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CAPITAL CONTROLS AND FINANCIAL CRISES

Joshua Aizenman

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**ABSTRACT**

The purpose of this paper is to explain the reluctance of developing countries to open up their capital market to foreigners, and the conditions inducing an emerging market economy to switch its policies. We consider an economy characterized initially by a one-sided openness to the capital market – domestic agents can borrow internationally, but foreign agents cannot hold domestic equity. We identify conditions under which the emerging market's capitalists would oppose financial reform. This would be the case if "green field" investment by multinationals would bid up real wages, reducing thereby the rents of domestic capitalists. A financial crisis that raises the domestic interest rate and causes a real exchange rate depreciation may induce the emerging market's capitalists to support opening up the economy to FDI. This attitude switch is more likely to occur the greater the debt overhang, the lower the borrowing constraint, and the weaker the market power of foreign entrepreneurs. Even in these circumstances, the emerging market's capitalists would prefer a partial reform to a comprehensive one -- they would prefer to maintain the restrictions on "green field" FDI.

Joshua Aizenman  
Department of Economics  
Dartmouth College  
Hanover, NH 03755  
and NBER  
j.aizenman@dartmouth.edu

"With so many South Korean firms in dire straits, it is hardly surprising that westerners are flocking to Seoul in search of bargains. GM and Ford are both close to establishing joint ventures with Daewoo and Samsung, two local car makers, respectively. The logic of such deals is seductive: most South Korean companies are short of cash and their shares are cheap, so outsiders should be able to dictate the terms to their own advantage. But history cautions joint venturers to beware. ... Most such troubles (with joint ventures) stem from South Korea's restrictions on foreign ownership. Until recently, outsiders were barred from owning controlling stakes in joint ventures in 'strategic' industries, such as finance. This allowed South Korea's chaebol (conglomerates), which like to use strong subsidiaries to prop up weak ones, to plunder joint ventures' coffers. ... The safest course for an outsider is to buy a majority stake. This is getting easier. The conditions of 1997's IMF bailout will accelerate the opening of South Korean industry to foreign ownership. Wholly owned and majority-owned foreign ventures accounted for more than 60% of the total last year, a number that is sure to grow. For all the talk of a new embrace for foreign investors, there is nothing like boardroom control to guarantee it."

From "South Korean joint ventures. Look before you leap", *The Economist*, 14-Mar-98

A widespread attitude of countries in the Far - East is the reluctance to open up their equity market to meaningful ownership by foreign entrepreneurs. Occasionally, it takes a major crisis to induce greater financial openness, as is exemplified by the experience of Korea cited above. Yet, the reluctance to open up the equity market may be stubborn enough to withstand a deep crisis (see Malaysia's current policies).

The purpose of this paper is to explain the conflicting forces accounting for the reluctance to open the equity market. We will provide a welfare interpretation for the divergent reactions to the crisis, explaining why the welfare gain from opening the financial market may be elusive from the perspective of the emerging market capitalists. We consider an economy where initially there is a one sided integration with the global capital market – domestic agents can borrow, but foreign entrepreneurs are not allowed to own domestic capital. We identify circumstances where, in the absence of a crisis, the restrictions on foreign ownership of domestic capital are desirable from the point of view of domestic capitalists. This were the case if "green field" investment by

multinationals would bid up real wages, thereby reducing the rents of domestic capitalists. In these circumstances, if domestic capitalists are in control, thereby determining domestic policies, there would be a one sided integration with the global capital market. Inward FDI would be prohibited, while international borrowing by domestic agents would be allowed.

We identify conditions under which capital flight following a confidence crisis may cause a reversal in the attitude towards capital market openness. The capital flight and the induced increase in the domestic interest rate and the real depreciation imply that there are welfare gains from opening the domestic equity market to foreign ownership. No attempt is made in the present paper to explain the dynamics leading to the crisis, and the sequences described in the paper are consistent with various scenarios.<sup>1</sup>

These arguments are summarized in Figure 2, plotting welfare in a two period economy. The 'inverted u' shape curves depict the welfare of the representative domestic capitalist as a function of foreign borrowing  $F$  in period 1. The solid curve ( $U$ ) depicts the welfare when all forms of FDI are prohibited. The broken curve ( $U_p$ ) depicts the welfare if a partial reform is adopted in period 1, allowing the sale of domestic capital to foreign entrepreneurs. The bold curve ( $U_f$ ) corresponds to the case of a full reform, allowing unrestricted inward FDI, including "green field" investment. In these circumstances, if the country has unrestricted access to the global financial market, domestic capitalists will support closing the economy entirely to FDI. If,

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<sup>1</sup> The crisis can be explained in several ways. Radelet and Sachs (1998) and Chang and Velasco (1998a, 1998b) attribute the crisis to an investor panic, but without addressing the origin of the panic. Caballero and Krishnamurthy (1998) suggest it may be due to the real or perceived inadequacy of international collateral stemming from microeconomic contractual problems. Calvo (1999) hypothesizes that poorly informed investors may misread a shift out of emerging-market assets by liquidity-constrained informed traders as signaling low returns and this confusion may lead to a market collapse. The moral hazard problem associated with domestic bailouts has been cited by various observers as a contributing factor in the Asian financial crisis [see Krugman (1998), Dooley (1997) and Corsetti, Pesenti, and Roubini (1998)]. The implications of greater uncertainty on the supply of international credit (and its disappearance) are studied in Aizenman and Marion (1999).

however, the country has limited access to the capital market (hence  $F$  is restricted to below a threshold  $F_0$ ), welfare will be higher in the reformed regime. Even in this case, domestic capitalists prefer partial financial reform, restricting "green field" investment. In these circumstances, a financial crisis leading to capital flight may induce the domestic economy to move towards opening its equity market to foreigners.

A key assumption driving some of the results is the presumed rivalry between the "green field" investment and the old capital. This rivalry is induced by the increase in real wages associated with the new capital. This effect may be reversed, however, if the old and the new capital are complementary. While the degree to which old and new capital are complements is subject to empirical debate, domestic capitalists may oppose unrestricted FDI as long as there is a significant downside risk regarding the ultimate rivalry of the old and the new capital.<sup>2</sup>

Section 2 describes the economy, deriving the results described above. Section 3 provides a simulation of a detailed example of the model. Section 4 concludes.

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<sup>2</sup> The results reported by Haddad and Harrison (1993) and Aitken and Harrison (1999) support the notion that FDI bids up the real wage, and the possibility of rivalry between the "green field" investment and the old capital. For further studies dealing with the wage and with the productivity implications of FDI see Feenstra and Gordon (1997). See Buffie (1993) for a model dealing with the labor market implications of FDI.

## 2. The model

Consider a 2 period economy, producing traded and non-traded goods, with the help of labor and capital.

### Preferences

The utility of the representative agent is given by

$$(1) \quad U = u(c_{1,T}; c_{1,N}) + \frac{u(c_{2,T}; c_{2,N})}{1 + \rho}$$

where  $u(c_{i,T}; c_{i,N})$  is the periodic utility at time  $i$  ( $i = 1, 2$ ) associated with the consumption of traded ( $c_{i,T}$ ) and non-traded ( $c_{i,N}$ ) goods in period  $i$ . The supply of labor is inelastic,  $L^s = \bar{L}$ .

### Production and endowment

The traded sector is capital intensive relative to the non-traded. For simplicity, we assume

$$(2) \quad \begin{aligned} X_{1,T} &= (L_{1,T}) ; & X_{2,T} &= (1 + a)(L_{2,T}) ; & & < 1 \\ X_{1,N} &= L_{1,N} ; & X_{2,N} &= L_{2,N} \end{aligned}$$

where  $X_{i,j}$  denotes the production of sector  $j$  at time  $i$ , using labor input  $L_{i,j}$  ( $j = T, N; i = 1, 2$ ).

Labor moves freely between the sectors, hence

$$(3) \quad \bar{L} = L_{i,N} + L_{i,T}; \quad i = 1, 2.$$

We normalize the price of the traded good to 1, and denote the real exchange rate, defined by the relative price of the non-traded to the traded good, by  $p_{i,N}$  ( $i = 1, 2$ ). Note that (2) implies that the real wage equals the real exchange rate.

We consider the case where labor cannot borrow. Capitalists have access to international borrowing, and the debt overhang is the outcome of their past borrowing. The outstanding foreign debt at the beginning of period 1 ('debt overhang') is  $D_1$ . The gross international borrowing in period one is  $F$ , at a real interest rate  $r$ . The stock of capital is owned by domestic entrepreneurs in period 1. In the absence of capital market reforms, it will continue to be domestically owned in period 2.

## 2.1 A Closed Domestic Equity Market

The current account in the absence of capital market reforms is

$$(4) \quad X_{1,T} - c_{1,T} = D_1 - F; \quad X_{2,T} - c_{2,T} = F(1 + r).$$

Solving the labor market equilibrium at period  $i$  yields

$$(5) \quad \begin{aligned} X_{i,T} &= X_{i,T}(p_{i,N}); & X_{i,T}' &< 0; \\ L_{i,T} &= L_{i,T}(p_{i,N}); & L_{i,T}' &< 0; \end{aligned}$$

$$X_{i,N} = \bar{L} - L_{i,T}$$

With unrestricted access to the global capital market, allowing lending and borrowing at a real interest rate of  $r$ , the domestic entrepreneur's consumption plan is the solution to

$$(6) \quad \max_{\{c_{1,T}; c_{1,N}; c_{2,T}; c_{2,N}; F\}} V^e$$

where

$$V^e = u(c_{1,T}; c_{1,N}) + \frac{u(c_{2,T}; c_{2,N})}{1 + r^*} - p_1 [c_{1,T} + p_{1,N} c_{1,N} - \{(1 - \tau) X_{1,T} + F - D_1\}] - p_2 [c_{2,T} + p_{2,N} c_{2,N} - \{(1 - \tau) X_{2,T} - F(1 + r^*)\}] ,$$

and (5) determines the pattern of employment and production. The first order conditions for optimal borrowing and consumption can be reduced to,<sup>3</sup>

$$(7) \quad a. \quad u'_{c_{1,T}} = u'_{c_{2,T}} \frac{1 + r^*}{1 + r^*} \quad b. \quad u'_{c_{i,N}} = u'_{c_{i,T}} p_{i,N}; \quad i = 1, 2$$

Equation (7a) provides the demand for foreign borrowing, as a function of the foreign interest rate. Equation (7b) provides the demand for non-traded goods. We summarize the reduced form of these demands by

$$(8) \quad a. \quad F = F(r^*) \quad b. \quad C_{i,N} = C_{i,N}(p_{i,N}; C_{i,T}) \quad i = 1, 2 .$$

The worker's consumption plan is the solution to

$$(6') \quad \max_{\{c_{1,T}; c_{1,N}; c_{2,T}; c_{2,N}\}} V^l$$

where

$$V^l = u(c_{1,T}; c_{1,N}) + \frac{u(c_{2,T}; c_{2,N})}{1 + r^*} - p_1 [c_{1,T} + p_{1,N} c_{1,N} - p_{1,N} \bar{L}] - p_2 [c_{2,T} + p_{2,N} c_{2,N} - p_{2,N} \bar{L}] .$$

The first order conditions for optimal labor's consumption can be reduced to (7b).

Applying (4), (5), and (8) we infer that, under the conventional assumptions about preferences, the real exchange rate can be reduced to

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<sup>3</sup> It is convenient to present the optimization problem facing the domestic agent in a way that allows a comparison between full and restricted access to international borrowing. This can be done by dealing separately with the budget constraints in each period, as is the case in (6).



$$(9) \quad p_{1,N} = p_{1,N}(F - D_1) \quad ; \quad p_{2,N} = p_{2,N}(F(1 + \dots))$$

## 2.2 Reforming the Capital Market

We consider now the case where the domestic economy reforms the capital market in period 1, allowing foreign ownership of the capital stock in the second period. We assume that foreign entrepreneurs purchase in period 1 a fraction  $\alpha$  of the domestic stock of capital. This equity position is associated with second period rents of  $(1 - \alpha)X_{2,T}$ . Foreign entrepreneurs discount future income at a rate of  $\delta$ , as would be the case with a linear intertemporal foreign utility function. We would like to consider the possibility that both the domestic and the foreign entrepreneurs operate in an oligopolistic market (like automobiles, etc.). In these circumstances, the equity price offered to the domestic producer in the first period may be the outcome of bargaining, splitting the future rent according to the bargaining power of the two parties. Specifically, selling the equity in period 1 implies that the future surplus is divided between the domestic and the foreign entrepreneurs according to weights  $(\alpha, 1 - \alpha)$ , respectively. Consequently, the price of the equity purchased in period 1 by the foreign entrepreneur is the discounted value of  $(1 - \alpha)X_{2,T}$ <sup>4</sup>

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<sup>4</sup> An illustration of the process determining the selling price is the case where both the foreign and the domestic agents have linear utilities. Specifically, if the threat point of the domestic capitalist is not to sell the equity, the selling price  $P$  is determined by maximizing the

corresponding Nash product, 
$$MAX P - \frac{(1 - \alpha)X_{2,T}}{1 + \alpha} - \frac{(1 - \alpha)X_{2,T} - P}{1 + \delta}$$
, where

$\alpha$  measures the bargaining power of the domestic agent. The resultant selling price is

$$(10) \quad \frac{(1 - \alpha)X_{2,T}}{1 + \alpha}.$$

In addition, we assume that opening up the economy to unrestricted inward FDI will induce multinationals to invest in new production facilities, employing  $L_{2,T}^M$  extra labor in the second period, increasing thereby the second period traded goods output by  $X_{2,T}^M$ . To simplify the analysis, we assume that this "green field" investment is externally financed, and requires only traded inputs in period 1. The "green field" investment modifies the second period traded goods production to

$$(11) \quad X_{2,T} + X_{2,T}^M \quad \text{where} \quad X_{2,T} = (1 + a)(L_{2,T}); \quad X_{2,T}^M = (1 + a_M)(L_{2,T}^M)$$

As before, we assume that the financial reform would result in the sale of a fraction  $\alpha$  of the 'old' capital to foreigners. The resultant current account is

$$(12)$$

$$X_{1,T} - c_{1,T} = D_1 - F - \frac{(1 - \alpha)X_{2,T}}{1 + \alpha}; \quad X_{2,T} - c_{2,T} = F(1 + \alpha) + (1 - \alpha)X_{2,T} + (1 - \alpha)(1 + a_M)(L_{2,T}^M)$$

The modified employment and production conditions are

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$$P = \frac{(1 - \alpha)X_{2,T}}{1 + \alpha} \left[ 1 - (1 - \alpha) \frac{\alpha^*}{1 + \alpha^*} \right], \text{ corresponding to a domestic bargaining share}$$

$$= 1 - (1 - \alpha) \frac{\alpha^*}{1 + \alpha^*}. \text{ A similar procedure applies for non linear utilities.}$$

$$\begin{aligned}
 X_{i,T} &= X_{i,T}(p_{i,N}); \quad X_{i,T}' < 0; \quad X_{2,T}^M = X_{2,T}^M(p_{2,N}); \quad X_{2,T}^{M'} < 0; \\
 (13) \quad L_{i,T} &= L_{i,T}(p_{i,N}); \quad L_{i,T}' < 0; \quad L_{2,T}^M = L_{2,T}^M(p_{2,N}); \quad L_{2,T}^{M'} < 0; \\
 X_{1,N} &= \bar{L} - L_{1,T}; \quad X_{2,N} = \bar{L} - L_{2,T} - L_{2,T}^M
 \end{aligned}$$

If a comprehensive reform takes place in period 1, allowing unrestricted FDI, the domestic entrepreneur's consumption plan is the solution to

$$(14) \quad \max_{\{c_{1,T}; c_{1,N}; c_{2,T}; c_{2,N}; F\}} V_f^e(\cdot)$$

where

$$\begin{aligned}
 V_f^e(\cdot) &= u(c_{1,T}; c_{1,N}) + \frac{u(c_{2,T}; c_{2,N})}{1 + \tau^*} - \tau_1 [c_{1,T} + p_{1,N}c_{1,N} - \{(1 - \tau)X_{1,T} + \frac{(1 - \tau)X_{2,T}}{1 + \tau} + F - D_1\}] \\
 &- \tau_2 [c_{2,T} + p_{2,N}c_{2,N} - \{(1 - \tau)(1 - \tau)X_{2,T} - F(1 + \tau)\}]
 \end{aligned}$$

and (13) determines the pattern of employment and production.

The case of partial reform, where "green field" investment is not allowed, corresponds to (14), where  $\tau > 0$  and  $L_{2,T}^M = 0$ ,

$$(15) \quad \max_{\{c_{1,T}; c_{1,N}; c_{2,T}; c_{2,N}; F\}} V_p^e(\cdot)$$

where

$$\begin{aligned}
 V_p^e(\cdot) &= u(c_{1,T}; c_{1,N}) + \frac{u(c_{2,T}; c_{2,N})}{1 + \tau^*} - \tau_1 [c_{1,T} + p_{1,N}c_{1,N} - \{(1 - \tau)X_{1,T} + \frac{(1 - \tau)X_{2,T}}{1 + \tau} + F - D_1\}] \\
 &- \tau_2 [c_{2,T} + p_{2,N}c_{2,N} - \{(1 - \tau)(1 - \tau)X_{2,T} - F(1 + \tau)\}]
 \end{aligned}$$

and

$$(16) \quad X_{i,T} = X_{i,T}(p_{i,N}); \quad X_{i,T}' < 0; \quad L_{i,T} = L_{i,T}(p_{i,N}); \quad L_{i,T}' < 0; \quad X_{i,N} = \bar{L} - L_{i,T} .$$

The domestic entrepreneur would support opening the domestic equity market for foreign ownership only if it would increase his net income, which is equivalent to

$$(17) \quad \left. \frac{V^e(\cdot)}{\cdot} \right|_{=0} > 0 .$$

Applying the first order conditions corresponding to (14), it follows that, with unrestricted access to international borrowing,

$$(18) \quad \text{sign} \left. \frac{V^e(\cdot)}{\cdot} \right|_{=0} = \text{sign}\{ -1 \} .$$

Hence, the domestic entrepreneur would not sell the equity as long as the foreign party has some bargaining power (and would be indifferent to the outcome if  $\beta = 1$ ).

This is not the case, however, if the domestic entrepreneur faces borrowing constraints, so that  $F = F_0 < F(\cdot)$ . In the presence of a binding foreign borrowing constraint, one expects a domestic loan market to emerge, segmented from the international market. Specifically, let  $F_d$  denote the domestic borrowing, at a real interest rate  $r_d$ . The existence of a foreign borrowing constraint, and segmented domestic borrowing modifies the problem facing the entrepreneur to

$$(19) \quad \max_{\{c_{1,T}; c_{1,N}; c_{2,T}; c_{2,N}; F_d\}} \tilde{V}^e(\cdot)$$

where

$$\tilde{V}^e(\cdot) = u(c_{1T}; c_{1N}) + \frac{u(c_{2T}; c_{2N})}{1 + r^*} - \beta_1 [c_{1T} + p_{1N}c_{1N} - ((1 - \beta_1)X_{1T} + \frac{(1 - \beta_1)X_{2T}}{1 + r^*} + F_d + F_0 - D_1)] - \beta_2 [c_{2T} + p_{2N}c_{2N} - \{(1 - \beta_2)(1 - \beta_2)X_{2T} - F_d(1 + r_d) - F_0(1 + r^*)\}]$$

In these circumstances, the domestic entrepreneur will support opening the capital market if <sup>5</sup>

$$(20) \quad \beta_1 > (1 + r^*) \frac{u'_{c_{2T}}}{u'_{c_{1T}}}$$

The F.O.C. characterizing the internal capital market is

$$(21) \quad 1 + r_d = u'_{c_{1T}} / \frac{u'_{c_{2T}}}{1 + r^*}$$

Applying this condition to (20), we infer that opening the domestic equity market is desirable if the premium of the domestic real interest rate above the foreign one, exceeds the bargaining share of foreign entrepreneurs --

$$(22) \quad \frac{r_d - r^*}{1 + r_d} > 1 - \beta_1$$

This condition is more likely to hold, the greater is the credit shortage in period 1 (as will be the case the greater the debt overhang is); the lower is the first period borrowing constraint,  $F_0$ ; and the weaker is the market power of the foreign entrepreneur. If (22) holds, the F.O.C. characterizing the equilibrium selling of domestic capital to foreigners, denoted by  $r^*$ , is

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<sup>5</sup> This condition is obtained by optimizing (19), for an exogenously given  $F = F_0$ .

$$(23) \quad \frac{\tilde{V}^e(\cdot)}{\cdot} = 0.$$

A comprehensive reform would impact the capitalists welfare in two ways. The direct effect is the outcome of selling the equity [equals at the margin to  $\frac{V_f^e(\cdot)}{\cdot}$ ]. The indirect effect is the impact of the "green field" investment on the second period rent. This in turn is given by

$$(24) \quad \left[ (1 - \alpha) X_{2,T} \right] = (1 - \alpha) \frac{X_{2,T}}{p_{2,T}} [p_{2,T}^f - p_{2,T}] < 0,$$

where  $p_{2,T}$  ( $p_{2,T}^f$ ) is the real exchange rate in the absence of FDI liberalization (with comprehensive liberalization). Equation (24) follows from the observation that the new investment by multinationals increases the demand for labor by  $L_{2,T}^M$ , bidding up real wages (= the real exchange rate), so that  $p_{2,T}^f - p_{2,T} > 0$ . The "green filed" investment cuts the rents of 'old capital', reducing the welfare of domestic capitalists. This adverse rent effect would impact domestic capitalists even if they would not sell their equity to the foreign entrepreneurs. The "green field" investment imposes a pecuniary externality, due to the incipient increase in the demand for labor.

It can be verified that with full access to international borrowing, no domestic capitalist would sell his equity position. Hence, the equilibrium is zero. Nevertheless, opening the economy to unrestricted FDI would reduce the welfare of domestic entrepreneurs if it were to induce "green field" investment. Consequently, emerging market capitalists will support capital controls prohibiting inward FDI in order to protect them against this adverse effect. A financial crisis reducing drastically borrowing below a borrowing constraint  $F_0$ , may induce reluctant domestic entrepreneurs to open up the economy to FDI. This would be the case if the beneficial effect of alleviating the shortage of funds in period 1 is large enough. It should compensate for the adverse effects of selling the equity at a discount due to limited bargaining power, and for the

decline of future rents due to future wage increases. Hence, a deep enough crisis may induce FDI liberalization.

Note that the interests of labor and capital regarding inward FDI clash. Opening the economy to FDI would clearly raise GNP. The impact of the real exchange rate appreciation on the real GNP, evaluated in terms of traded goods, is

$$(25) \quad \frac{[\bar{L}p_{2,T} + (1 - \alpha)(1 - \beta)X_{2,T}]}{p_{2,T}} = \bar{L} - (1 - \alpha)L_{2,T} > 0$$

Hence, the "green field" investment increases real GNP. Thus, if labor is 'in control', opening up to FDI is Labor's policy choice, even in the absence of a crisis. It can be verified that labor's gain exceeds capitalists' losses. This suggests that, if the attitude of capitalists is the obstacle to the reform, a side payment from labor to capitalists may be needed to induce a reform. This transfer may be implemented by shifting part of the debt service to the tax payer.

3. Example

Consider the case where the periodic utilities are -

$$(26) \quad u_i = \frac{[(c_{i,T}) (c_{i,N})^{1-\alpha}]^{1-\alpha}}{1-\alpha} \quad ; \quad 0 < \alpha < 1$$

The production functions are

$$(27) \quad \begin{aligned} X_{1,T} &= \sqrt{L_{1,T}}; & X_{2,T} &= (1+a)\sqrt{L_{2,T}}; & X_{2,T}^M &= (1+a_M)\sqrt{L_{2,T}^M} \\ X_{1,N} &= L_{1,N}; & X_{2,N} &= L_{2,N} \end{aligned}$$

from which it follows that

$$(28) \quad \begin{aligned} L_{1,T} &= \frac{1}{2p_{1,N}^2}; & X_{1,T} &= \frac{1}{2p_{1,N}} \\ L_{2,T} &= \frac{1+a}{2p_{2,N}^2}; & X_{2,T} &= \frac{(1+a)^2}{2p_{2,N}}; & X_{2,T}^M &= \frac{(1+a_M)^2}{2p_{2,N}} \end{aligned}$$

Applying the properties of the Cobb-Douglas utility, it follows that

$$(29) \quad c_{i,T} = \frac{1}{1-\alpha} p_{i,N} c_{i,N}; \quad c_{i,N} = X_{i,N}; \quad i = 1, 2.$$

Applying (27)-(29) and the current account constraints (4) we can solve for the real exchange rate in the absence of a reform, as a function of the current account, leading to

$$(30) \quad \begin{aligned} \text{a.} \quad p_{1,N} &= \frac{F - D_1 + \sqrt{(F - D_1)^2 + \frac{1}{1-\alpha} \bar{L} (2 + \frac{1}{1-\alpha})}}{2 \frac{1}{1-\alpha} \bar{L}} \\ \text{b.} \quad p_{2,N} &= \frac{-(1+\alpha)F + \sqrt{[(1+\alpha)F]^2 + \frac{1}{1-\alpha} \bar{L} (1+\alpha)^2 (2 + \frac{1}{1-\alpha})}}{2 \frac{1}{1-\alpha} \bar{L}} \end{aligned}$$



It is easy to verify that

$$(31) \quad p_{1,N} = p_{1,N}(F - D_1; \quad) \quad p_{2,N} = p_{2,N}(F; \quad)$$

Following similar steps, we find that the real exchange rates with a partial and full capital market reform (denoted by the upper index p and f, respectively) are given by

$$(32) \quad p_{1,N}^p = \frac{F + \frac{0.5}{1+} \frac{(1+a)^2}{2p_{2,N}^r} - D_1 + \sqrt{\left(F + \frac{0.5}{1+} \frac{(1+a)^2}{2p_{2,N}^r} - D_1\right)^2 + \frac{\bar{L}}{1-} \left(2 + \frac{\bar{L}}{1-}\right)}}{2 \frac{\bar{L}}{1-}}$$

$$(33) \quad p_{2,N}^p = \frac{-(1+ )F + \sqrt{[(1+ )F]^2 + \frac{\bar{L}}{1-} (1+a)^2 \{2(1-0.5 ) + \frac{\bar{L}}{1-}\}}}{2 \frac{\bar{L}}{1-}}.$$

$$(32') \quad p_{1,N}^f = \frac{F + \frac{0.5}{1+} \frac{(1+a)^2}{2p_{2,N}^f} - D_1 + \sqrt{\left(F + \frac{0.5}{1+} \frac{(1+a)^2}{2p_{2,N}^f} - D_1\right)^2 + \frac{\bar{L}}{1-} \left(2 + \frac{\bar{L}}{1-}\right)}}{2 \frac{\bar{L}}{1-}}$$

$$(33') \quad p_{2,N}^f = \frac{-(1+ )F + \sqrt{[(1+ )F]^2 + \frac{\bar{L}}{1-} (1+a)^2 \{2(1-0.5 ) + \frac{\bar{L}}{1-}\} + (1+a_M)^2 \{1 + \frac{\bar{L}}{1-}\}}}{2 \frac{\bar{L}}{1-}}.$$

We close this section with a simulation, plotting the dependency of domestic entrepreneurs' welfare on borrowing, F. Figure 1 reports the utility in the absence of any reform (U), and with full reform, opening the economy to unrestricted inward FDI (U<sub>f</sub>). The optimal borrowing in the non reformed regime is about 0.24, and in the fully reformed regime about 0.17. The drop in borrowing induced by the reform reflects the adverse wealth effect brought about by

the "green field" investment, as lower borrowing is needed to support the first period consumption. This adverse welfare effect implies that domestic capitalists are worse off in the fully liberalized regime. Hence, in line with our previous discussion, domestic capitalists would oppose inward FDI if they have full access to international borrowing.

We turn now to a comparison of the utility and the first period real exchange rate for the case where the financial crisis imposes a borrowing constraint on the economy. In Figure 2 we contrast 3 scenarios -- no FDI allowed ( $U$ ); no "green field" investment allowed, but equity purchase by foreigners is allowed ( $U_p$ ), and full FDI liberalization ( $U_f$ ). Suppose that the onset of the financial crisis imposes a borrowing constraint of  $F_0 = 0.09$ . It can be verified that at this low level of international borrowing, domestic capitalists are better off selling part of their domestic equity. The optimal equity sale in the two reformed regimes, for  $F_0 = 0.09$ , turned out to be  $p^* = 0.42$ ;  $f^* = 0.36$  (where  $p^*$ ;  $f^*$  denotes the optimal equity sale in the partially and the fully reformed regimes, respectively). The utilities  $U_p$  and  $U_f$  reported in Figure 2 correspond to these optimal equity sales.

The relative position of the curves implies that the financial panic would induce domestic capitalists to support the reform. If domestic capitalists would have the choice, they would prefer the partial reform to the comprehensive one. This follows from the observation that the bold curve  $U_f$  (corresponding to the capitalists' welfare with full reform) is below the broken curve  $U_p$  (corresponding to the capitalists' welfare with partial reform). The vertical difference between these curves measures the adverse income effect of the drop in second period domestic rents due to the increase in real wages attributed to the "green field" investment. This adverse income effect corresponds to the transfer of income to labor. Labor gains both from this transfer, and from the added income associated with the higher wages paid by other employers, induced by the "green field" investment.

The above provides, in a nut-shell, an interpretation for the impact of the crisis on capital market reforms. The crisis has lead foreigners to reduce drastically their exposure to Korea, setting a very low level for  $F$ . This in turn led to a sharp increase of the real interest rate, and to

a sharp real depreciation. In these circumstances, the (previously unattractive) option of selling domestic capital to foreigners becomes a desirable one. A key factor contributing to the regime switch is the crisis, leading to capital flight and to a sharp increase in the domestic real interest rate. Note that a large debt overhang may be a precondition for the regime switch.

#### 4. Concluding remarks

The purpose of this paper is to explain the reluctance to open up capital markets in developing countries, and to study the impact of a financial crisis on the attitude towards financial reforms. We consider an economy where, prior to the crisis, the emerging market's capitalists have unrestricted access to international borrowing, but inward FDI is prohibited. We identified a key role for a crisis and the resultant capital flight in inducing the country to open up.

The paper views debt overhang as the 'culprit', explaining the vulnerability to capital flight. No attempt was made to model the forces leading to the build up of this debt overhang. The model described above is consistent with various scenarios, including the possibility that domestic producers used foreign borrowing to maximize non economic objectives [like size], and thus overextending their investment [see Krugman (1998) and the lead citation from the Economist]. This may explain the 'cleansing effect' of the crisis, punishing corporations that abused their access to the international capital market and the implicit insurance provided to them by the domestic tax payers. All these issues can be added to the above framework, providing a richer, and more realistic account of the crisis dynamics.

## References

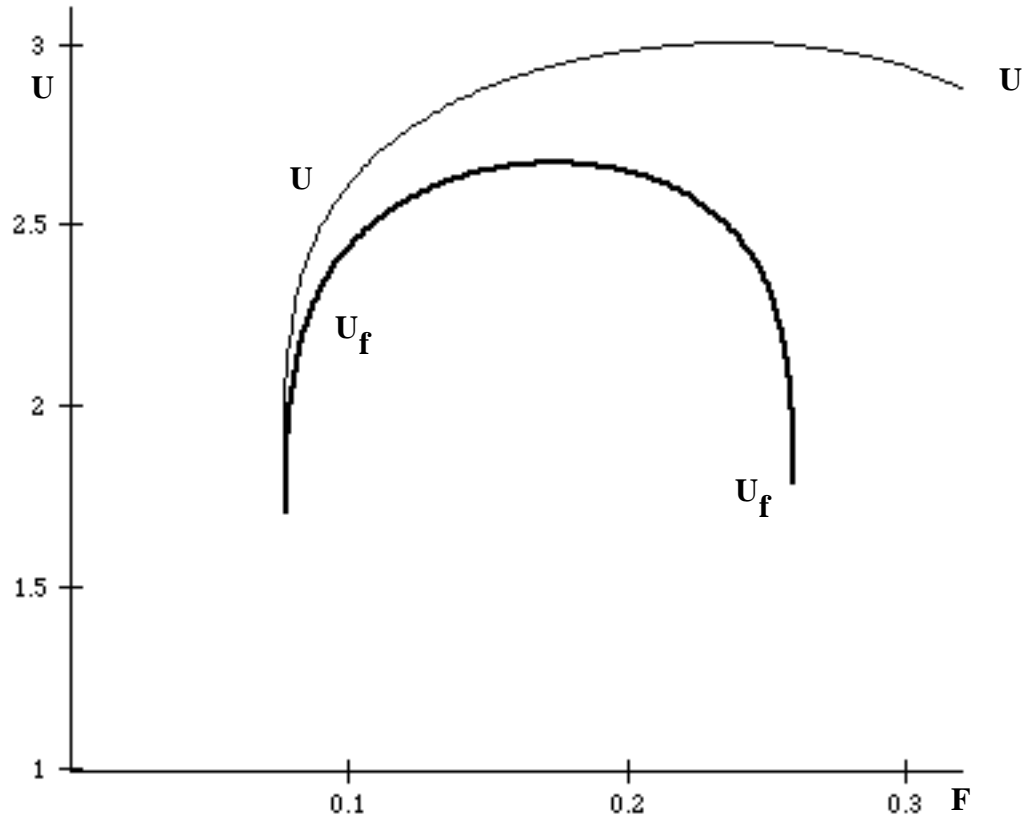
- Aizenman, Joshua and Nancy Marion (1999). "Uncertainty and the Disappearance of Intentional Credit," Dartmouth Working paper, August.
- Aitken, B. J. and A. E. Harrison (1999). "Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela," *American Economic Review*, June, pp. 605-618.
- Baldwin, Robert, E. (1994), "The Effects of Trade and Foreign Direct Investment on Employment and Relative Wages," *OECD Economic Studies*; 0(23), Winter 1994, pages 7-54.
- Blomstrom, Magnus. (1989), *Foreign investment and spillovers*, Routledge, 1989.
- Buffie, Edward, F. (1993), "Direct Foreign Investment, Crowding Out, and Underemployment in the Dualistic Economy," *Oxford Economic Papers*; 45(4), October 1993, pages 639-67.
- Caballero, Ricardo and Arvind Krishnamurthy (1998), "Emerging Market Crises: an Asset Markets Perspective," NBER Working Paper No. 6843, December.
- Calvo, Guillermo (1999). "Contagion in Emerging Markets: When Wall Street is a Carrier," World Bank/Universitat Torcuato Di Tella Conference on Integration and Contagion, June 17-18, 1999.
- Chang, Roberto and Andres Velasco (1998a), "Financial Crises in Emerging Markets: A Canonical Model," NBER Working Paper No. 6606, June.
- \_\_\_\_\_ (1998b), "The Asian Liquidity Crisis," NBER Working Paper No. 6796, November.
- Corsetti, Giancarlo, Paolo Pesenti, and Nouriel Roubini (1998). "Paper Tigers? A Model of the Asian Crisis," NBER Working Paper No. 6783, November.
- Dooley, M. "A Model of Crises in Emerging Markets," NBER Working Paper No. 6300, December 1997.
- Feenstra, Robert C. and Gordon H. Hanson, (1997). "Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras," *Journal of International Economics*; 42(3-4), May 1997, pages 371-93.

Haddad, Mona and Ann Harrison (1993). "Are There Positive Spillovers from Direct Foreign Investment? Evidence from Panel Data for Morocco," *Journal of Development Economics*; 42(1), October 1993, pages 51-74.

Krugman, Paul (1994), "The Myth of Asia's Miracle, a Cautionary Fable," *Foreign Affairs*, November/December.

Krugman, Paul (1998). "Fire-Sale FDI", mimeo, MIT, January.

Radelet, Steven and Jeff Sachs (1998). "The East Asian Financial Crisis: Diagnosis, Remedies, Prospects," *Brookings Papers on Economic Activity*, Volume 1.



**Figure 1**

**Borrowing and Domestic Entrepreneurs' Welfare**

Plotted for  $\bar{L} = 1$ ;  $D_1 = 0.3$ ;  $\alpha = 0.8$ ,  $\beta = 0.2$ ;  $\gamma = 0.7$ ;  $a = a_M = 0.8$   
 $\delta = 0.1$ ;  $\tau^* = 0.2$ ;  $\tau_f^* = 0$

**UU = all FDI prohibited, U\_fU\_f = full reform**

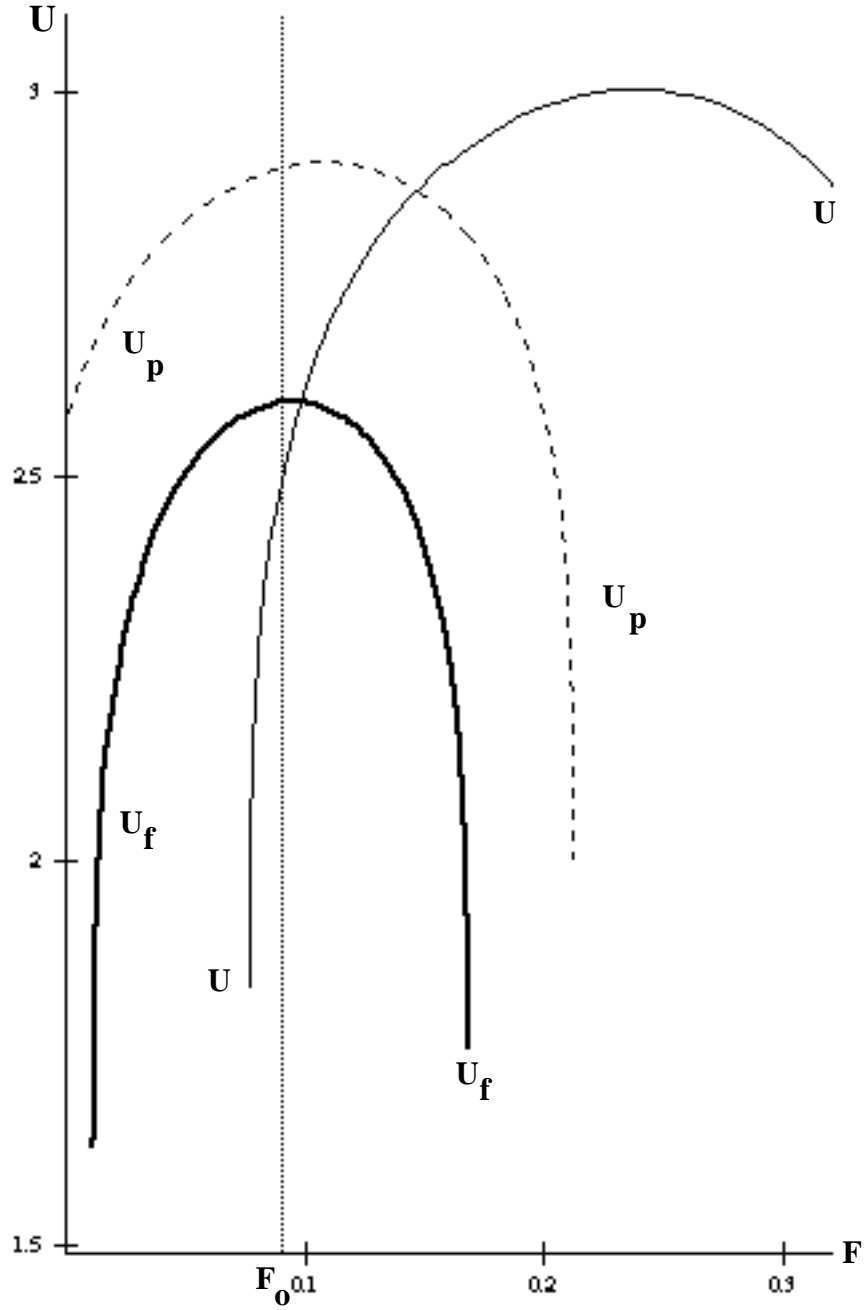


Figure 2

**Borrowing Constraints and Domestic Entrepreneurs' Welfare**

Plotted for  $\bar{L} = 1$ ;  $D_1 = 0.3$ ;  $\alpha = 0.8$ ,  $\beta = 0.2$ ;  $\gamma = 0.7$ ;  $a = a_M = 0.8$   
 $\delta = 0.1$ ;  $\theta^* = 0.2$ ;  $\rho^* = 0.42$ ;  $\tau_f^* = 0.36$

**UU = all FDI prohibited,  $U_p U_p$  = partial reform,  $U_f U_f$  = full reform**

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