UNIVERSIDAD DE SAN ANDRÉS

Seminario del Departamento de Economía

"Global Moral Hazard, Capital Account Liberalization and the 'Overlending Syndrome'"

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Martes 20 de abril de 1999
11 hs.
Aula Roberto J. Lebach

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

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March 12, 1999

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. Because of deposit insurance, banks maximize the value of the option implicit in the deposit contract by investing in high-yield/high-risk projects. In the presence of restrictions on international lending, low-risk developed countries are associated with narrow intermediation margins and low deposit rates. After a relaxation of such restrictions, banks in low-risk countries bene...t from lending funds captured in home markets at low deposit rates to high-risk projects in emerging economies, even if these projects command lower expected returns. This, in turn, has a negative impact on bank pro...tability in the borrowing country, irrespective of whether foreign funds are chanelled through domestic banks or lent directly to domestic ...rms. In this context, expectations of a ...nancial bail-out further stimulate international lending, amplifying the negative impact of ...nancial opening on banking sector fragility. The results provide an alternative explanation for the expansion in international bank lending to emerging economies during the 1990s, its resilience to the Mexican crisis, and its adverse impact on banking sector fragility in recipient countries.

JEL Classi...cation: D82, F30, G15, G21

Keywords: banking crises, capital account liberalization, deposit insurance, moral hazard.

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1 Introduction

After a period of sustained growth during the late 1980s and the early 1990s, international capital markets were shaken by two far-reaching crises in Mexico and Southeast Asia. In both situations, analysts have forecast a slow-down or even a reversal of the direction of international capital ‡ows, as a result of a revised perception of the risk implicit in emerging economies that have been the recipients of a large part of these ‡ows. However, the empirical evidence from the period following the Mexican crisis suggests that the opposite has been the case. Capital continued ‡owing, and international yield spreads narrowed, even for Latin American countries where contagion from the Mexican crisis was felt more strongly and adverse e¤ects on investor sentiment were expected to last longer.[1] Indeed, less than a year after the Mexican crisis, international yield spreads in countries like Argentina, Brazil or Mexico were already below pre-crisis levels.

Several explanations have been advanced to account for these facts. Cyclical recessions in industrial countries may have led to lax monetary policies and low interest rates, encouraging investors to look for more pro...table options abroad.[2] In addition, the apparent convergence in international asset yields may have been caused by a tendency towards portfolio diversi...cation, stimulated in turn by a better technology, greater access, and a broader menu of investment alternatives in emerging markets.[3]

A new, increasingly popular, argument relies on the moral hazard problem prompted by the perception of implicit government guarantees in recipient economies, a perception that has largely been validated by recent bail outs. These guarantees, by arti...cially lowering the associated credit risk, reduce the lending rates demanded by ...nancial intermediaries, stimulating the demand for credit beyond what would be economically e¢cient, leading to what McKinnon and Pill have referred to as the "overborrowing syndrome."[4] One can extend this intuition to the international level, as long as the guarantees are seen to bene...t domestic and foreign lenders in a similar way. Thus, the relaxation of restrictions on international capital ‡ows 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 international lending.[5]

[1] This was also true for other emerging markets like Turkey that felt the impact of the Mexican collapse, as well as for Asian economies that were less a¤ected by it. In short, the occurrence of a crisis, and the subsequent realization of the risks involved in emerging economies, seems to have induced, if anything, a positive reaction from international investors. See IMF (1997a) and BIS (1998).

[2] This could help explain the rise in stock markets and the decline in asset yields in these economies. See IMF(1997b), pp. 4-5.

[3] Naturally, one cannot rule out the hypothesis that investors simply misjudged the risk involved in such investments, although this argument can hardly explain why this judgement was not revised upwards after the Mexican crisis.

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

[5] However, it should be noted that government guarantees, in the form of explicit or im-

This paper argues that the removal of government guarantees in the recipient country does not eliminate the moral hazard problem posed by the existence of deposit guarantees in lender countries. On the one hand, the presence of explicit or implicit deposit insurance in the home market allows banks to engage in further risk taking without being penalized by investors through higher deposit rates. In turn, limited liability banks maximize the value of the option implicit in the deposit contract by investing in high-yield/high-risk projects.[6] As capital markets in developing countries are liberalized, capital ‡ows naturally from developed to emerging markets in search of risky projects, even in a situation in which expected returns in the latter are below those in the former. This could explain why overlending appears to be particularly pervasive in emerging economies, independently of the extent of implicit guarantees. More important, the argument is consistent with the unprecedented surge in interbank lending ‡ows in 1994-1996, particularly to Asian markets.[7] Excessive (i.e., ine¢cient) foreign lending arises in this case from the arti...cially low cost of (domestically insured) loanable funds in mature economies, rather than from the arti...cially high expected return of (implicitly guaranteed) investment in emerging ones as Mckinnon and Pill (1997) emphasize.

This paper refers to this aspect of the moral hazard problem as the "over-lending syndrome." The wording is not totally arbitrary: it means to emphasize that, while the overborrowing argument suggests that perceived policies in the recipient country are at the origin of the problem, in the overlending case it is the policies in the lender country that create the incentives for excessive foreign exposure.[8] In addition to widespread beliefs in implicit guarantees prevalent in mature economies, beliefs supported by well-developed safety nets and, in many cases, by the precedent of past bail outs, prudential regulations provide an additional stimulus for foreign (particularly short-term interbank) lending. 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

plicit insurance, "too-big-to fail" institutions, or bail-out precedents, seems to be a fairly general phenomenum in most countries, including mature lender economies. Accordingly, we should also observe some degree of overinvestment also in developed economies. Moreover, the signi...cant volume of net capital in‡ows to emerging markets in recent years would require, according to this view, that the guarantees, or their e¤ect on the risk-taking behavior of ...nancial intermediaries, have been particularly strong in those economies.

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

[7] These ‡ows, which accounted for about 50 percent of net in‡ows to major Asian economies by end-1996, took the form of the carry trade, through which Asian banks borrowed in foreign currency (typically, dollars or yen) in the international interbank market, to onlend domestically in local currency. See IMF (1998) for a description of the di¤erent techniques.

[8] These incentives are not speci...c 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.

interbank exposures, as opposed to corporate loans or bonds.[9]

This paper illustrates the link between global moral hazard and capital account liberalization in the context of a simple analytical framework. A spatial competition model à la Salop (1979) is used to represent imperfect competition for fully insured deposits. The model assumes limited liability of bank shareholders/managers, and full deposit ...nancing of bank loans (i.e., banks do not hold equity capital).[10] Higher credit risk is modeled as a mean-preserving spread in the distribution of returns, such that projects in high-risk countries have higher returns if the project succeeds, but similar expected returns.[11] A comparison of equilibria for otherwise identical economies that di¤er in their credit risk levels shows that, in the absence of international capital ‡ows, low risk countries are associated with lower deposit rates, narrower intermediation margins, smaller credit volumes and higher expected returns. As international capital markets are liberalized, banks in low-risk countries respond by investing part of their low-cost funds in risky projects abroad, thereby increasing their returns if the project pays o¤, while avoiding the extra cost if the project goes under. Thus, once we think of di¤erent countries as investment opportunities, the standard moral hazard argument can be directly applied to the case of international capital ‡ows. Interestingly, it can be shown that foreign funds ‡ow from more to less pro...table markets, hence the reference to "overlending." This is because, by virtue of the nature of the deposit contract option, banks only care about returns of successful investments, which are increasing in risk. Moreover, the removal of deposit guarantees in the borrowing country does not mitigate the problem. On the contrary, since uninsured deposits command higher deposit rates, the removal of deposit insurance leads to a contraction in domestic credit and, as a consequence, an increase in expected returns that make investment in the high-risk economy more attractive and stimulates foreign borrowing further.

On the other hand, the exposure to an elastic supply of foreign funds as a result of the liberalization of the capital account erodes banks' oligopolistic rents, reducing short-run pro...ts and forcing banks to exit the market in the long run. Thus, capital account liberalization has the immediate e¤ect of increasing banking sector fragility in the borrowing economy. This general result, which holds even in the case in which foreign funds are intermediated through the domestic banking sector, is ampli...ed by the surge in foreign lending induced by moral hazard, inasmuch as the associated credit boom in the recipient economy

[9] I am grateful to Winfrind Blaschke for providing this example.

[10] Spatial competition models are not new in the banking literature. Examples include Cordella and Levy Yeyati (1998b), Chiappori et al. (1995), and Besanko and Thakor (1992), on which the present model is loosely based. 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, 1993). Finally, the assumption of full deposit ...nancing 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.

[11] It is trivial to see that even a risk-maximizing bank would choose a safe project if the risky project has a su¢ciently low expected return.

causes bank pro...ts to decline further.

The moral hazard aspect discussed in this paper is complementary to McKinnon and Pill's argument. Clearly, the overlending syndrome is only exacerbated if creditors perceive that they will be partially bailed out in the event of a systemic crisis in the foreign country. An implicit guarantee can be modeled as a positive shift, rather than a spread, of the distribution of returns. Thus, bail-out expectations reduce the probability of default without a¤ecting the distribution of project returns, arti...cially increasing banks' expected pro...ts and, in turn, the supply of credit, both domestic and foreign. An important di¤erence, however, arises depending on whether the bail out entails a credit guarantee under which both foreign and domestic banks are compensated for 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. In this instance, it can be shown that, while the foreign lending rate is further depressed as foreign banks factor in the higher returns implicit in the guarantee, bank exit in the recipient market accelerates. Thus, a one-sided bail out that provides a higher degree of protection to foreign creditors than to domestic banks introduces yet another stimulus to international bank ‡ows, aggravating the negative impact of these ‡ows on the health of the banking sector in the borrowing economy.

2 The model

Consider an economy in which a number n of banks are located symmetrically around the unit circumference. An individual bank i collects funds from depositors o¤ering 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. The probability of success, p, is such that $pR = \overline{R}(L)$; with $\overline{R}' < 0$ and $\overline{R}(0) = 1$, where L denotes the stock of outstanding loans in the economy.[12] Thus, higher probability of success is associated with lower "good-time" returns, so that projects di¤er in risk but not in expected pay-o¤. At the end of each period, if bank i's investment fails, the bank is liquidated, and outstanding deposits are covered by the deposit insurance.

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:

$$s(r_i; r_{i\,i}; n) = \frac{S(r_i)}{t}\; u(r_i)_{\,i}\; u(r_{i\,i}) + \frac{t^{*}}{n}\;; \qquad (1)$$

[12] Two assumptions underlie this speci...cation: Banks behave competitively in the credit market, and potential borrowers face the same menu of projects with expected returns ordered according to the aggregate production function Q(L), such that $Q' > 0$, $Q'' < 0$, and $Q'(0) = 1$. The ...rst assumption, made for simplicity, is brie‡y discussed in the last section.

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.[13]

Then, bank i's pro...ts can be expressed as:

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

The paper will focus in the symmetric Nash equilibrium, which is de...ned below.

De...nition. A symmetric Nash equilibrium is de...ned as deposit rates $r^* = r_1^* ::: = r_n^*$, $r^* \in [0; R]$; and a number of banks $n^* \geq 0$, such that:

Local Oligopoly:

ii) Each bank i maximizes pro...ts $\pi(r_i; r_{-i}; n)$ at r^* when the other banks o¤er the same deposit rate:

$$r^* = \arg\max_{r_i \in [0;R]} \pi(r_i; r^*; n)$$

Free entry:

The number of banks n^* is such that:

$$\pi(r^*; r^*; n^*) - F = 0; \tag{3}$$

where F represents entry costs.

Finally, assume that loans are fully ...nanced by deposits, so that, at a symmetric equilibrium:

$$L = ns(r; r; n) = S(r): \tag{4}$$

From (2), the solution of the bank's maximization problem satis...es ...rst and second order conditions given by:

$$\frac{\partial \pi}{\partial r_i} = p(R - r_i)\, s_1(r_i; r_{-i}; n) - ps(r_i; r_{-i}; n) = 0: \tag{5}$$

$$\frac{\partial^2 \pi}{\partial r_i^2} = p(R - r_i)\, s_{11}(r_i; r_{-i}; n) - 2ps_1(r_i; r_{-i}; n) < 0: \tag{6}$$

Denoting $s' = s_1(r; r; n)$ and using the fact that, from (4),

$$s(r; r; n) = \frac{S(r)}{n}; \tag{7}$$

a symmetric equilibrium can be characterized by:

$$r = R - \frac{S(r)}{ns'(r; n)}: \tag{8}$$

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

Note that the equilibrium deposit rate only depends on the pay o¤ 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 e¤ective marginal cost of funds to the bank is equal to the actual marginal cost times the probability of success, which thus cancels out of equation (8).[14]

Combining (7) and (8), the equilibrium number of banks in the long run, n, can be computed from the free entry condition:

$$¼(r; r; n) = \frac{p}{n^2} £ \frac{S^2(r)}{s^{¶}(r; n)} = F: \tag{9}$$

The following proposition describes how the equilibrium values depend on the level of risk.

Proposition 1 Low country risk (alternatively, a high probability of success p is associated with: i) a low deposit rate r; ii) a narrower intermediation margin (R ¡ r) and, iii) a higher expected return $\overline{R}$.

Proof: In Appendix.

To understand the intuition underlying the result, recall that we assumed that projects with a lower probability of success promise a higher pay o¤ 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, which decreases with p. In turn, because depositors are insured, deposit supply is independent of the level of risk banks engage in. As a consequence, banks maximize the value of the option implicit in the deposit contract by maximizing their portfolio risk, without being punished by risk-wary depositors through a higher deposit rate. Then, greater access to projects with a high yield-risk pro...le in developing countries leads to substantial bank pro...ts that translate, through tougher competition, into higher deposit rates. Note, however, that only part of the di¤erence in project yields is passed on to depositors, a fact re‡ected in the widening of the intermediation margin. In bad times, on the other hand, losses are transferred to the deposit insurance scheme and, ultimately, to its contributors.[15]

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

[14] The qualitative results do not change after introducing equity capital into the problem, as long as liabilities net of investment proceeds in bad times exceed the amount of equity. Naturally, the fact that bank shareholders loose their equity holdings in case of bankruptcy reduces that value of the deposit option and, accordingly, the incentives to engage in risky lending.

[15] Unless bank contributions to the insurance scheme are risk-based, the way in which the insurance fund is ...nanced is of little importance. In particular, even if the scheme entails a tranfer from taxpayers to bank shareholders, individual depositors would knowingly try to bene...t from the higher deposit rates o¤ered by risk-taking banks, as the marginal e¤ect of their investment decisions on the expected ...scal cost of future bail outs is negligible.

of ...nancial intermediation and a surge in the supply of credit that exhausts the menu of pro...table investment opportunities, and depresses the expected return of new projects, $\overline{R}$.

At this point, it is easy to show that moral hazard is always associated with a higher level of investment.[16] Consider, for example, the case of banks with unlimited liability (in which bank shareholders are expected to come up with enough funds to cover their losses in full), and denote it with the subindex u. Bank pro...ts can now be expressed as

$$¼_u(r_i; r_{¡\,i}; n) = {}^{¡}\overline{R}_{¡}\ r_i{}^{¢} s(r_i; r_{¡\,i}; n); \tag{10}$$

and equation (8) becomes

$$r_u = \overline{R}_{¡}\ \frac{S(r_u)}{ns^{0}(r_u; n)}: \tag{11}$$

It follows that deposit rates, now a function of expected rather than good-time returns, are smaller than in the previous case and that, accordingly, fewer funds are intermediated through the banking system.[17] In this context, moral hazard can be represented by a clockwise rotation of the average and, in turn, the marginal, cost curves. This is illustrated in Figure 1. 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, pR. The introduction of limited liability implies that banks have to pay depositors only if the project succeeds. Accordingly, the average (marginal) cost curve rotates from AC (MC) to AC' (MC'), moving the equilibrium volume of deposits (credit) from S (L) to S' (L'), and reducing expected returns from pR to pR^{0}.

Comparing (8) and (11), it can also be seen that the impact of the moral hazard problem on investment, measured as the di¤erence between equilibrium deposit rates, $r_{¡}\ r_u$, is a function of the di¤erence between good-time and expected returns, $R_{¡}\ \overline{R}$, which is, in turn, negatively correlated with the probability of success, p. In terms of Figure 1, then, the higher the level of risk, the larger the rotation of the average cost curve. Thus the chances that investment goes beyond what would be socially e¢cient due to moral hazard are higher in volatile economies with a larger menu of high yield-high risk projects.[18]

3 The overlending syndrome

The combination of low deposit rates and the positive link between risk and the value of the deposit option makes it pro...table for banks in safe economies to

[16] I deliberately avoid the concept of overinvestment because, in an imperfectly competitive world, the equilibrium level of investment in the absence of moral hazard is below the optimal.

[17] The proof, omitted here, goes along the lines of part (i) of the proof of Proposition 1.

[18] This result suggests that prudential measures aimed at reducing banks' vulnerability through the imposition of risk-adjusted penalties, should be made more stringent in volatile economies.

lend internationally to countries with greater risk, even when 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 the level of country risk, $1 - p$, with $p_A > p_B$. In addition, assume that banks in one country can invest in the other country in a context of perfectly competitive international capital markets.[19]

A ...rst insight can be obtained by considering the problem of an individual bank in country A the day after restrictions on international lending are lifted. Investing in country B is pro...table for a bank in A since $\frac{\partial \overline{R}}{\partial p} > - r$,[20] which in turn ensures that

$$\frac{\overline{R}_A - \overline{R}_B}{p_A - p_B} < r_A; \tag{12}$$

and, rearranging,

$$p_A (R_A - r_A) < p_B (R_B - r_A): \tag{13}$$

Thus, banks in the safer economy A would invest funds borrowed domestically at a low rate in high-yield/high-risk projects in country B, because by doing so they lower their expected marginal costs (from $p_A r_A$ to $p_B r_A$) without a¤ecting their expected returns pR by as much. On the other hand, banks in country B are willing to borrow from A at any rate $R^{\alpha} < R_B$, that allows them to onlend the funds domestically at a pro...t.

However, as banks in A shift funds from the local to the foreign market, returns in A increase while returns in the foreign market B decline. Therefore, banks in country A invest in country B only to the point at which the gain in returns in good times, $R_B - R_A$, perfectly o¤sets the increase in the probability of default associated with their exposure to country B, as will be shown in the next section.

For the moment, note that the access to perfectly competitive international capital markets has the e¤ect of depressing returns in the recipient country, reducing the oligopolistic rents of local banks, and increasing banking fragility in the short run. In the long run, low pro...ts force banks in country B to exit the market.[21]

The impact of the opening of the domestic banking sector in country B is illustrated in Figure 2. Ex ante, banks extract rents per unit of deposit that are equal to the di¤erence between expected marginal and average costs (curves MC and AC, respectively) at the point in which the former are equal to expected returns, $\overline{R}$, which corresponds to a volume of credit $L_B = S_B$. The access to an elastic supply of foreign funds at a rate $R^{\alpha} < R_B$ modi...es the curve of marginal

[19] The discussion in the following section assumes that international lending is intermediated through domestic banks. The reader can easily verify that the case in which foreign banks can lend directly to domestic ...rms yields identical results.

[20] See the proof of Proposition 2 in the Appendix.

[21] Conversely, banks in A bene...t from higher intermadiation margins, inducing entry in the long run.

costs, which is now ‡at beyond S_B^0. The new equilibrium is associated with a larger volume of credit L_B^0, of which an amount $L_B^0 \text{ ¡ } S_B^0$ corresponds to foreign funds that are onlent domestically. Thus, bank rents are reduced to the vertical di¤erence between marginal and average costs at $S = S_B^0$, times the now smaller volume of deposits, S_B^0.

At this point, it should be clear to the reader that the factor behind foreign lending is deposit insurance in the lender, and not in the recipient, country. Indeed, the removal of the deposit insurance in country B would only increase the deposit rate r_B, as depositors become more sensitive to risk. By increasing the cost of domestic funds, it would reduce the volume of domestic credit and increase expected returns, which in turn would make investment opportunities in B more attractive to country A's banks, fostering foreign lending further.

It is also immediate to see how international capital ‡ows are directly linked to the presence of moral hazard. If investment decisions were made based on expected returns, the equilibrium in both economies would be identical and such that $r_A = r_B = r_u$ as de...ned by (11), with $S_u = S(r_u)$ and $\overline{R}_u = \overline{R}(S_u)$. Therefore, no international lending should occur. More precisely, in the context of the model, international lending is entirely caused by moral hazard.

Moreover, because banks prefer projects with the same expected pay-o¤ but higher risk-return pro...le, in equilibrium they are willing to invest in a high-risk market even when expected returns are below those at home (recall that, before restrictions on international lending are lifted, $\overline{R}_B < \overline{R}_A$). Thus, we can state that:

Remark 2 Due to moral hazard, international lending ‡ows from more to less pro...table economies.

These "ine¢cient" lending ‡ows driven solely by the risk-maximizing behavior induced by moral hazard is what this paper denotes as the "overlending syndrome."

3.1 An example

To illustrate this argument more formally, we need to characterize the probability of that a bank averts default as a function of the composition of its loan portfolio. Denote a portfolio comprised of a share $1 \text{ ¡ } \mu$ of domestic assets, and μ of foreign assets, as a μ-portfolio. Furthermore, assume for simplicity that the probability that returns from a μ-portfolio exceeds the amount that the bank has to pay depositors at the end of the period is given by

$$p(\mu) = p_A \text{ ¡ } \mu(p_A \text{ ¡ } p_B): \tag{14}$$

Denoting the new equilibrium values by **b**, the maximization problem for a bank in A becomes:[22]

$$\max_{r_{i;A};\mu} \text{¼}(r_{i;A}; r_{\text{¡ } i;A}; \mu; n) = p(\mu) \left[\overline{R}_A + \mu \text{¢} \text{ ¡ } r_{i;A} \right] s(r_{i;A}; r_{\text{¡ } i;A}; n) \tag{15}$$

[22] One can immediatly see that, since $R_B > R_A$, it is not pro...table for banks in B to invest in country A.

where ¢ = $\hat{R}_B$ ¡ $\hat{R}_A$. From the …rst order condition with respect to r we obtain:

$$b_A = \hat{R}_A + \mu ¢ ¡ \frac{S(b_A)}{n s'(b_A)}: \tag{16}$$

Substituting (14) into the …rst order condition with respect to μ, we obtain:

$$\frac{@¼}{@\mu} = \frac{S(b_A)}{n_A}\left[p_A ¡ \mu(p_A ¡ p_B)\right]¢ ¡ (p_A ¡ p_B)\left[\hat{R}_A + \mu ¢ ¡ b_A\right] = 0: \tag{17}$$

The share that a bank in country A prefers to invest in country B can be computed directly from (16) and (17) as:

$$\mu = \frac{p_A}{(p_A ¡ p_B)} ¡ \frac{S(b_A)}{¢ n_A s'(b_A)}: \tag{18}$$

On the other hand, interest rates in country B are given, as before, by

$$b_B = \hat{R}_B ¡ \frac{S(b_B)}{n_B s'(b_B)}: \tag{19}$$

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

$$\hat{R}_A = R^3 b_A = \frac{\overline{R}[(1 ¡ \mu) S(b_A)]}{p_A}; \tag{20}$$

$$\hat{R}_B = R^3 b_B = \frac{\overline{R}[\mu S(b_A) + S(b_B)]}{p_B}:$$

Equations (16), (18), (19), and (20) characterize the equilibrium.

Equation (17) simply says that banks in the safe economy will engage in risky foreign lending as long as good-time returns abroad are su¢ciently high compared with those at home, so as to compensate for the associated increase in the probability of default. The following proposition shows that this is always the case.

Proposition 3 In equilibrium, banks in the safe economy invest a strictly positive share $\mu \in (0; 1)$ of their portfolio in assets of the risky economy.

Proof: In Appendix.

Several points should be made regarding the previous results. First, it follows from equation (19) that deposit rates fall in the recipient economy as a result of the decline in local returns induced by new borrowing from international markets.[23] However, by virtue of (17), and since the intermediation margin has

[23] Di¤erentiating totally (19),

$$\frac{dr_B}{d\mu} = \frac{@\hat{R}_B}{@\mu} + R'_B S'_B ¡ \frac{S'(r_B)s'(r_B) ¡ S(r_B)s''(r_B)}{n s'^2(r_B)} \cdot \frac{dr_B}{d\mu}:$$

Note that $s_{11} < 0$ implies that $s'' < 0$, which, after rearranging, ensures that

$$\frac{dr_B}{d\mu} = \frac{\frac{@R_B}{@\mu}}{1 ¡ R'_B S'_B + \frac{S'(r_B)s'(r_B) ¡ S(r_B)s''(r_B)}{n s'^2(r_B)}} < 0:$$

to be positive (i.e., $R_A + \mu\phi \; ¡ \; r_i > 0$) for the bank to operate, an interior solution requires that $\phi > 0$. Therefore, while lending rates partially converge across countries, lending rates in country B are still above those in country A in equilibrium.

Second, equation (19) shows that bank margins in country B follow the decline of deposit rates.[24] On the other, positive pro...ts are extracted only from the intermediation of domestic deposits, the volume of which falls with the reduction of the deposit rate. Thus, both the intermediation margin and the domestic funds over which they are applied decline. In other words,

Remark 4 The liberalization of the capital account causes bank pro...ts to fall in the borrowing economy, irrespective of whether foreign funds are intermediated through local banks or lent directly to domestic ...rms.

Note that individual banks borrow abroad even though by doing so they reduce the overall pro...tability of the sector. As mentioned above, this comes as a consequence of the exposure of the imperfectly competitive domestic market to the elastic supply of less costly foreign funds, which eliminates part of the oligopolistic rents previously captured by local banks. The opposite is true for banks in country A: from (17) it follows that foreign lending maximizes the average intermediation margin,[25] and from (16), that the domestic deposit rate r_A increases, and with it the volume of deposits. In the long run, low (high) pro...ts induce bank exit (entry) in country B (A), restoring the value of operating banks back to their original level.

Figure 3 illustrates the link between moral hazard and international ‡ows. Since the probability of success cancels out of equations (16) and (19) as banks base their investment decisions on good-time rather than expected pay-o¤s, the e¤ects in countries A and B can be directly compared by dividing cost and revenue curves by p_A and p_B, respectively. The ...gure highlights two important points discussed above. First, the opposite impact of capital ‡ows on each country's banking sector. Second, the fact these ‡ows would not occur in the absence of moral hazard, since expected revenue and cost curves are identical in both economies.

Finally, note that an increase in banking competition in country A, which can be modeled as a decline in entry costs F that eventually leads to a larger number of banks (alternatively, as a ‡attening of the marginal cost curve MC in terms of Figure 3), raises deposit rates, increases the supply of domestic funds and exerts downward pressure on domestic returns. As a result, the

[24] Since

$$\frac{d(R_B ¡ r_B)}{d\mu} = \frac{d\left[\frac{s(b_B)}{n_B s'(b_B)}\right]}{d\mu} = \frac{S'(r_B)s'(r_B) ¡ S(r_B)s''(r_B)}{ns'^2(r_B)} £ \frac{dr_B}{d\mu} < 0:$$

[25] Although margins at home may decline, since

$$R_A ¡ b_A = \frac{s(b_A)}{nS'(b_A)} ¡ \mu\phi:$$

domestic margin, $\bar{R}_A - b_A$, narrows and the return differential, ϕ, widens, reducing the second right-hand-side term in (18) and increasing the share of foreign lending, μ. The opposite would be the case for country B, where lower entry barriers and tougher competition would increases deposit rates and the volume of deposits, reducing local returns $\bar{R}_B$ and, in turn, ϕ. Thus, countries with less competitive banking sectors would tend to generate wider margins and higher levels of returns, aggravating the overlending syndrome. More formally,

Remark 5 The more (less) competitive the domestic banking sector of the lender (borrowing) economy, the stronger the incentives for international lending.

According to this argument, increasing competition arising from the recent financial deregulation trend in industrial countries can be counted as an additional factor behind the surge of capital flows to developing countries. In addition, a particularly high degree of market concentration in the banking sector may help to explain the relative importance of international lending flows to Asian markets.[26]

4 Bail outs

The previous section showed how profit maximizing banks may look for investment opportunities abroad to widen their distribution of returns and enhance the value of their deposit option. The discussion deliberately ignored the possibility of a financial bail out in the event that the project fails by assuming that in difficult times banks are simply liquidated and their losses taken on by the government through the deposit insurance scheme. As a result, it could be shown how excessive international lending can be caused simply by a combination of moral hazard, in the form of profit maximizing banks, and the removal of restrictions on capital flows.

This section discusses the consequences of broadening the scope of the government guarantee, previously assumed to be restricted only to domestic depositors, to include: a) all claims vis à vis domestic banks; and b) all 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. As expected, the main consequence of either alternative assumption is an increase in foreign lending. However, there is a fundamental difference between

[26] It is interesting to mention that an increase in competition across the board (modeled as a reduction of entry costs in both markets) increases the difference in expected returns, $\bar{R}_A - \bar{R}_B$. In particular, in the limiting case of perfect competition, $R = r = \frac{\bar{R}}{p}$, from which $\frac{\partial \bar{R}}{\partial p} = -r$. Thus, further competition across the board appears to attenuate the overlending problem. This is simply because competition amplifies the impact of moral hazard on investment, itself increasing with risk, and therefore depresses returns more rapidly in the high-risk economy. Unfortunately, this is attained at the cost of an overly excessive investment level.

the two situations in terms of the impact on the domestic banking sector of the borrowing economy. Let's consider each case in turn.

First assume that foreign liabilities of country B's failed banks are expected to be covered in full by the government with probability ° < 1, so that the probability that foreign lenders recoup their investment becomes $\hat{p}_B$, such that

$$p_A > \hat{p}_B = p_B + \circ (1 - p_B) > p_B;$$

where $\hat{}$ denotes the new equilibrium values.[27] This translates into a probability of success of a μ-portfolio equal to

$$\hat{p}(\mu) = p(\mu) + \mu \circ (1 - p_B) > p(\mu); \tag{21}$$

with

$$\hat{p}'(\mu) = p'(\mu) + \circ (1 - p_B) > p'(\mu): \tag{22}$$

Substituting (21) and (22) into (17), it can be seen that the optimal share of foreign lending, β, increases with the expectation of a bail out, as (18) now becomes

$$\beta = \frac{p_A}{(p_A - \hat{p}_B)} - \frac{S(e_A)}{\phi n_A s'(e_A)} > \mu; \tag{23}$$

where $\phi = R_B - R_A$. Moreover, a higher overall intermediation margin $b_A + \mu\phi - b_A$ induces banks to raise deposit rates to increase their volume of funds, which translates in further growth in foreign lending.[28] In case (a), then, expectations of a forthcoming financial rescue increases profits of foreign lenders at the expense of domestic banks since capital inflows drive down R_B, exacerbating the adverse effect of capital market liberalization on bank profits in the recipient economy.[29]

One can see immediately that bank profits in country B are higher in case (b) than in case (a), since

$$\pi_b = \hat{p}_B \left[R_B - e_B \, s(e_B; n_B) \right] > p_B \left[R_B - e_B \, s(e_B; n_B) \right] = \pi_a;$$

as in the former case domestic banks benefit from a blanket credit guarantee. Thus, lower margins are partially compensated by a lower probability of default. Indeed, it may be the case that the reduction in the probability of default of domestic banks as a result of the introduction of the guarantees more than

[27] Note that, while the effective default risk of a project declines, the project's distribution of returns remain unchanged.

[28] Recall that the volume of foreign lending is equal to $\mu S(e_A)$:

[29] Note that deposit rates in country B are given, as before, by:

$$e_B = R_B - \frac{S(e_B)}{n_B s'(e_B)}:$$

compensates the decline in margins, so that higher pro...ts strengthens domestic competition in the short run, while in the long run new entry depresses domestic returns, possibly crowding out foreign lending. While the net e¤ect on pro...ts and, in turn, the long-term impact on the volume of foreign lending is di¢cult to assess in this case, the presence of government guarantees clearly entails less pressure on domestic banks than in case (a).

The main conclusion that can be drawn from this discussion is that a bail out 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.[30]

5 Final remarks

This paper intended to convey two main messages. First, it argued that capital account liberalization may induce pro...t- (risk-) maximizing banks in safe industrial economies to invest in high-risk/high-return projects in emerging economies, even when expected returns in the recipient market are expected to be lower than in the lender market. This "ine¢cient" lending to less productive projects, driven solely by the existence of deposit protection in lender economies, is what has been referred to in this paper as the overlending syndrome. The paper emphasized that overlending occurs even if creditors do not expect to be rescued by the government of the recipient country or the international ...nancial community. On the other hand, it was shown that expectations of a ...nancial bail out, while not a necessary factor for excessive foreign lending, provide an additional incentive that ampli...es the thrust of international lending.

Second, this paper illustrated how capital account liberalization, by introducing an elastic supply of less costly foreign funds that erodes the monopolistic rents 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 ...rms. Moral hazard aggravates the e¤ect inasmuch as it increases the volume of capital in‡ows to developing economies beyond what would be justi...ed on grounds of di¤erences in expected returns to investment. Again, the presence of implicit guarantees, by reinforcing the foreign lending boom, ampli...es this negative impact, particularly in the case in which these guarantees are expected to protect foreign, but not domestic, banks.

It should be noted, however, that the overlending syndrome is weaker when domestic intermediaries enjoy a signi...cant degree of market power in the credit market, in which case they would be willing to borrow abroad at a rate equal to their marginal revenue, which will be lower than the expected return in the economy. Thus, banks facing a downward sloping demand for credit would limit

[30] One can go a step further to argue that, if any such bail out is taken by international lenders as indication of future ones, a surge rather than a decline in international lending should be expected after the short-run impact of the crisis wears o¤.

their borrowing, preserving part of their rents. This introduces an important difference between the cases in which foreign funds are intermediated by local banks or lent directly to the final users. In general, the latter will 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-bail out 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 themselves in risky lending is not penalize accordingly.[31] Unless governments in lender countries penalize high-risk investments abroad by incorporating a realistic assessment of the associated credit risk, governments in recipient countries may be forced to assume a more active stance, for example, through taxes on risk-weighted foreign borrowing, so as to prevent overlending and to avoid the adverse impact that massive inflows of funds may have on the financial vulnerability of the country in the short run.

6 Appendix

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.,

$$\max_S U(S) = [I(S) + (r - 1)S]; \tag{24}$$

where $I' > 0$, and $I'' < 0$. The FOC is given by

$$I' + (r - 1) = 0 \tag{25}$$

from which

$$S'(r) = -\frac{1}{I''} > 0: \tag{26}$$

Denoting $u(r) = I[1 - S(r)] + [r - 1]S(r)$ 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

$$u(r_i) - tx = u(r_{i-1}) - t\left(\frac{1}{n} - x\right); \tag{27}$$

[31] The underlying logic is reminiscent of the argument that assumes that a balanced currency position eliminates exchange rate risk, ignoring the fact that, by transferring the risk to unhedged borrowers, banks simply convert it into credit risk.

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

$$x_i(r_i; r_{i\,i}; n) = \frac{u(r_i) - u(r_{i\,i}) + \frac{t}{n}}{2}: \tag{28}$$

Then, from (28), it follows that the bank faces a supply of funds equal to

$$s(r_i; r_{i\,i}; n) = 2x(r_i; r_{i\,i}; n)S(r_i) = S(r_i)\left[u(r_i) - u(r_{i\,i}) + \frac{t}{n}\right]: \tag{29}$$

Proposition 1

Proof:

i) Differentiating (1) totally with respect to p,

$$\frac{\partial r}{\partial p} = -\frac{\overline{R}}{p^2} - \left[\frac{1}{n}\left(\frac{S'}{s'} - \frac{Ss''}{(s')^2}\right) - \frac{\overline{R}'S'}{p}\right]\frac{\partial r}{\partial p} + \frac{1}{n^2}\frac{S}{s'}\frac{\partial n}{\partial p}: \tag{30}$$

From (9), the long run equilibrium is characterized by

$$\Phi = \frac{pS^2}{n^2 s'} = F: \tag{31}$$

In turn, differentiating totally,

$$\frac{\partial \Phi}{\partial p} = \frac{1}{n^2}\frac{S^2}{s'} + \frac{ps}{S'}\left(2S' - \frac{Ss''}{s'}\right)\frac{\partial r}{\partial p} - \frac{2}{n}\frac{pS^2}{s'}\frac{\partial n}{\partial p} = 0; \tag{32}$$

from which we obtain

$$\frac{\partial n}{\partial p} = \frac{n}{2p} + \frac{n}{2S}\left(2S' - \frac{Ss''}{s'}\right)\frac{\partial r}{\partial p}: \tag{33}$$

Substituting (33) into (30),

$$\frac{\partial r}{\partial p} = -\frac{\overline{R}}{p^2} - \left[\frac{1}{n}\left(\frac{S'}{s'} - \frac{Ss''}{s'^2}\right) - \frac{\overline{R}'S'}{p}\right]\frac{\partial r}{\partial p} + \frac{1}{2n}\frac{S}{ps'} + \frac{1}{2ns'}\left(2S' - \frac{Ss''}{s'}\right)\frac{\partial r}{\partial p} \tag{34}$$

from which, after simplifying,

$$\frac{\partial r}{\partial p} = \frac{-\frac{\overline{R}}{p^2} + \frac{1}{2}\frac{S}{pns'}}{1 - \frac{1}{2}\frac{Ss''}{ns'^2} - \frac{\overline{R}'s'}{p}}: \tag{35}$$

Substituting (5) into (6) implies that, at a symmetric equilibrium,

$$s(r; r; n)s_{11}(r; r; n) - 2s_1^2(r; r; n) < 0; \tag{36}$$

where

$$s_1(r;r;n) = \frac{S'}{n} + Su' = s'; \tag{37}$$

and

$$s_{11}(r;r;n) = \frac{S''}{n} + 2S'u' + Su'' > \frac{S''}{n} + S'u' + Su'' = s'': \tag{38}$$

Combining (36), (37) and (38), we obtain

$$ss'' - 2s'^2 < s(r;r;n)s_{11}(r;r;n) - 2s_1^2(r;r;n) < 0; \tag{39}$$

which, since $s = \frac{S}{n}$, implies that

$$\frac{1}{2}\frac{Ss''}{ns'^2} < 1: \tag{40}$$

On the other hand, from (8),

$$\frac{\overline{R}}{p} = r + \frac{S}{ns'} > \frac{S}{ns'}: \tag{41}$$

Then, substituting (40) and (41) into (35) gives $\frac{\partial r}{\partial p} < 0$: Lower country risk is associated with lower deposit rates in the long run.

ii) The intermediation margin is given by $R - r = \frac{S}{ns'}$ from (8). Then, taking derivatives with respect to p,

$$\frac{\partial (R - r)}{\partial p} = \frac{S's' - Ss''}{ns'^2}\cdot\frac{\partial r}{\partial p} - \frac{S}{n^2s'}\frac{\partial n}{\partial p} =$$

$$= \frac{S's' - Ss''}{ns'^2}\cdot\frac{\partial r}{\partial p} - \frac{S}{n^2s'}\left(\frac{n}{2p} + \frac{n}{S}\left(S' - \frac{Ss''}{2s'}\right)\frac{\partial r}{\partial p}\right) =$$

$$= -\frac{Ss''}{2ns'^2}\cdot\frac{\partial r}{\partial p} - \frac{1}{2}\frac{S}{pns'} < 0: \tag{42}$$

Hence intermediation margins decline with country risk, as deposit rates adjust only partially to lower good time returns R in the safe economy.

iii) The third part of the proposition follows directly from $\frac{\partial \overline{R}}{\partial p} = \overline{R}'S'\frac{\partial r}{\partial p} > 0$.

Proposition 2

Proof:

i) First note that, from (16) and (17),

$$\left.\frac{\partial \bar{\mu}}{\partial \mu}\right|_{\mu=0} > 0 \iff \frac{\phi}{(p_A - p_B)} > \frac{R_A - r_A}{p_A}: \tag{43}$$

But from (39) we know that $\frac{Ss^{00}}{2ns^{02}} < 1$, which implies that, for $\mu = 0$,

$$\frac{@\overline{R}}{@p} = \overline{R}'S'\frac{@r}{@p} = ¡\ \overline{R}'S'\frac{\frac{\overline{R}}{p^2} ¡\ \frac{1}{2}\frac{S}{pns'}}{1 ¡\ \frac{1}{2}\frac{Ss^{00}}{ns^{02}} ¡\ \frac{\overline{R}'S'}{p}} < ¡\ \overline{R}'S'\frac{\frac{\overline{R}}{p^2} ¡\ \frac{1}{2}\frac{S}{pns'}}{¡\ \frac{\overline{R}'S'}{p}} < \frac{\overline{R}}{p} ¡\ \frac{S}{ns'} = r; \tag{44}$$

and

$$¡\ \frac{@R}{@p} = \frac{1}{p}\ R ¡\ \frac{@\overline{R}^{*}}{@p} > \frac{R ¡\ r}{p}; \tag{45}$$

from which,

$$\frac{¢}{(p_A ¡\ p_B)}\Big|_{p_A=p_B} = ¡\ \frac{@R}{@p}\Big|_{p=p_A} > \frac{R_A ¡\ r_A}{p_A}\ )\ \frac{@¼}{@\mu}\Big|_{\mu=0;p_A=p_B} > 0: \tag{46}$$

Thus, for values of country risk su¢ciently close to each other, it is optimal for banks in country A to invest at least a fraction of their portfolio in country B. Moreover, using (42),

$$¡\ \frac{@\frac{R ¡\ r}{p}}{@p} = \frac{R ¡\ r}{p^2} ¡\ \frac{1}{p}\frac{@(R ¡\ r)}{@p} > 0: \tag{47}$$

Combining (45) and (47), at any $p < p_A$,

$$¡\ \frac{@R}{@p} > \frac{R ¡\ r}{p} > \frac{R_A ¡\ r_A}{p_A};$$

which implies that

$$\frac{¢}{(p_A ¡\ p_B)} = ¡\ \frac{R_B ¡\ R_A}{p_B ¡\ p_A} = \frac{1}{p_B ¡\ p_A}\int_{p_A}^{p_B} ¡\ \frac{@R}{@p}dp > \frac{R_A ¡\ r_A}{p_A}: \tag{48}$$

Then, it follows that, for any pair $p_A; p_B$, such that $p_A > p_B > 0$, the equilibrium share of foreign lending μ is strictly positive.

ii) Note that, from (20), $\frac{@¢}{@\mu} < 0$. Indeed, ¢ turns negative as banks become more specialized in foreign assets since, in the limit, $\overline{R}_A(0) = 1$. Hence, it follows that in equilibrium, $\mu < 1$.

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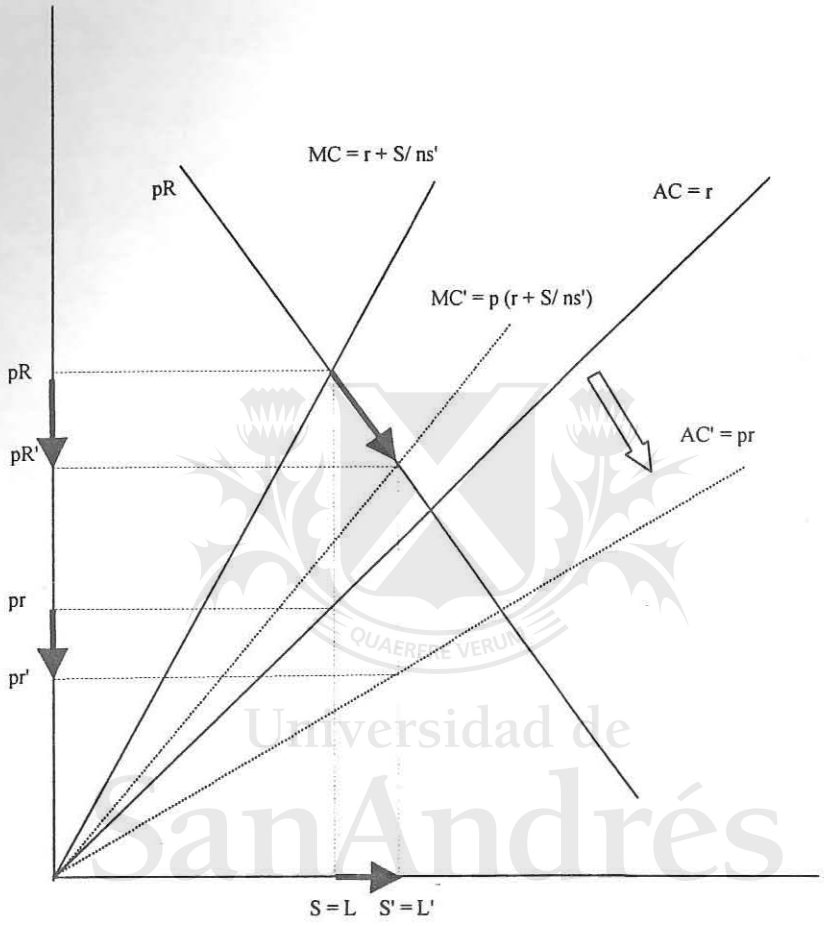

Figure 1. Moral Hazard, Investment and Returns

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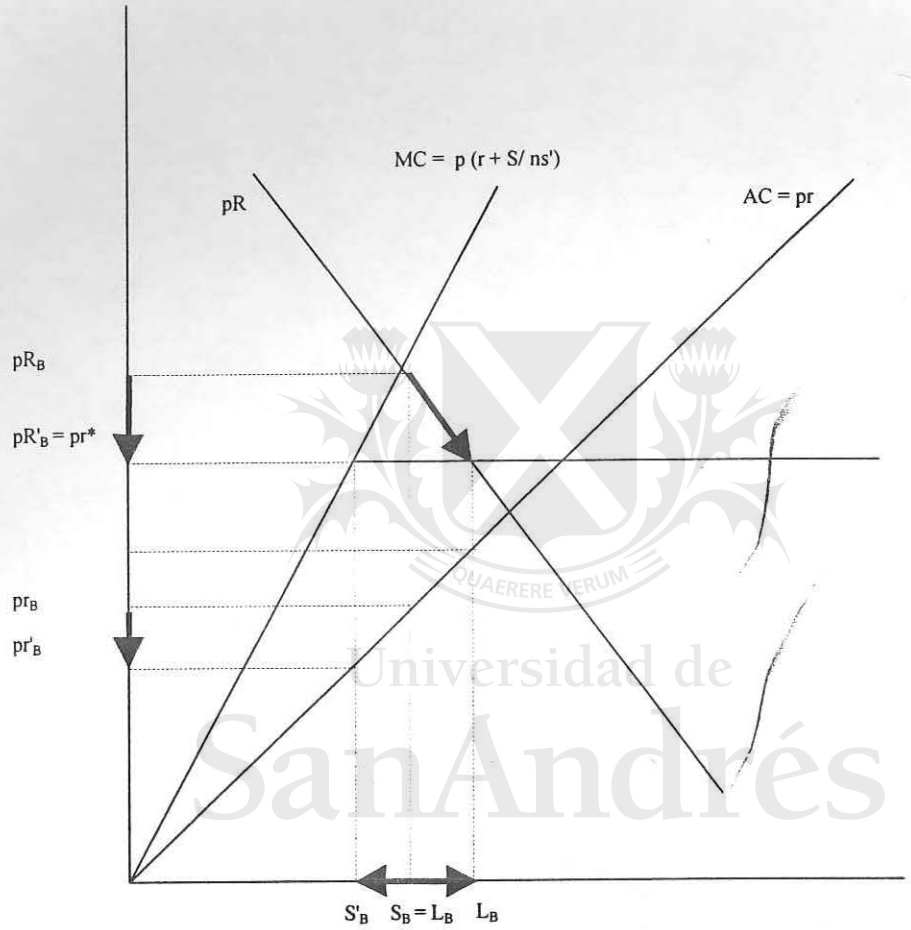

Figure 2. Impact of Capital Account Liberalization on Country B

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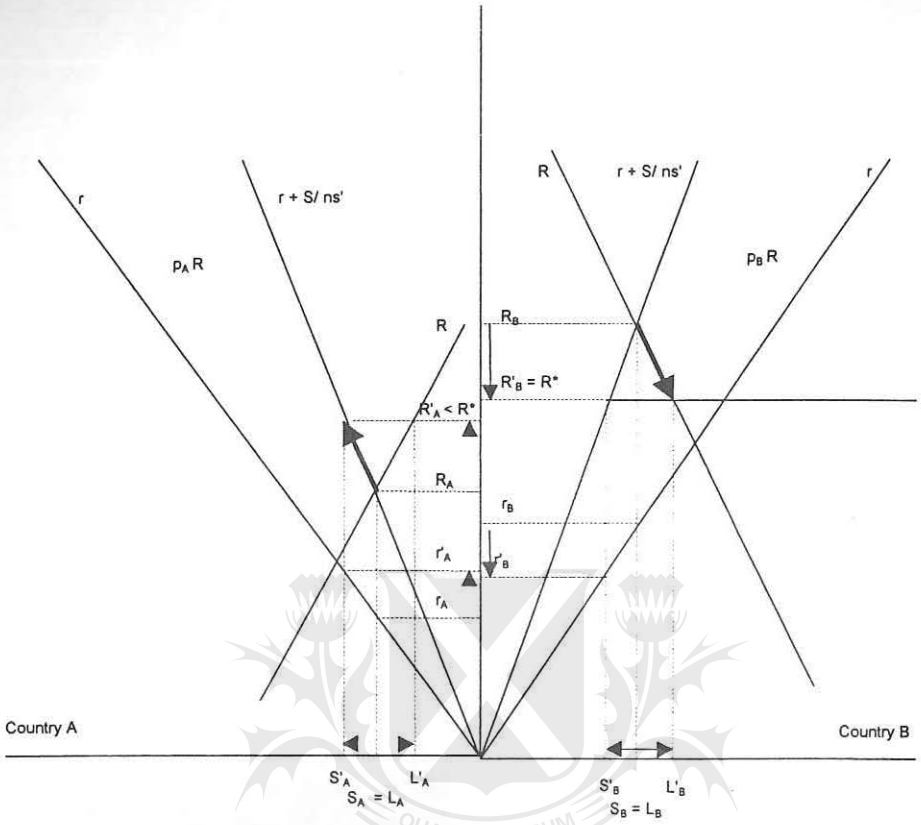

Figure 3. Capital Account Liberalization and International Lending

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