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Global Moral Hazard, Capital Account Liberalization and the "Overlending Syndrome"[1]

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Abstract

The removal of government guarantees in borrowing countries does not eliminate the moral hazard problem posed by the existence of deposit guarantees in lender countries. The paper shows that, after restrictions on international capital flows are lifted, banks in low-risk developed countries benefit from lending funds captured in home markets at low deposit rates to high-risk/high-yield projects in emerging economies, even though these projects command lower expected returns. This, in turn, has a negative impact on bank profitability in the borrowing country, even when foreign funds are intermediated through domestic banks. The results are consistent with the surge in international bank lending flows that led to recent banking crises in Asia.

JEL Classification Numbers: D82, F30, G21

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Contents Page

Figures

I. INTRODUCTION

After the Mexican crisis in December 1994, most analysts forecast a slow-down or even a reversal of the direction of international capital flows to emerging markets, as a result of a revised perception of the associated risk. However, the empirical evidence from the period following the Mexican crisis runs contrary to this prediction: Capital continued flowing, and international yield spreads narrowed, even for Latin American countries where contagion from the Mexican crisis was felt more strongly and adverse effects on investor sentiment were expected to last longer.[2]

A popular argument that tries to explain this process relies on the moral hazard problem created by the perception, largely validated by recent bailouts, of implicit guarantees provided either by local governments or international financial institutions, that insure investments in emerging economies. These guarantees, by artificially lowering the associated credit risk, reduce the lending rates demanded by financial intermediaries, stimulating the demand for credit beyond what would be economically efficient, leading to what McKinnon and Pill have referred to as the "overborrowing syndrome."[3] One can extend this intuition to the international level, as long as the guarantees are seen to benefit domestic and foreign lenders in a similar way. Then, the relaxation of restrictions on international capital flows provides additional investment funds, exacerbating the consequences of the moral hazard problem. The natural conclusion from this argument is that the removal of such guarantees can be regarded as a necessary condition for a successful liberalization of the capital account.[4]

This paper argues that the removal of guarantees in the recipient country does not eliminate the moral hazard problem posed by the existence of deposit guarantees in *lender* countries. The paper presents an analytical model of two economies that differ only in their levels of country risk. In the model, moral hazard arises from the combination of limited liability banks that maximize the value of the option implicit in the deposit contract by investing in high-yield/high-risk projects,[5] and the presence of explicit or implicit deposit insurance that allows banks to engage in further risk taking without being penalized by investors through higher deposit rates.

The main results are the following:

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[2] Indeed, less than two years after the Mexican crisis, international yield spreads in countries like Argentina, Brazil or Mexico were already below pre-crisis levels.

[3] See, e.g., McKinnon and Pill (1997). See also Dooley (1996) and Krugman (1998).

[4] It should be noted, however, that government guarantees, in the form of explicit or implicit insurance, "too-big-to-fail" institutions, or bailout precedents, seem to be a fairly general phenomenon in most countries, including mature lender economies. Accordingly, we should also observe some degree of overinvestment in developed countries.

[5] Since banks do not have to cover losses in case of default, their expected profits depend only on the upside of the distribution of project returns.

i) In the absence of international capital flows, low-risk economies are associated with lower deposit rates and lower yields, and higher expected returns to investment.

ii) As financial markets in developing countries are liberalized, capital flows from developed to emerging markets in search of higher yields, even though *expected* returns in the latter are below those in the former. Thus, excessive (i.e., inefficient) foreign lending arises in this case from the artificially low cost of (domestically insured) loanable funds in mature economies, rather than from the artificially high expected return of (implicitly guaranteed) investment in emerging ones as McKinnon and Pill (1997) emphasize.

iii) Moreover, the exposure to an elastic supply of foreign funds as a result of the liberalization of the capital account erodes borrowing banks' oligopolistic rents, reducing short-run profits and forcing banks to exit the market in the long run. Thus, capital account liberalization has the immediate effect of increasing banking sector fragility in the borrowing economy.[6]

The previous results may help to explain the lower risk sensitivity exhibited by international bank lending rates relative to the yields of fixed income instruments (Figure 1), since in the former an increase in credit risk is not totally reflected in an increase in the lenders' own financing costs (deposit rates). In turn, this lack of sensitivity may be behind the substitution of bank lending for fixed income instruments in times of financial distress, and the unprecedented surge in interbank lending flows that characterized the period that led up to the Asian crises, particularly to those markets that proved to be more financially vulnerable (Figure 2).

The reference to the moral hazard problem illustrated in the paper as the "overlending syndrome" is not arbitrary: It means to emphasize that, while the overborrowing argument suggests that policies in the recipient country are at the origin of the problem, in our case it is the moral hazard associated with explicit or implicit guarantees in the lender country that generates incentives for international lending flows.[7]

It is easy to see that the moral hazard aspect discussed here is complementary to McKinnon and Pill's argument. Clearly, the overlending syndrome is only exacerbated if foreign creditors perceive that they will be partially bailed out in the event of a crisis in a foreign country, since bailout expectations reduce the probability of default without affecting the distribution of project returns. An important difference, however, arises depending on whether the bailout entails a credit guarantee under which both foreign and domestic banks are compensated for

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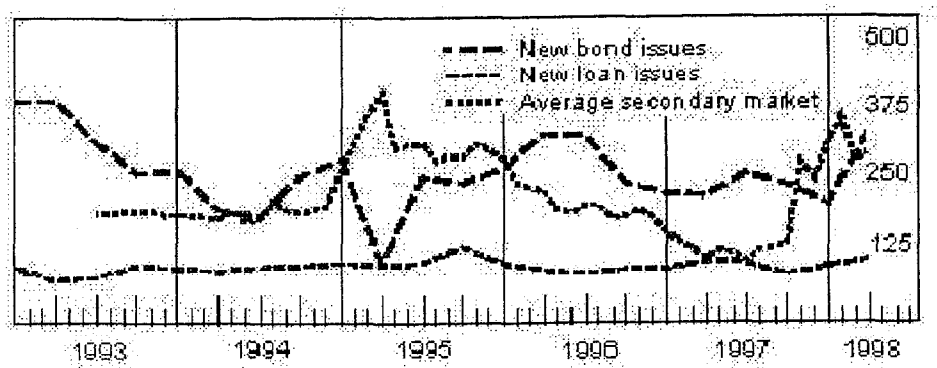
[6] Note that the result holds even if, as the paper assumes, foreign funds are intermediated exclusively through the domestic banking sector.

[7] These incentives are not specific of mature economies. The holding of Brady bonds by Korean banks is a good example of how banks in high-risk economies invest in even more risky ones.

Figure 1

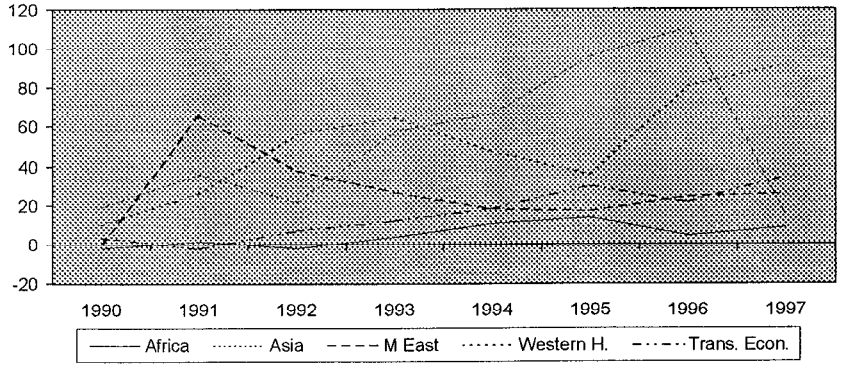
Spreads on emerging market debt instruments[1]



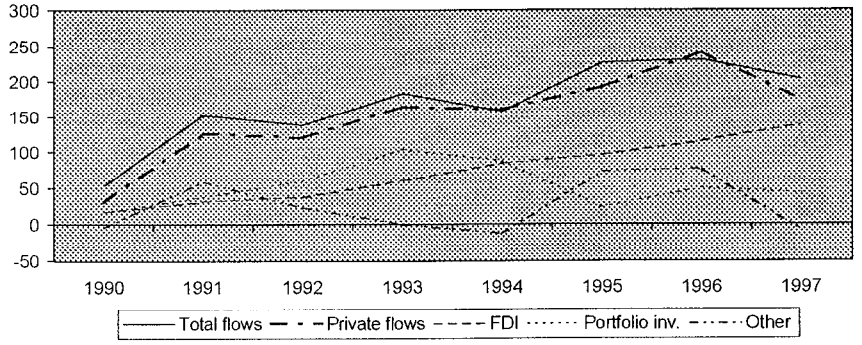
[1] Over US Treasury bonds of appropriate maturity (for new loan issues, over LIBOR)
New bond and loan issues based on a subset for which spreads were available.
Secondary market spread is an unweighted average of the following countries: Argentina, Brazil, Chile, Colombia, Mexico, India, Indonesia, Korea, Phillipines.

Figure 2

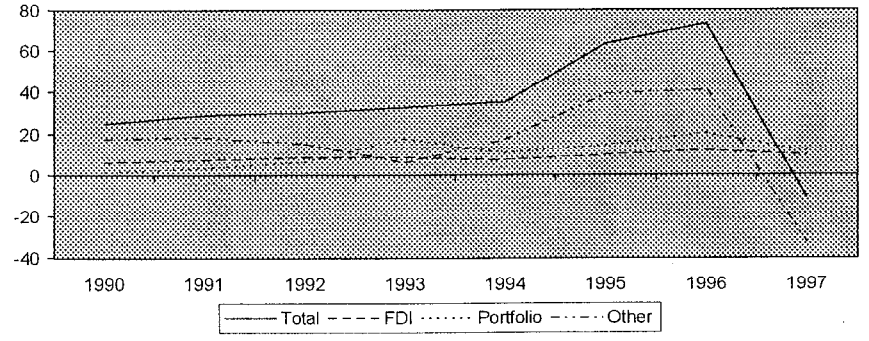
Net Private Capital Flows to Emerging Markets by Region
(in billions of US dollars)



Net Private Capital Flows to Emerging Markets
by Type of Investment
(in billions of US dollars)



Net Private Capital Flows to ASIA
Indonesia, Korea, Malaysia, Philippines, and Thailand.
(in billions of US dollars)



their investment losses or, on the contrary, whether the rescue is expected to protect only creditors of failed domestic banks. The second situation introduces an asymmetry between foreign and domestic institutions: While foreign lenders are treated as any other local depositor, insolvent local banks face the risk of liquidation. Therefore, a one-sided bailout that provides a higher degree of protection to foreign creditors than to domestic banks introduces an additional stimulus to international bank flows, while aggravating the negative impact of these flows on the health of the banking sector in the borrowing economy.

II. The Model

Consider an economy *à la* Salop (1979) in which a number n of banks are located symmetrically around a unit circumference representing the "product specification" space.[8] An individual bank i collects funds through a standard deposit contract offering an interest rate $r_i > 1$, and invests the proceeds in projects that return R, if the project succeeds, and 0, if the project fails. At the end of each period, if bank i's investment fails, the bank is liquidated, and outstanding deposits are fully covered by a deposit insurance fund.[9]

Expected investment returns are given by $pR = \overline{R}(L)$, with $\overline{R}' < 0$ and $\overline{R}(0) = \infty$, where p denotes the probability of success, and L is the stock of outstanding loans.[10] Thus, the probability p, common to all projects in a given economy, can be interpreted as a measure of

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[8] Distances along this circle should be interpreted as differences between the individual depositor's preferred product specification, and that offered by existing banks. For examples of spatial competition models, see Cordella and Levy Yeyati (1998b), Chiappori et al. (1995), and Besanko and Thakor (1992), on which the present model is loosely based.

[9] Unless bank contributions to the insurance scheme are risk-based, the way in which the insurance fund is financed is of little importance. In particular, even if the scheme entails a transfer from taxpayers to bank shareholders, individual depositors would knowingly try to benefit from the higher deposit rates offered by risk-taking banks, as the marginal effect of their investment decisions on the expected fiscal cost of future defaults is negligible. The results of the model are robust to the introduction of a partial insurance scheme. Indeed, it can be shown that the elimination of deposit insurance does not prevent excessive risk taking if depositors are not fully informed about the banks' risk exposure (Cordella and Levy Yeyati, 1998a, and Matutes and Vives, 1995).

[10] Two assumptions underlie this specification: Banks behave competitively in the credit market, and potential borrowers face the same menu of projects with expected returns ordered according to a standard aggregate production function $Q(L)$, such that $Q' > 0$, $Q'' < 0$, and $Q'(0) = \infty$. The first assumption, made for simplicity, is briefly discussed in the last section.

country-specific risk due to aggregate macroeconomic conditions. Note that a higher probability of success is associated with lower "good-time" returns, R, so that cross-country differences in credit risk do not entail differences in expected returns.[11]

Loanable funds are supplied to an individual bank i by a continuum of depositors, uniformly distributed along the unit circumference, according to the following supply function:

$$s(r_i, r_{-i}, n) = \frac{S(r_i)}{t}\left[u(r_i) - u(r_{-i}) + \frac{t}{n}\right], \tag{1}$$

with $S' > 0$, $S'' < 0$, $u' > 0$, $u'' > 0$, where the subscript $-i$ denotes other operating banks, and t is the "transportation cost" per unit of distance, henceforth assumed to be equal to one for simplicity.[12]

Then, bank i's profits can be expressed as:

$$\pi(r_i, r_{-i}, n) = p(R - r_i)s(r_i, r_{-i}, n), \tag{2}$$

Finally, assume that loans are fully financed by deposits,[13] so that, at a symmetric equilibrium:

$$L = ns(r, r, n) = S(r). \tag{3}$$

From (2), the solution of the bank's maximization problem has to satisfy the first order conditions given by:

$$\frac{\partial \pi}{\partial r_i} = p(R - r_i)s_1(r_i, r_{-i}, n) - ps(r_i, r_{-i}, n) = 0, \tag{4}$$

from which, denoting $s'(r,n) = s_1(r,r,n)$, and imposing symmetry, we obtain:

$$r = R - \frac{S(r)}{ns'(r,n)}. \tag{5}$$

Note that the equilibrium deposit rate only depends on the payoff to a successful project, or good-time returns, R, in turn increasing in p. This is because the bank has the option not to honor the deposit contract and exit the market without incurring any losses if the project fails. Therefore, the *effective* marginal cost of funds to the bank is equal to the actual marginal cost times the probability of success p, which thus cancels out of equation (5).

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[11] In this way, I rule out higher expected returns as a possible (efficient) reason for investing in risky economies.

[12] The characterization of depositors' preferences, based on Besanko and Thakor (1992), assumes that depositors first choose the bank, and then the amount to be deposited. See the Appendix for a brief derivation.

[13] The assumption of full deposit financing can be relaxed without altering the qualitative results, as long as the value of equity is not large enough to avert the possibility of default.

Combining (2) and (5), the equilibrium number of banks in the long run, n, can be computed from the free-entry condition:

$$\pi(r^*, r^*, n^*) = p \times \frac{S^2(r^*)}{n^{*2}\, s'(r^*, n^*)} = F, \tag{6}$$

where the asterisk denotes equilibrium values and F represents entry costs. The following proposition describes how the equilibrium values depend on the level of risk.

Proposition 1 *Low-risk countries (high values of p) are associated with:*

i) *lower deposit rates r;*

ii) *higher expected returns* $\overline{R}$ *; and*

iii) *lower good-time returns R*

Proof: In Appendix.

Recall that we assumed that projects with a lower probability of success promise a higher payoff R in case they indeed succeed. Because limited liability eliminates the expected loss in case of default, banks only care about the upside of the distribution of returns, in this case R, which decreases with p. In turn, because depositors are insured, deposit supply is independent of the level of risk. As a consequence, banks are allowed to enhance the value of the option implicit in the deposit contract by increasing their portfolio risk, without being punished by risk-wary depositors through a higher deposit rate. Then, greater access to projects with a high yield-high risk profile leads to improved bank profits that translate, through stiffer competition, into higher deposit rates.

Also note that, while good-time returns in a high-risk economy are above those in a safe one, the opposite is true for *expected* returns, as increased competition driven by the extra rents available in the former, results in a deepening of financial intermediation and a surge in the supply of credit that exhausts the menu of profitable investment opportunities, depressing the expected return of the next available project, $\overline{R}$.

It is easy to show that moral hazard is always associated with a higher level of investment. Solving the problem for a bank with unlimited liability (i.e., one in which bank shareholders are expected to cover their losses in full with equity capital), and denoting this case by the subindex u, equation (5) becomes

$$r_u = \overline{R} - \frac{S(r_u)}{n s'(r_u, n)}, \tag{7}$$

Along the lines of part (i) of the proof of Proposition 1, it can be shown that the deposit rate, now a function of expected rather than good-time returns, is smaller than in the previous case and, accordingly, fewer funds are intermediated through the banking system.

The point is illustrated in Figure 3. The equilibrium with unlimited liability is given by the intersection of the marginal cost curve (MC) and the marginal revenue curve, which coincides with the average revenue curve, $\overline{R}$. The introduction of limited liability implies that banks have to pay depositors only if the project succeeds. Accordingly, the average effective cost curve rotates from AC_0 to AC_1, moving the equilibrium volume of credit up from L_0 to L_1, and reducing expected returns from $\overline{R}_0$ *to* $\overline{R}_1$.

A. The overlending syndrome

The combination of higher good-time returns in risky economies with low risk sensitivity of deposit rates due to the deposit insurance makes it profitable for banks in safe economies to lend internationally to risky countries, even if, as shown in Proposition 1, expected returns in the latter are below those in the former. The intuition behind this point can be captured in a simple way by considering two economies, A and B, that are identical except for their level of country risk, *1-p*, with $p_A > p_B$. Assume that banks in each economy can borrow in perfectly competitive international capital markets and denote as a θ-portfolio a portfolio comprised of a $(1-\theta)$ share of domestic assets and θ share of foreign assets. [14] Furthermore, assume that the probability that returns from a θ-portfolio exceed the bank's liabilities at the end of the period is given by $p(\theta)$, where $p'(\theta) \leq 0$.[15]

While the optimization problem for a bank in B remains as in the previous section, a bank in A now solves:

$$\max_{\hat{r},A,\theta} \pi(r_{i,A}, r_{-i,-A}, \theta, n) = p(\theta)[R_A + \theta\Delta - r_{i,A}]s(r_{i,A}, r_{-i,-A}, n) \tag{8}$$

where $\Delta = R_A - R_B$, from which the first order condition for an interior solution is given by:

$$\frac{\partial \pi}{\partial \theta} = \frac{S(r_A)}{n_A}\{p(\theta)\Delta + p'(\theta)[R_A + \theta\Delta - r_A]\} = 0. \tag{9}$$

On the other hand, the first order condition with respect to $r_{i,A}$ yields:

$$r_A = R_A + \theta\Delta - \frac{S(r_A)}{ns'(r_A)}, \tag{10}$$

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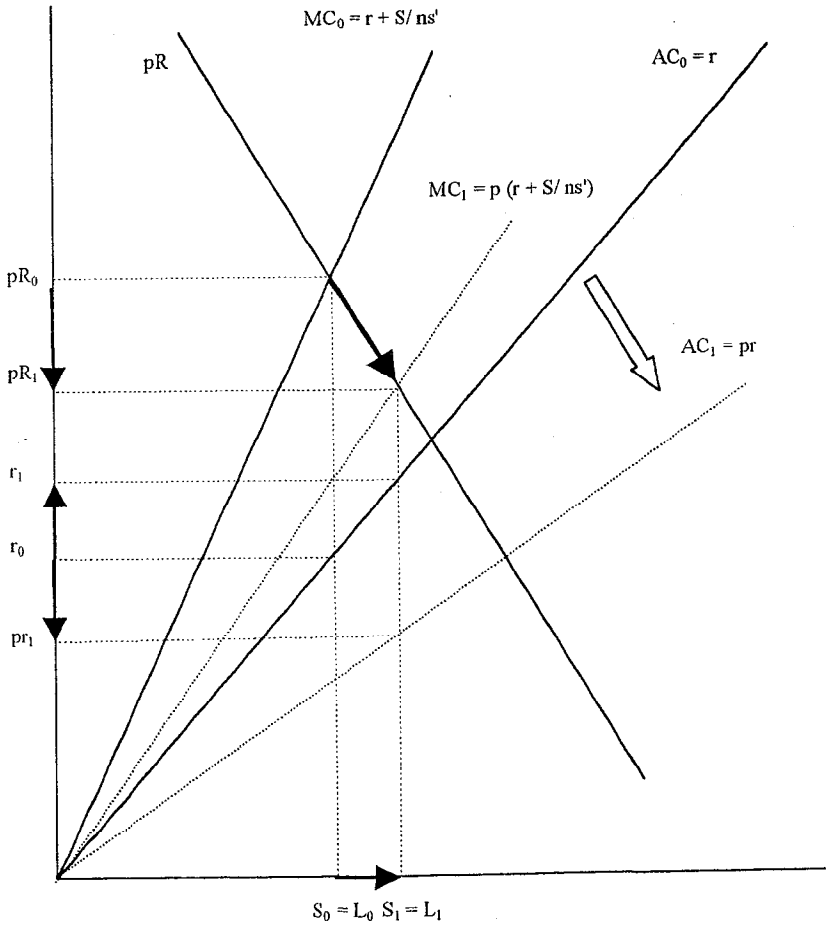
[14] The discussion in this section assumes that international lending is intermediated through domestic banks. It can be easily shown that the case in which foreign banks lend directly to domestic firms yields similar results.

[15] The example implicitly assumes that risks are perfectly correlated across countries, to abstract from the case in which international lending is driven by risk diversification.

Moral Hazard and Investment Returns

Figure 3



while interest rates in country B are characterized, as before, by

$$\hat{r}_B = \hat{R}_B - \frac{S(\hat{r}_B)}{n_B s'(\hat{r}_B)}. \tag{11}$$

Finally, returns in countries A and B are now equal to

$$\begin{aligned} R_A &= R(L_A) = \frac{\overline{R}[(1-\theta)S(r_A)]}{p_A}, \\ R_B &= R(L_B) = \frac{\overline{R}[\theta S(r_A) + S(r_B)]}{p_A}. \end{aligned} \tag{12}$$

Equations (9)-(12) characterize the interior symmetric equilibrium.

Equation (9) simply says that banks in the low-risk economy will engage in risky foreign lending if, and only, if good-time returns abroad are sufficiently high compared with those at home, so as to compensate for the associated increase in the probability of default, that is, denoting by ^ the new equilibrium values:

$$\hat{\Delta} = \frac{-p'(\hat{\theta})}{p(\hat{\theta})}\left[\hat{R}_A + \hat{\theta}\hat{\Delta} - \hat{r}_A\right]. \tag{13}$$

It is straightforward to verify that the optimal share is strictly less than one, since returns in the safe economy become arbitrarily large as θ approaches one.[16] On the other hand, from (13) we can derive a necessary condition such that banks in A invest at least some fraction of their portfolio in risky projects in B. More precisely:

Remark 1 *Banks in the safe economy invest a strictly positive share $\theta \in (0,1)$ if*

$$R_B - R_A \geq \frac{-p'(0)}{p_A}(R_A - r_A). \tag{14}$$

Remark 1 simply says that international lending increases with the difference between returns in both countries, and decreases with the marginal impact of foreign exposure on the probability of default of lender banks. Thus, if small foreign exposures have a negligible impact on the overall probability of default of lender banks, relatively minor cross-country differences in returns (alternatively, domestic lending rates) are sufficient to induce moral hazard-related interbank flows.

To focus on the impact of international lending on financial fragility, the following discussion assumes that condition (14) is verified.

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[16] Note that $\lim_{\theta \to 1} \overline{R} = \infty$ implies that $\lim_{\theta \to 1} \Delta = \infty$.

B. Financial fragility

It is easy to show that deposit rates fall in the recipient economy as a result of the decline in local returns induced by new borrowing from international markets. Differentiating totally (11) and simplifying, we get:

$$\frac{\partial \hat{r}_B}{\partial \theta} = \frac{\frac{\bar{R}_B}{p_B} S(\hat{r}_A)}{1 - \frac{\bar{R}_B}{p_B} S'(\hat{r}_B) + \frac{1}{n}\left(\frac{S'(\hat{r}_B)}{s'(\hat{r}_B)} - \frac{S(\hat{r}_B)s''(\hat{r}_B)}{[s'(\hat{r}_B)]^2}\right)} < 0, \tag{15}$$

since it is straightforward to check that:[17]

$$\frac{1}{n}\left(\frac{S'}{s'} - \frac{Ss''}{(s')^2}\right) > -1. \tag{16}$$

Moreover, keeping the number of banks constant, substituting (10) into (8) and differentiating, after imposing symmetry we obtain:

$$\frac{\partial \hat{\pi}_B}{\partial \theta} = \frac{pS(\hat{r}_B)}{n^2[s'(\hat{r}_B)]^2}[2S'(\hat{r}_B)s'(\hat{r}_B) - s''(\hat{r}_B)S(\hat{r}_B)]\frac{\partial \hat{r}_B}{\partial \theta}.$$

But it is immediate to check that

$$2S's' - s''S = 2(S')^2 - SS'',$$

from which it follows that:

Proposition 2 *If*

$$2(S')^2 - SS'' > 0 \tag{17}$$

capital account liberalization reduces bank profits in the borrowing economy in the short run.

Proposition 2 says that, under condition (17), access to perfectly competitive international capital markets has the effect of depressing returns in the recipient country, reducing the oligopolistic rents of local banks, and increasing banking fragility in the short run. Note that (17) is indeed quite weak, since a wide class of supply functions satisfies the (even weaker) regularity condition $(S')^2 - SS'' > 0$.

It can be shown that the opposite happens in the banking sector of the lender economy, as higher returns abroad result in higher profits, larger deposit portfolios and higher deposit rates:

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[17] See proof of Proposition 1 in Appendix.

Remark 2 *Capital account liberalization increases deposit rates and bank profits in the lender economy in the short run.*

Proof: In Appendix.

The impact of the removal of controls on international lending flows on the banking sectors of countries A and B is illustrated in Figure 4. In particular, note that before restrictions are lifted, banks in B extract rents per unit of deposit that are equal to the difference between expected marginal and average costs curves (MC and AC, respectively) which corresponds to a volume of credit $L_{B,0} = S_{B,O}$. In turn, access to an elastic supply of foreign funds at a rate $R^* < R_{B,0}$ flattens the curve of marginal costs beyond $S_{B,1}$, bringing the new equilibrium volume of credit up to $L_{B,1}$, of which an amount $L_{B,1}$-$S_{B,1}$ corresponds to foreign funds that are onlent domestically. Thus, bank rents are reduced to the vertical difference between marginal and average costs at $S = S_{B,1}$, times the now smaller volume of deposits, $S_{B,1}$.[18] In other words, individual banks borrow abroad even though by doing so they reduce the overall profitability of the sector. As mentioned above, this comes from the fact that the exposure of the imperfectly competitive domestic market to the supply of elastic of (marginally less costly) foreign funds eliminates part of the oligopolistic rents previously captured by local banks.

III. Discussion

It is important to stress at this point that the previous results are not solely due to the fact that banks search for high-yield projects ignoring the associated risk. If that were the case, domestic banks in the risky economy would capture those projects before restrictions on capital flows are lifted. *It is the combination of moral hazard with imperfect competition in the deposit market that induces international flows.* More precisely, the point depends crucially on the existence of fairly competitive international capital markets that drive down the marginal cost of funds in the borrowing economy.[19] Thus, financial opening has an unexpected impact on industry profits: By reducing marginal costs, it fosters competition to a point at which

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[18] It can be shown that bank margins in B also decline whenever $S'(r_B)s'(r_B) - S(r_B)s''(r_B) > 0$, which is assumed in the chart for expositional purposes.

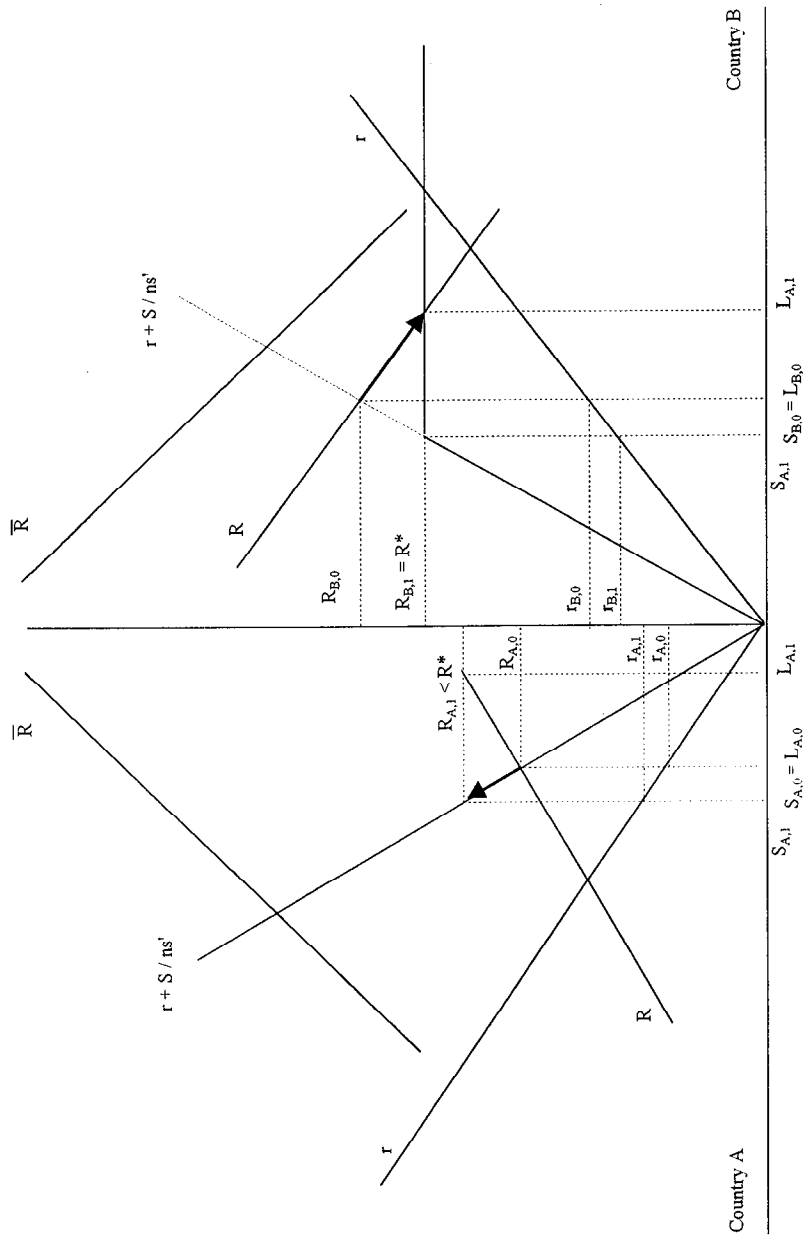
[19] Otherwise, banks in B would be willing to borrow abroad only at the lower rate

$$R^* \leq \frac{R_B}{(1+\frac{1}{\varepsilon_{S^*}})},$$

where ε_{S^*} is the interest rate elasticity of the supply of foreign funds faced by an individual bank in B.

Capital Account Convertibility and International Lending

Figure 4



profits actually decline in the short run. In turn, in the long run, profits are brought back to their initial level through exit (bankruptcy) of existing banks, a process that leads to further concentration.[20]

The analysis in the previous section leads to a number of additional implications. First, in equilibrium, expected returns on loans from banks in A to banks in B are below domestic expected returns in A, since as good-time returns converge across countries, the difference between expected returns widens. But given the assumptions of the model, if investment decisions were made based solely on expected returns, as it would be the case in the absence of moral hazard, the equilibrium in both economies would be identical and such that $r_A = r_B = r_u$ as defined by (7), and $\overline{R}_A = \overline{R}_B = \overline{R}(S(r_u))$. Therefore, no international lending should occur. Thus, it is immediate to see that, in the current framework, *international lending flows to risky economies with lower expected returns is entirely due to moral hazard.*

It should be clear at this point that the removal of the deposit insurance in country B would likely increase the deposit rate r_B demanded by depositors in B, as they become more sensitive to risk. In turn, by increasing the cost of domestic funds in B, this would reduce the volume of domestic credit and increase expected returns, which in turn would make investment opportunities in the high-risk country even more attractive to country A's banks, fostering foreign lending further.

Similarly, an increase in banking competition in country A arising, for example, from a fall in either transportation of entry costs, raises deposit rates, increases the aggregate stock of loans and exerts downward pressure on domestic returns. As a result, the return differential, Δ, widens, increasing the share of foreign lending, θ. By the same token, less competition in B would tend to generate higher levels of domestic returns, with identical consequences. Thus, *the more (less) competitive the domestic banking sector of the lender (borrowing) economy, the stronger the incentives for international lending*. This suggests that increased competition arising from the recent financial deregulation trend in industrial countries coupled with a high degree of market power in the banking sector of most Asian economies may help to explain the surge in international lending flows to Asian markets.

Bailouts

The previous discussion deliberately ignored the possibility of a financial bailout by assuming that in case of insolvency banks are simply liquidated and their losses taken on by the government through the deposit insurance scheme. Intuitively, the perception that foreign banks may be bailed out in the event of a crisis is bound to increase foreign lending. However, its effect on the banking sector of the borrowing economy will depend on whether the government guarantee is expected to comprise: a) all claims vis à vis domestic banks; and b) all

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20 This process resembles the impact of a decline in geographical differentiation studied in Cordella and Levy Yeyati (1998b).

claims vis à vis domestic borrowers. In the first case, foreign banks are treated, for the purpose of the guarantee, as any other depositor, while failed domestic banks still face liquidation in case of insolvency. In the second, a blanket credit guarantee insures banks, both domestic and foreign, against losses from failed loans.

In terms of the previous model, assume that foreign liabilities of country B's failed banks are expected to be covered in full by the government with probability $\gamma < 1$. In turn, denoting by ~ the new equilibrium values, the probability that foreign lenders recoup their investment increases to:

$$\tilde{p}_B = p_B + \gamma(1 - p_B) > p_B,$$

Substituting into (9), it can be readily seen that the optimal share of foreign lending, $\tilde{\theta}$, increases with γ. In turn, capital inflows drive down returns in B, exacerbating the adverse effect of capital market liberalization on bank profits in the recipient economy.

One can see immediately that the impact on bank profits in country B is higher in case (b) than in case (a), by comparing

$$\tilde{\pi}|_b = \tilde{p}_B[\tilde{R}_B - \tilde{r}_B]s(\tilde{r}_B, n_B) > p_B[\tilde{R}_B - \tilde{r}_B]s(\tilde{r}_B, n_B) = \tilde{\pi}|_a,$$

as in the former case domestic banks benefit from the blanket credit guarantee, and lower margins are partially compensated by a lower probability of default.[21] Thus, a bailout perceived to penalize insolvent domestic institutions while protecting foreign lenders introduces an asymmetry that at the same time stimulates foreign lending and increases banking fragility in the recipient economy.

IV. Final Remarks

This paper intended to convey two main messages. First, it argued that capital account liberalization may induce banks in low-risk industrial economies to invest in high-risk/high-yield projects in emerging markets, even when expected returns in the latter are below those in the former. This inefficient lending to less productive projects, referred to in this paper as the overlending syndrome, occurs even if creditors do not expect to be rescued by the government of the recipient country or the international financial community.

Second, the paper illustrated how capital account liberalization, by introducing an elastic supply of less costly foreign funds that erodes the oligopolistic rents previously captured by banks in the recipient economy, may increase banking sector fragility, even when funds are intermediated locally through domestic banks as opposed to lent directly to domestic firms.

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[21] Indeed, it may well be the case that the reduction in the default risk of banks in B more than compensates the decline in margins, so that higher profits induce new entry in the long run, depressing domestic returns and possibly crowding out foreign lending.

Moral hazard aggravates the effect inasmuch as it increases the volume of capital inflows to these economies beyond what would be justified on grounds of differences in expected returns to investment. In turn, the presence of implicit guarantees, by reinforcing the foreign lending boom, amplifies this negative impact, particularly in the case in which these guarantees are expected to cover foreign, but not domestic, banks.

It should be noted, however, that the overlending syndrome is weaker when domestic intermediaries enjoy a significant degree of market power in the credit market, since in that case they would be willing to borrow abroad at a rate that does not exceed their marginal revenue, which is lower than the expected return in the economy, thus reducing the volume of foreign borrowing while preserving part of their rents. This introduces an important difference between the case in which foreign funds are largely intermediated by local banks and the one in which they are lent directly to the final users. In general, the latter should be associated with a larger volume of foreign lending and a heavier burden on domestic banks.

The main policy implication that can be drawn from the paper is that a no-bailout policy may not be enough to prevent excessive foreign lending. Deposit insurance coupled with limited liability introduces a market imperfection (in the form of the deposit option) that is handled domestically through enhanced supervision and associated risk-adjusted penalties. However, while risky domestic loans receive a higher weight for the purpose of the computation of capital requirements, short-term exposure to foreign banks that engage in risky lending is not penalized accordingly. On the contrary, prudential regulations sometimes provide an additional stimulus for foreign (particularly short-term interbank) lending.[22] Unless governments in lender countries penalize high-risk investments abroad by incorporating a realistic assessment of the associated credit risk, (which is clearly in their best interest since they are, to a large extent, the residual claimants of failed foreign investments), governments in recipient countries may be forced to assume a more active stance to prevent overlending and to avoid the adverse impact that massive inflows of funds may have on the financial soundness of the country.

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[22] For example, the Basle Capital Accord requires only a 20 percent risk weighting for the computation of the capital adequacy ratio for short-term interbank exposures to non-OECD countries, while exposures over one year have to be weighted at 100 percent. Moreover, the same rules discriminate in favor of interbank lending by applying the concessionary 20 percent risk weighting to interbank exposures, as opposed to corporate loans or bonds.

APPENDIX

Deposit supply function

For a given deposit rate, agents maximize the sum of expected returns to their investment plus the liquidity benefits derived from holding a deposit account, i.e.,

$$\max_{S} U(S) = [l(S) + (r-1)S], \tag{A.1}$$

where $l' > 0$, and $l'' < 0$. The first order condition is given by

$$l' + (r-1) = 0 \tag{A.2}$$

from which

$$S'(r) = -\frac{1}{l''} > 0. \tag{A.3}$$

Denoting $u(r) \equiv l[S(r)] + [r-1]S(r)$ the maximal utility for a given deposit rate, depositors choose the bank that maximizes $u(r) - tx$, where x denotes the distance to the bank. Applying the envelope theorem, $u' = S(r) > 0$ and $u'' = S'(r) > 0$.

A depositor is indifferent between two adjacent banks whenever

$$u(r_i) - tx = u(r_{-i}) - t(\tfrac{1}{n} - x), \tag{A.4}$$

from which bank i's marginal depositor is located at a distance

$$x_i(r_i, r_{-i}, n) = \frac{u(r_i) - u(r_{-i}) + \frac{t}{n}}{2}. \tag{A.5}$$

Then, from (A.5), it follows that the bank faces a supply of funds equal to

$$s(r_i, r_{-i}, n) = 2x(r_i, r_{-i}, n)S(r_i) = S(r_i)[u(r_i) - u(r_{-i}) + \tfrac{t}{n}] \tag{A.6}$$

The following properties of the deposit supply function are used in the paper:

$$
\begin{aligned}
&s(r,r,n) = \frac{S(r)}{n} \\
&s_1(r_i,r_{-i},n) = S'(r_i)\left[u(r_i) - u(r_{-i}) + \tfrac{1}{n}\right] + S^2(r_i) > 0 \\
&s_3(r,r,n) = -\frac{S(r_i)}{n^2} < 0 \\
&s_{11}(r,r,n) = \frac{S''(r)}{n} + 3S(r)S'(r) \\
&s_{13}(r,r,n) = -\frac{S'(r_i)}{n^2} < 0 \\
&s' \equiv s_1(r,r,n) = \frac{S'(r)}{n} + S^2(r) > 0 \\
&s'' \equiv \frac{\partial s'}{\partial r} = \frac{S''(r)}{n} + 2S(r)S'(r)
\end{aligned}
\tag{A.7}
$$

Proposition 1

Proof:

i) Differentiating the equilibrium condition (6) with respect to p, and given that $s_{13}(r,r,n) = -\frac{S'(r_i)}{n^2}$ from (24):

$$
\frac{d\pi^*}{dp} = \frac{1}{n^2} - \left[\frac{S^2}{s'} + \frac{pS}{s'}\left(2S' - \frac{Ss''}{s'}\right)\frac{dr^*}{dp} - \frac{pS^2}{ns'}\left(2 - \frac{S'}{ns'}\right)\frac{dn^*}{dp}\right] = 0, \tag{A.8}
$$

from which we obtain

$$
\frac{dn^*}{dp} = \frac{\frac{n}{p} + \frac{n}{s}\left(2S' - \frac{Ss''}{s'}\right)\frac{dr^*}{dp}}{2 - \frac{S'}{ns'}}. \tag{A.9}
$$

In turn, totally differentiating (5):

$$
\left[1 + \frac{1}{n}\left(\frac{S'}{s'} - \frac{Ss''}{(s')^2}\right) - \frac{\bar{R}'S'}{p}\right]\frac{\partial r}{\partial p} + \frac{\bar{R}}{p^2} - \frac{S}{n^2 s'}\left(1 - \frac{S'}{ns'}\right)\frac{\partial n}{\partial p} = 0, \tag{A.10}
$$

and substituting (A.9) into (A.10), and rearranging:

$$
\frac{dr^*}{dp} = \left.\frac{\partial r}{\partial p}\right|_{r=r^*} = \frac{\frac{-\bar{R}}{p^2} + \theta\frac{'}{pns'}}{1 - \frac{\bar{R}'S'}{p} + \frac{1}{n}\left[\frac{S'}{s'}(1-2\theta) - \frac{Ss''}{(s')^2}(1-\theta)\right]}, \tag{A.11}
$$

where

$$\theta = \frac{1-\frac{S'}{ns'}}{2-\frac{S'}{ns'}} < \frac{1}{2}.$$

But, using $\frac{Ss''}{(s')^2} \leq 1$ from (A.7), $\frac{1}{n}\left|\frac{S'}{s'}(1-2\theta) - \frac{Ss''}{(s')^2}(1-\theta)\right| > -1$, which combined with (5) yields:

$$\frac{dr^*}{dp} < \frac{\frac{R+r}{2}}{\overline{R}'S'} < 0 \qquad \text{(A.12)}$$

Thus, low country risk is associated with low deposit rates.

ii) The second part of the proposition follows directly from the fact that, at equilibrium, $\frac{d\overline{R}^*}{dp} = \overline{R}'S'\frac{dr^*}{dp} > 0$.

iii) Finally, from (A.12),

$$\frac{d\overline{R}^*}{dp} = \overline{R}'S'\frac{dr^*}{dp} < \frac{R^*+r^*}{2} < R^*, \qquad \text{(A.13)}$$

which implies that

$$\frac{dR^*}{dp} = -\frac{1}{p}\left[R^* - \frac{\partial \overline{R}^*}{\partial p}\right] < 0. \qquad \text{(A.14)}$$

Remark 2

Proof:

(i) The first part of the proof follows directly by contradiction, by noting that, for any $\theta > 0, \hat{r}_A < r_A$ implies that $S(\hat{r}_A) < S(r_A)$ and, from (12), $\hat{R}_A > R_A$. But since, in equilibrium, $\Delta > 0$, then we know that $\hat{R}_A + \theta\Delta > R_A$, which in turn implies that $\hat{r}_A > r_A$.

(ii) The second part follows from the fact that investing a the optimal portfolio share θ in foreign assets yields higher profits than investing the whole portfolio domestically, so that:

$$\hat{\pi} = p(\theta)\left[\hat{R}_A + \theta\Delta - \hat{r}_A\right]\frac{S(\hat{r}_A)}{n} > p_A\left[\hat{R}_A - \hat{r}_A\right]\frac{S(\hat{r}_A)}{n}. \qquad \text{(A.15)}$$

The fact that $\hat{r}_A > r_A$, and $S'(r) > 0$ completes the proof.

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