements for Northern Banks are not binding, then free movement of depositor funds across borders should be encouraged. This contrasts with the case for free movement of bank capital, which, as we saw in propositions 3 and 5 above, can be harmful. Of course it can be difficult in practice to distinguish these two types of capital flows, but a policy of exchange controls for the South, where sums above a given limit cannot be easily converted, might be helpful. This may help us to understand why exchange controls are often adopted by developing countries, although there are obviously a number of other justifications for such a policy.

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<sup>42</sup>Whether this indeed occurs depends on whether the foreign office of the multinational bank is set up as a branch or as a subsidiary of the headquarters. We leave the analysis of the optimal choice in this respect for future research.

*E. Regulatory Learning*

We have assumed throughout our discussion that the regulator's ability to screen licence applicants is exogenous. In practice, the regulator may learn how to screen more effectively through contact with other regulators. This suggests a benefit of open economies which is absent from our model: namely, that they encourage regulatory learning and experimentation. This type of argument has been made in the context of other forms of financial regulation: see for example Kane (1984) and Romano (2001).

Allowing regulators to make an effort to improve their screening technology in our model is clearly beneficial. With an unregulated playing field, both regulators have an incentive to acquire the better technology and the presence of the cherry-picking externality suggests that the Southern regulator has an especially strong incentive to improve her skills. The Northern regulator, on the other hand, has no particular interest in transferring her skills to the weaker regulator, except insofar as this may improve the quality of multinationals. With a regulated playing field, welfare in both economies is improved if the better regulator can transfer some of her skills to the weaker one, and so raise the lowest common denominator; and here the Northern regulator has an obvious incentive to participate in the transfer of regulatory technologies.<sup>43</sup> In both cases, and in contrast to other literature on regulatory competition (Acharya, 2003, Dell'Araccia and Marquez, 2005), our model predicts a *race to the top* in regulatory quality, rather than a race to the bottom. Whether learning effects mitigate in favour of or against level playing fields is rather unclear: it would be interesting to model the learning process to assess the relative importance of the "catch-up effect" with an unregulated playing field, and the "pull-up effect" with a level playing field. In either case, however, regulatory learning is presumably a fairly long-run phenomenon, so in the medium term, we expect that the effects highlighted in this paper would continue to be important in affecting the trade-off between level and unregulated regulatory playing fields.

### **VIII. Conclusion**

In this paper, we examine a model of two banking sectors whose regulators have different abilities. We deliberately abstract from many real-world features in order to demonstrate that important externalities arise between the two regulators *even when the banks which they regulate do not compete with one another at all*. This is in contrast to much of the recent literature (e.g., Acharya, 2003, Dell'Araccia and Marquez, 2003) which addresses issues of financial integration when foreign banks compete directly with domestic ones.

One might expect that in the absence of direct linkages between economies, it would be optimal for regulators to act independently to choose the capital requirements best suited to their local economies. In this case, the Northern regulator's superior screening ability allows it to set looser capital requirements, and enables Northern bankers to pay lower deposit rates, while still retaining depositor confidence. The problem with this is that every banker will apply first to operate in the North, where expected bank profits are higher. Any bank chartered in the South must therefore have been rejected in the North, which reduces public confidence in Southern banks. In other words, the mere existence of the Northern regulator imposes a *cherry-picking externality* upon the South, and this serves to reduce the benefits to the North of setting

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<sup>43</sup>In its 2001 Annual Report, the State of New York Banking Department draws attention to its "leadership role in providing seminars abroad to banking supervisors, sharing its expertise in assessing financial and operational risks." See [http://www.banking.state.ny.us/report01/Narratives/foreign\\_banking.html](http://www.banking.state.ny.us/report01/Narratives/foreign_banking.html).

regulatory standards on a unilateral basis.

Our results suggest that international capital flows reduce confidence in weakly-regulated economies without benefiting well-regulated economies. This result accords well with the casual observation of Hellman *et al* (2000) that in recent years financial liberalisation seems to have resulted in both increased international capital flows and a greater incidence of banking crises. One obvious response to this problem is to attempt to close borders to bank capital flows.

While closing borders to bank capital flows *ex ante* will prevent reputational contagion, a second possible response is to impose a level playing field on banks in the two economies, so that being chartered by the better regulator is no more attractive than being chartered by the worse regulator. The Basle Accord takes a step in this direction but, according to our model, does not go far enough since deposit rates as well as capital requirements should be harmonised. When there are no multinational banks, we show that adopting a level playing field is beneficial for the Southern economy and harmful for the North. From the point of view of global welfare, a level playing field is preferable to an unregulated playing field if and only if regulatory abilities are not too different.

We extend our results to the more realistic case involving multinational banks, which have two banking charters. The second charter provides valuable certification for the multinational bank and enables it to operate with lower capital requirements, and to pay lower deposit rates. Although local banks shrink, multinational banking always raises welfare. Even when bank capital mobility gives rise to a cherry-picking externality, combining it with a level regulatory playing field strictly raises welfare relative to the closed economy case.

Our model is predicated on the assumption that the competence of the Southern regulator is given. Evidently, however, it would be better for all concerned if her ability and reputation could be improved, irrespective of whether playing fields are level or unregulated, of whether multinational banks are permitted, and of whether capital flows are substantial or not. Thus our paper underlines the importance of the work done by the IMF, BIS and developed country regulators in trying to pass on regulatory skills and best practices to regulators in developing countries in improving global welfare.

## REFERENCES

- Acharya, Viral V., 2003, Is the international convergence of capital adequacy regulation desirable?, *Journal of Finance* 58, 2745 – 81.
- Barth, James R., Gerard Caprio, Jr, and Ross Levine, 2001, The regulation and supervision of banks around the world: A new database, Policy Research Working Paper 2588 World Bank Washington, DC.
- Basle Committee on Banking Supervision, 1988, *International Convergence of Capital Measurement and Banking Standards* (Bank for International Settlements: Basle).
- , 1999, A new capital adequacy framework, Consultative paper Bank for International Settlements Basle.
- Berger, Allen N., 2004, Potential competitive effects of Basel II on banks in SME credit markets in the United States, Finance and Economics Discussion Paper 2004-12 Federal Reserve Board Board of Governors of the Federal Reserve System, Washington, DC.

- Claessens, Stijn, Asli Demirgüç-Kunt, and Harry Huizinga, 2001, How does foreign entry affect domestic banking markets?, *Journal of Banking and Finance* 25, 891 – 911.
- Clarke, George, Robert Cull, Maria Soledad Martinez Peria, and Susana M. Sánchez, 2001, Foreign bank entry: Experience, implications for developing countries, and agenda for further research, Policy Research Working Paper 2698 World Bank Washington, D.C.
- de Haas, Ralph, and Iman van Lelyveld, 2003, Foreign banks and credit stability in central and eastern europe, Staff Report 109 De Nederlandsche Bank Amsterdam.
- Dell’Ariccia, Giovanni, and Robert Marquez, 2004, Information and bank credit allocation, *Journal of Financial Economics* 72, 185 – 214.
- Dell’Ariccia, Giovanni, and Robert Marquez, 2005, Competition among regulators and credit market integration, *Journal of Financial Economics* Forthcoming.
- Demirgüç-Kunt, Asli, and Enrica Detragiache, 1998, The determinants of banking crises: Evidence from developed and developing countries, IMF Staff Papers 45 International Monetary Fund Washington, D.C.
- Demirgüç-Kunt, Asli, and Harry Huizinga, 1999, Determinants of commercial bank interest margins and profitability: Some international evidence, *World Bank Economic Review* 13, 379 – 408.
- Demirgüç-Kunt, Asli, and Edward J. Kane, 2002, Deposit insurance around the globe: Where does it work?, *Journal of Economic Perspectives* 16, 175 – 195.
- Giannetti, Mariassunta, and Steven Ongena, 2005, Financial integration and entrepreneurial activity: Evidence from foreign bank entry in emerging markets, Working Paper 498 European Central Bank Frankfurt.
- Hakenes, Hendrik, and Isabel Schnabel, 2005, Bank size and risk-taking under Basel II, Preprint 2005/6 Max Planck Institute for Research on Collective Goods Bonn, Germany.
- Hellman, Thomas F., Kevin C. Murdock, and Joseph E. Stiglitz, 2000, Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough?, *American Economic Review* 90, 147 – 165.
- Holthausen, Cornelia, and Thomas Rønde, 2002, Cooperation in international banking supervision: A political economy approach, Mimeo European Central Bank Frankfurt, Germany.
- Kane, Edward J., 1984, Regulatory structure in futures markets: Jurisdictional competition between the SEC, the CFTC, and other agencies, *Journal of Futures Markets* 4, 367 – 384.
- La Porta, Rafael, Florencio López-de Silanes, and Guillermo Zamarripa, 2003, Related lending, *Quarterly Journal of Economics* 118, 231 – 268.
- Laeven, Luc, 2001, Insider lending and bank ownership: The case of Russia, *Journal of Comparative Economics* 29, 207 – 229.
- Mandaró, Laura, 1999, Japanese banks in the United States: Who’s left?, *International Banker* 11.
- Martinez Peria, Maria Soledad, Andrew Powell, and Ivanna Vladkova Hollar, 2002, Banking on foreigners: The behavior of international bank lending to latin america, 1985 - 2000, Policy Research Working Paper 2893 World Bank Washington, D.C.

- McCall Rosenblum, Frances, 1989, *Financial Politics in Contemporary Japan* (Cornell University Press: New York).
- Mian, Atif, 2005, Distance constraints: The limits of foreign lending in poor economies, *Journal of Finance* Forthcoming.
- Morrison, Alan D., and Lucy White, 2004, Is deposit insurance a good thing and if so, who should pay for it?, Working Paper 2004-FE-08 Oxford Financial Research Center University of Oxford.
- , 2005a, Crises and capital requirements in banking, *American Economic Review* Forthcoming.
- , 2005b, Reputational contagion and optimal regulatory forbearance, Mimeo Saïd Business School University of Oxford.
- Obstfeld, Maurice, 1998, The global capital market: Benefactor or menace?, *Journal of Economic Perspectives* 12, 9 – 30.
- , and Kenneth Rogoff, 1995, The mirage of fixed exchange rates, *Journal of Economic Perspectives* 9, 73 – 96.
- Peek, Joe, and Eric S. Rosengren, 2000, Collateral damage: Effects of the Japanese bank crisis on real activity in the United States, *American Economic Review* 90, 30 – 45.
- Prasad, Eswar, Kenneth Rogoff, Shang-Jin Wei, and M. Ayhan Kose, 2003, Effects of financial globalization on developing countries: Some empirical evidence, Occasional Paper 220 International Monetary Fund Washington, D.C.
- Radelet, Steven, and Jeffrey Sachs, 1998, The onset of the East Asian financial crisis, Working Paper 6680 National Bureau of Economic Research Cambridge, MA.
- Reese, Jr, William A., and Michael S. Weisbach, 2002, Protection of minority shareholder interests, cross-listings in the united states, and subsequent equity offerings, *Journal of Financial Economics* 66, 65 – 104.
- Repullo, Rafael, and Javier Suarez, 2004, Loan pricing under Basel capital requirements, *Journal of Financial Intermediation* 13, 496 – 521.
- Romano, Roberta, 2001, The need for competition in international securities regulation, Working Paper 00-49 Yale International Center for Finance Yale School of Management.
- Sachs, Jeffrey E., 1998, Alternative approaches to financial crises in emerging markets, in Miles Kahler, ed.: *Capital Flows and Financial Crises* . chap. 9, pp. 247 – 262 (Manchester University Press: Manchester, U.K.).
- Stiglitz, Joseph E., 2004, Capital-market liberalization, globalization, and the IMF, *Oxford Review of Economic Policy* 20, 57 – 71.
- Suzuki, Yoshio, 1988, *The Japanese Financial System* (Clarendon Press: Oxford, UK).

Appendix

*Proof of Proposition 4*

When  $a^N < \bar{a}(g)$ , differentiation of equations 16 and 17 yields the following:

$$\begin{aligned}\frac{\partial W_U^N}{\partial a^N} &= \mu(1-g)k_N(g) \left\{ 1 + \gamma_N(g) \frac{(R\Delta p - C)}{Rp_L} k_N(g) \right\}; \\ \frac{\partial W_U^S}{\partial a^N} &= -\mu \frac{g(1-g)(1-a^S)}{2-g} k_S(g^S) \left\{ 1 + \gamma_S(g^S) \frac{(R\Delta p - C)}{Rp_L} k_S(g^S) \right\}.\end{aligned}$$

In both of these expressions, the first term in the curly brackets is the quality effect identified in the text, while the second is the size effect. Since  $\frac{g(1-a^S)}{2-g} < 1$ , we must have

$$\frac{\partial W_U^N}{\partial a^N} + \frac{\partial W_U^S}{\partial a^N} > \mu(1-g) \{k(a^N, g) - k(a^S, g^S)\} + \mu \frac{(R\Delta p - C) \gamma_N(g)}{Rp_L} \{k_N(g)^2 - k_S(g^S)^2\} > 0.$$

When  $a^N > \bar{a}(g)$ ,  $\frac{\partial W_U^N}{\partial a^N} = N(1-g)$  and when  $a^S > \bar{a}(g^S)$ ,  $\frac{\partial W_U^S}{\partial a^N} = -N \frac{g(1-g)(1-a^S)}{2-g}$ , so when  $a^S > \bar{a}(g^S)$ ,

$$\frac{\partial W_U^N}{\partial a^N} + \frac{\partial W_U^S}{\partial a^N} = \frac{N}{\mu}(1-g) \left\{ 1 - \frac{(1-a^S)g}{2-g} \right\} > 0.$$

When  $a^N > \bar{a}(g)$  and  $a^S < \bar{a}(g^S)$ ,

$$\frac{\partial W_U^N}{\partial a^N} + \frac{\partial W_U^S}{\partial a^N} = N(1-g) - \mu \frac{g(1-g)}{2-g} k_S(g^S) \left\{ 1 + \gamma_S(g^S) \frac{R\Delta p - C}{Rp_L} k_S(g^S) \right\}.$$

Rearrangement of this expression yields part (2) of the proposition.

*Proof of Proposition 6*

We are concerned only with the region  $a^S < \bar{a}(g)$  (for higher values is represented by the shaded region in figure 4 where the level playing field is certainly preferred). The proof consists of a series of lemmas:

LEMMA 1 *When  $a^S < \bar{a}(g)$ ,  $\frac{\partial^2(\Delta W)}{\partial (a^N)^2} > 0$ .*

*Proof.* Throughout this region,

$$\frac{\partial S}{\partial a^N} = -\mu \frac{(1-a^S)g(1-g)k_S(g^S)}{2-g} \left\{ \underbrace{1}_{\text{Quality effect}} + \underbrace{\frac{k_S(g^S)(R\Delta p - C)\gamma_S(g^S)}{Rp_L}}_{\text{Size effect}} \right\}.$$

The quality effect arises because a higher  $a^N$  reduces the quality of the Southern regulator's pool, while the size effect arises because the quality effect raises the minimum acceptable deposit rate in the South and hence (to ensure monitoring incentive compatibility) reduces the size of Southern banks. Note that both effects are unambiguously negative. Differentiating again, we obtain:

$$\begin{aligned}\frac{\partial^2 S}{\partial (a^N)^2} / \left( \mu \frac{(1-a^S)g(1-g)}{2-g} \right) &= -\frac{\partial k_S(g^S)}{\partial a^N} 1 + 2k_S(g^S) \frac{R\Delta p - C}{Rp_L} \gamma_S(g^S) \\ &\quad + k_S(g^S)^2 \frac{R\Delta p - C}{Rp_L} (1-a^S) \frac{g(1-g)}{2-g} > 0.\end{aligned}$$

For  $a^N < \bar{a}(g)$ ,

$$\frac{\partial N}{\partial a^N} = \mu(1-g) \left\{ \underbrace{[k_N(g) - k_S(g)]}_{\text{Quality effect}} + \underbrace{\frac{\gamma_N(g) k_N(g)^2 (R\Delta p - C)(1-g)}{Rp_L}}_{\text{Size effect}} \right\},$$

from which it is obvious that  $\frac{\partial^2 N}{\partial (a^N)^2} > 0$ . For  $a^N > \bar{a}(g)$ ,  $\frac{\partial N}{\partial a^N} = (1-g)(N - \mu k(a^S, g))$  so that in this region,  $\frac{\partial^2 N}{\partial (a^N)^2} = 0$ .  $\square$

LEMMA 2  $\frac{\partial}{\partial a^S} \left( \frac{\Delta W}{k(a^S, g)} \right) < 0$ .

*Proof.* For  $a^N < \bar{a}(g)$ ,  $\frac{\partial}{\partial a^S} \left( \frac{N}{k_S(g)} \right) < 0$  by inspection. For  $a^N \geq \bar{a}(g)$ ,

$$\frac{\partial}{\partial a^S} \left( \frac{N}{k_S(g)} \right) = -N \gamma_N(g) \frac{R\Delta p - C}{Rp_L} (1-g) < 0.$$

Finally, straightforward differentiation yields

$$\frac{\partial}{\partial a^S} \left( \frac{S}{k_S(g)} \right) = \frac{a^N C g (1-g) p_L [C p_L - (R\Delta p - C) \Delta p]}{(2-g) [C p_L - (R\Delta p - C) \Delta p \gamma_S(g^S)]^2} < 0.$$

$\square$

LEMMA 3 *If for some  $(\tilde{a}^N, \tilde{a}^S)$ ,  $\Delta W \geq 0$  then  $\Delta W > 0$  for all  $(a^N, a^S) \in Q$ , where*

$$Q \equiv \{ (a^N, a^S) : a^N \geq \tilde{a}^N \text{ and } a^S \leq \tilde{a}^S, \text{ with at least one strict inequality} \}.$$

*Proof.* Suppose that  $\Delta W(\tilde{a}^N, \tilde{a}^S) \geq 0$ . We show that  $\Delta W$  is increasing throughout  $Q$ . Since  $\Delta W(\tilde{a}^S, \tilde{a}^S) < 0$ , there must be a minimum  $\bar{a}^N$  at which  $\Delta W(\bar{a}^N, \tilde{a}^S) \geq 0$  and at this point,  $\Delta W$  must be increasing in  $a^N$ . By lemma 1,  $\Delta W$  must increase for all  $a^N > \bar{a}^N$  and  $\Delta W$  must therefore be positive for all  $a^N > \bar{a}^N$ . By lemma 2,  $\frac{\Delta W}{k(a^S, g)}$  is never negative for  $a < \tilde{a}^S$  and hence neither is  $\Delta W$ .  $\square$

Proposition 6 follows immediately from lemma 3 as follows.

If there is no point  $(\tilde{a}^N, \tilde{a}^S)$  at which  $\Delta W \geq 0$  then  $\lambda$  is negative. If there is such a point then since  $\Delta W < 0$  at  $(\tilde{a}^S, \tilde{a}^S)$  there is a minimum  $\bar{a}^N$  at which  $\Delta W(\bar{a}^N, \tilde{a}^S) \geq 0$ : without loss of generality we assume that this point is  $\tilde{a}^N$  and hence that  $\Delta W(\tilde{a}^N, \tilde{a}^S) = 0$ . Lemma 3 implies that  $\Delta W > 0$  in the positive quadrant to the SE of  $(\tilde{a}^N, \tilde{a}^S)$ . If there are no points outside this quadrant for which  $\Delta W \geq 0$  then its boundary is  $\lambda$ . If there are then lemma 3 implies that they must lie to the SW or the NE of  $(\tilde{a}^N, \tilde{a}^S)$ . In other words, the set of points  $(a^N, a^S)$  for which  $\Delta W = 0$  must always be contained within the SW and the NE quadrant centered at any of the points. Connecting this points must therefore yield an increasing line, as required.

### Bank Sizes in Open Economies with Borders Opened After Licence Allocation

PROPOSITION 9 *Consider an open economy with multinational banks in which liberalisation occurs after the assignment of banking licences. For  $l \in \{N, S\}$ , there exist  $\bar{a}_l^l(g, m, a^f) < \bar{a}_l^M(g, m, a^f)$  such that:*

1. For  $q \in \{L, M\}$ ,  $\bar{a}_l^q$  is decreasing in  $a^f$  and  $\bar{a}_S^q(g, m, \bar{a}_N^q(a^S)) > a^S$ ;

2. The respective sizes of multinational and local banks operating in country  $l$  are given by  $k_l^M(g)$  and  $k_{l,f}^L(g)$ , where

$$k_l^M(g) \equiv \begin{cases} \frac{Rp_L \Delta p}{Rp_L \Delta p - \pi_l^M(g)(R\Delta p - C)}, & a^l \leq \bar{a}_l^M(g, m, a^f); \\ \frac{N}{m}, & a^l > \bar{a}_l^M(g, m, a^f), \end{cases}$$

and

$$k_l^L(g) \equiv \begin{cases} \frac{Rp_L \Delta p}{Rp_L \Delta p - \pi_l^L(g)(R\Delta p - C)}, & a^l \leq \bar{a}_l^L(g, m, a^f); \\ \frac{N - mk_{l,f}^g}{\mu - m}, & \bar{a}_l^L(g, m, a^f) < a^l \leq \bar{a}_l^M(g, m, a^f); \\ 0, & a^l > \bar{a}_l^M(g, m, a^f). \end{cases}$$

*Proof.* Firstly note that the IR constraint (22) intersects the banker's monitoring IC constraint where  $k = \frac{Rp_L \Delta p}{Rp_L \Delta p - \pi_l^q(g)(R\Delta p - C)}$ . The maximum quantity that the banking sector can absorb is therefore

$$T_l(g) \equiv m \frac{Rp_L \Delta p}{Rp_L \Delta p - \pi_l^M(g)(R\Delta p - C)} + (\mu - m) \frac{Rp_L \Delta p}{Rp_L \Delta p - \pi_l^L(g)(R\Delta p - C)}.$$

For a given  $a^f$ ,  $T_l$  is monotonically increasing in  $a^l$ . There therefore exists  $\bar{a}_l^M(g, m, a^f)$  such that  $T_{\bar{a}_l^M(g, m, a^f)}(g) = N$ . Moreover, since  $T_l$  is increasing in  $a^f$ ,  $\bar{a}_l^M$  is decreasing in  $a^f$ .

For  $a^l > \bar{a}_l^M(g, m, a^f)$ , the banking sector can absorb more than the total amount of local deposits. We assume that the regulator's primary concern is maximisation of local welfare. The optimal policy therefore is to allow multinational banks to expand at the expense of local banks, which are of lower expected quality, in such a way that the total capacity of the banking sector is precisely  $N$ . (For higher capacities there is a chance that the foreign country will reap some of the benefits of multinational bank certification.) The regulator will therefore set multinational bank size equal to  $\frac{Rp_L \Delta p}{Rp_L \Delta p - \pi_l^M(g)(R\Delta p - C)}$ , and local bank size equal to  $\frac{N - mk_l^M}{\mu - m}$ . This will be feasible provided  $\frac{N - mk_l^M}{\mu - m} > 0$ ; for given  $a^f$ , let  $\bar{a}_l^L(g, m, a^f)$  be the value of  $\bar{a}^l$  for which  $\frac{N - mk_l^M}{\mu - m} = 0$ . For higher values of  $a^l$ , the regulator can ensure that the total demand for deposits is met by multinational banks if she sets local bank size equal to zero and multinational bank size equal to  $\frac{N}{m}$ . Again,  $\bar{a}_{l,f}^L$  is decreasing in  $a^f$ .

Finally, note that since  $\pi_N^q > \pi_S^q$ , it must follow that  $T_N(\bar{a}_N^L(a^S), a^S) > T_S(\bar{a}_N^L(a^S), a^S)$  and hence that  $\bar{a}_S^L(g, m, \bar{a}_N^L(a^S)) > a^S$ . Similarly,  $\bar{a}_S^M(g, m, \bar{a}_N^M(a^S)) > a^S$ .  $\square$

#### Northern-Domiciled MNBs Larger than Southern-Domiciled MNBs

LEMMA 4  $k_{N,S}^\theta \geq k_{S,N}^\theta$ .

*Proof.* The lemma is an immediate consequence of the following observation:

$$k_{a^N, a^S}^q - k_{a^S, a^N}^q = \frac{Rp_L \Delta p^2 (R\Delta p - C) (a^N - a^S) (1 - q)}{\left[ Rp_L \Delta p - \pi_{a^N, a^S}^q(g) (R\Delta p - C) \right] \left[ Rp_L \Delta p - \pi_{a^S, a^N}^q(g) (R\Delta p - C) \right]} \geq 0. \quad (25)$$

$\square$

*Proof of Proposition 7*

When  $m \leq g\mu$  we have  $M = 1$ ,  $L = \frac{g\mu - m}{\mu - m}$  and hence:

$$W_l|_{m \leq g\mu} = \left( a^l + (1 - a^l) (1 - a^f) g \right) \left\{ m k_l^1(g) + (\mu - m) k_l^L(g) \right\} \\ + \left( 1 - a^l \right) a^f \left\{ m k_l^1(g) + (g\mu - m) k_l^L(g) \right\}. \quad (26)$$

Expansion of the first curly bracket yields:

$$m k_l^1(g) + (\mu - m) k_l^L(g) = R p_L \Delta p \left\{ \frac{m}{R p_L \Delta p - \pi_l^1(g) (R \Delta p - C)} + \frac{\mu - m}{R p_L \Delta p - \pi_l^L(g) (R \Delta p - C)} \right\}$$

Differentiate with respect to  $m$  to obtain after some manipulation:

$$\frac{R p_L \Delta p^3 (R \Delta p - C)^2 \mu^2 (1 - g)^2 [a^f (1 - a^l)]^2}{[R p_L \Delta p - \pi_l^1(g) (R \Delta p - C)] [R p_L \Delta p - \pi_l^L(g) (R \Delta p - C)]^2 (\mu - m)^2} > 0.$$

The second curly bracketed term in equation 26 can be written as  $m k_l^1(g) + (\mu - m) k_l^L(g) - (1 - g\mu) k_l^L(g)$ , and

$$\frac{d k^L}{d m} \Big|_{m \leq g\mu} = - \frac{R p_L \Delta p^2 (R \Delta p - C) a^f (1 - a^l) \mu (1 - g)}{[R p_L \Delta p - \pi_l^L(g) (R \Delta p - C)]^2 (\mu - m)^2} < 0. \quad (27)$$

Now consider the case where  $g\mu < m$  so that  $M = \frac{g\mu}{m}$  and  $L = 0$ . In this case equation (24) reduces to

$$W_l|_{m > g\mu} = \left( a^l + (1 - a^l) (1 - a^f) g \right) \left\{ m k_l^M(g) + (\mu - m) k_l^0(g) \right\} + \left( 1 - a^l \right) a^f g \mu k_l^M(g)$$

The first curly bracketed term differentiates with respect to  $m$  to give after manipulation:

$$- \frac{R p_L \Delta p^3 (R \Delta p - C)^2 \mu^2 g^2 [a^f (1 - a^l)]^2}{[R p_L \Delta p - \pi_l^M(g) (R \Delta p - C)]^2 [R p_L \Delta p - \pi_l^0(g) (R \Delta p - C)] m^2} < 0.$$

Finally,

$$\frac{d k^M}{d m} \Big|_{m > g\mu} = - \frac{R p_L \Delta p^2 (R \Delta p - C) (1 - a^l) a^f g \mu}{[R p_L \Delta p - \pi_l^M(g) (R \Delta p - C)]^2 m^2} < 0$$