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Fire-Sale FDI[1]

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Fire-Sale FDI

Abstract

Capital flight associated with the onset of a financial crisis in a country is often accompanied by an inflow of capital associated with foreign direct investment (FDI). Our paper provides a theoretical framework for this puzzle, and draws wider conclusions on the welfare effects of foreign takeovers. When fundamentals deteriorate, the return that can be pledged to portfolio investors is limited by the incentive constraints of the managers. Only with direct control by investors can the surplus in the project be unlocked. It is precisely during crises that there is the conjunction of the loss of control by incumbent domestic managers, and the lack of domestic capital to take over failing firms. Foreign investors can take over failing firms and capture the surplus, even though they value the assets less. Our theory is consistent with FDI inflows during financial crises being associated with the acquisition of stakes that grant control, rather than simply being acquisitions of cashflow stakes, and is also consistent with the subsequent "flipping" of the FDI assets, where the asset is sold to investors with higher valuations once the crisis abates.

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1 Introduction

One characteristic feature of capital flows associated with some financial crises is the contrast between capital *outflows* associated with portfolio investments, and the *inflows* associated with foreign direct investment (FDI). Even as foreign investors and creditors run for cover as the crisis unfolds, there is an accompanying surge in direct inward investment where foreign investors take over firms in the crisis-stricken country. A recent paper by Aguiar and Gopinath (2005) documents the evidence from mergers and acquisitions data for Asian countries that underwent the 1997 Asian financial crisis. The phenomenon was also noted in an early anecdotal piece by Krugman (1998).

Table 1 reports the correlation between FDI and foreign portfolio investments (FPI) over the period 1980-2005 for the countries hit by the Asian financial crisis. In particular, it presents the correlation between FDI and FPI (and also FDI and only the debt component of FPI) for the non-crisis years of 1980-1995 and 2001-2005 and for the crisis years of 1996-2000. The pattern is striking. With the exception of Indonesia, there is a significant reversal in the sign of correlation between FDI and FPI: In non-crisis years, the two are positively correlated (and weakly negatively so for Malaysia in the case of FPI Debt), but in crisis years, they are strongly negatively correlated. This pattern is further illustrated in Figures 1 and 2 for South Korea and Philippines, respectively. Figures 1a and 2a plot the time-series of FDI and FPI flows for the two countries during 1990-2005. The sharp rise in FDI around 1996-1997 is markedly coincident with the steep drop in FPI. Figures 1b and 2b graphically illustrate the reversal of correlation between FDI and FPI Debt. The message is clear: The crisis and the non-crisis years behave as though there is some sort of a regime shift in the relationship between FDI and FPI.[1]

This divergent behavior of portfolio flows and FDI flows poses a puzzle for economists. On the surface, the drying up of foreign portfolio flows seems to indicate a lack of confidence in the economy of the crisis-stricken country. If so, then the same lack of confidence should also be exhibited with regard to FDI flows. The fact that FDI flows surge in the midst of a "flight to quality" strongly suggests a qualitative difference between portfolio flows and FDI flows. Our paper is an attempt to provide a theoretical framework for understanding this difference, and to explore the associated welfare questions. We begin by addressing the following pair of questions.

- Why do FDI flows surge even as portfolio flows reverse?
- Why do we observe such a juxtaposition especially during financial crises?

[1] Indeed, in both cases, with the significant increase in FDI, even the relevant range of the plot changes.

Finding the answers to these two questions also opens up a number of important follow-up inquiries. It turns out that by answering these two questions, we can address the frequently observed phenomenon of "flipping" by foreign investors, where the foreign acquirers who buy the assets during the crisis quickly re-sell the asset as soon as the crisis abates. Often, the acquirer is an entity that does not have the expertise or experience in running the type of business that it has acquired.

The takeover of banks by foreign acquirers in crisis-stricken countries is one example. In several Asian countries, the foreign takeover of banks has been the subject of much political controversy, leading to public debates on whether banking assets had been sold too cheaply to foreigners. The controversy is sharpened by the fact that in several high-profile cases of foreign entry into the banking sector, the acquiring entities were private equity firms with no obvious expertise or experience in the banking industry, as evidenced by the fact that the acquirers did not hold a banking license in their home country. We return to this issue below. One of our objectives in this paper is to shed light both on why such entry takes place, and on the overall welfare consequences of such entry. As we will see shortly, the welfare consequences can be quite subtle.

Our theoretical framework uses as its starting point the limits to the pledgeability of returns to investors when the stake comes without control of the firm. Without control, the incentive compatibility constraint associated with the manager's moral hazard limits the extent to which the investor can recover the initial investment. At the ex-ante stage, this limits the external financing capacity of the firm. When fundamentals deteriorate, the tighter are the pledgeability constraints, and so even previously feasible investment in projects become infeasible. There is, therefore, an inefficiency associated with portfolio investment in that positive NPV projects are abandoned during the "flight to quality" that accompanies a deterioration in fundamentals.

However, when control can be assured, the surplus in the relationship can be unlocked by the investor, even when a portfolio investor without control would find the investment unprofitable. This is because control enables the investor to eliminate the inefficiency associated with the agency problem and thus increase the size of the cake. Indeed, this increase in the size of the cake may be so large that it overcomes whatever shortfall there is between the value that can be generated by the highest value investor and the value that is actually created by the foreign takeover. More specifically, due to the outflow of portfolio investment, assets are put up for liquidation at fire-sale prices, and, as a result, even when the foreign owner is inefficient, the takeover is profitable due to the low price at which the target is acquired. Thus, during a crisis, there is a surge of FDI inflows and this coincides exactly with an outflow of portfolio capital.

There are three important implications of our model. First, FDI flows surge precisely

when there is a flight to safety or an outflow of portfolio capital, and both phenomena have a common cause - namely, the aggravation of the firm-level moral hazard and resulting reduction in ability of firms to pledge future returns. The resulting fall in external financing - the outflow of portfolio capital - leads to fire sales. This, in turn, raises the shadow value of capital deployed to buy these assets, generating an inflow of FDI. This pattern is illustrated in Figures 1 and 2 for South Korea and Philippines, respectively, which illustrate the negative correlation between FDI and FPI during crisis periods.

Second, the FDI inflows that happen during financial crises should be associated with the acquisition of stakes that grant control, rather than simply acquisition of a cashflow stakes. In this way, our framework allows us to address the key empirical feature that it is precisely during financial crises that we see the juxtaposition of the surge in FDI with the flight to quality in portfolio flows. There is ample evidence supporting this hypothesis. Acharya, Shin and Yorulmazer (2007), studying M&A activity in the financial sector in the countries hit by the Asian crisis during the period 1996-2000 show (in their Table 2) that the crisis year of 1998 witnessed greater foreign acquisitions, but crucially that unlike non-crisis years, these acquisitions represented stakes of greater than 50 percent, and often the entire 100 percent. In contrast, the stakes during non-crisis years were far smaller and almost always lower than 50 percent. Additional evidence from UN (1999), Chari, Ouimet and Tesar (2004), and Aguiar and Gopinath (2005) is discussed in Section 5.

And, finally, the "flipping" of assets acquired in fire sales once prices rebound is a direct consequence of our theory, since even inefficient foreign owners acquire assets during fire sales. Using the SDC Platinum data on mergers and acquisitions, Figure 3 provides succinct evidence for such flipping in the banking and financial institutions sector during the South East Asian crisis. It defines a "flip" as the subsequent sale (2001 onwards) for an acquisition that occurred during the crisis period (1996-2000). Employing the standard definition of a controlling acquisition as corresponding to a purchase of at least 10% of the target, the figure plots the cumulative percentage of flipped deals in each class as a function of the number of years since the acquisition in the crisis period. While hardly any domestic deals get flipped in the first year, close to 2% of foreign deals get flipped, and the gap between the two only widens as more time elapses, especially so after the fifth year. By ten years since acquisition, close to 14% of foreign deals get flipped as compared to less than 4% of domestic deals.

Most importantly, we are able to address the key welfare questions that are of most relevance to policy makers. The role of foreign capital in the overall resolution policy following a crisis has been a key thread in the policy discussions. We are able to provide a theoretical framework that can accommodate the competing forces. In particular, we argue that even though inflows of FDI may be associated with inefficiency of allocation, they might be the second best in a world where bailouts of firms are likely to be marred by political economy considerations.

The remainder of the paper is structured as follows. Sections 2 and 3 present the theoretical model and its analysis. Section 4 presents extensions of the benchmark model. Before turning to normative analysis, we present in detail existing and new evidence supporting the three key implications of our model. Section 6 provides an analysis of resolution of financial crises and Section 7 concludes. Proofs not contained in the text are contained in the Appendix.

2 Model

There are three dates, indexed by $t \in \{0, 1, 2\}$. We consider an economy populated with a continuum of domestic firms indexed by $i \in [0, 1]$, whose objective is to maximize the sum of expected profit over time. Domestic firms begin with a unit of endowment at date $t = 0$. The event tree for our benchmark model is outlined in Figure 4.

[Figure 4 here]

Each domestic firm has two consecutive investment opportunities, one at date $t = 0$ and the other at date $t = 1$. The date 0 project needs one unit of input at date 0, and yields its outcome at date 1. The date 1 project needs one unit of input at date 1, and yields its outcome at date 2. Provided that firm i exerts high effort, the return on its date t project is given by

$$R_{it} = \begin{cases} R_t & \text{with prob } \alpha_t \\ 0 & \text{with prob } 1 - \alpha_t \end{cases} \tag{1}$$

where $R_t > 1$ is a constant. At a particular date t the outcomes across firms are independent, so that by the law of large numbers, exactly proportion α_t of the firms have return R_t, and proportion $1 - \alpha_t$ have zero return.

Crucially, there is aggregate risk in the economy in the sense that α_0 and α_1 are random variables when viewed from date 0. We denote by $E(\alpha_1|\alpha_0)$ the expected value of α_1 conditional on the realization of α_0.

There is also moral hazard at the individual firm level. If the firm does not exert effort, then when the return is high, it cannot generate R_t but only $R_t - \overline{\Delta}$ and its owners enjoy a non-pecuniary benefit of $B \in (0, \overline{\Delta})$. For the firm owners to exert effort, appropriate incentives have to be provided by giving them a minimum share of the future profits. We denote this share as θ and get the incentive compatibility constraint as:

$$\alpha_t \theta R_t \geqslant \alpha_t \left(\theta(R_t - \overline{\Delta}) + B\right) \tag{IC}$$

Firm owners need a minimum share of $\overline{\theta} = B/\overline{\Delta}$ to exert high effort. Therefore, the firm can pledge at most a fraction $\tau = 1 - \overline{\theta}$ of its project outcome to outside investors.[2] We will describe the outside investors in more detail shortly. We assume that at date 0, the entire share of the firm profits belongs to the firm owners, and therefore, moral hazard is not a concern at the beginning.

When viewed from date 1, the net present value for a domestic firm from the risky investment when it exerts high effort is

$$\overline{p} = E\left(\alpha_1|\alpha_0\right) R_1 - 1 \tag{2}$$

In addition to domestic firms, there is a group of risk-neutral foreign investors who have total funds of w that can be used either to purchase or finance domestic firms - that is, either for FPI (foreign portfolio investment) or for FDI (foreign direct investment). Due to the binary nature of the project outcome, we can interpret the FPI financing from outside investors as either debt or equity.

Foreigners do not have the skills to generate the full value from domestic assets. This can be considered a metaphor for some form of expertise in domestic markets. It is also a simple way of introducing barriers to entry into the domestic market. To capture this formally, we assume that foreigners cannot generate R_1 but only $R_1 - \Delta$, for some constant $\Delta > 0$.[3] The notion that foreigners may not be able to run the domestic assets as efficiently as the domestic firms is akin to the notion of *asset-specificity*, first introduced in the corporate-finance literature by Williamson (1988) and Shleifer and Vishny (1992).[4]

Finally, there is a social planner (the ministry of finance and financial regulator rolled into one) who oversees the resolution of failed firms through assets sales, recapitalization of failed firms and/or regulation of foreign entry.

For a domestic firm, if the return from the first-period investment is high, then the firm operates one more period and makes the second-period investment using the proceeds from the first investment. If the return is low and the firm cannot raise financing for the second investment, then the firm is put up for sale.

Domestic firms that had the high return from the first period investment are potential purchasers of failed firms' projects. Because of moral hazard, the surviving domestic firms

[2]Note that, once the firm is left with a share that is less than $\overline{\theta}$, it can as well pledge the entire future return of $\left(\alpha_t(R_t - \overline{\Delta})\right)$. For $\overline{\Delta} > \sqrt{BR_t}$, this is less than $\left(\alpha_t(1-\overline{\theta})R_t\right)$, the amount that can be pledged when the firm chooses the good project. Throughout, we assume that $\overline{\Delta} > \sqrt{BR_t}$.

[3]We assume that $\alpha_t\left(R - \Delta\right) \geqslant 1$, as otherwise the analysis would be uninteresting.

[4]There is strong empirical support for this idea in the corporate-finance literature, as shown, for example, by Pulvino (1998) for the airline industry, and by Acharya, Bharath, and Srinivasan (2003) for the entire universe of defaulted firms in the US over the period 1981 to 1999 (see also Berger, Ofek, and Swary (1996) and Stromberg (2000)).

cannot pledge all their future income, but only a fraction τ. The total resources available to a surviving domestic firm at date 1 to purchase failed firm assets is

$$\ell = R_0 + \tau E\left(\alpha_1|\alpha_0\right) R_1 - 1 \tag{3}$$

The firm has R_0 from the date 0 investment, and can raise $\tau E\left(\alpha_1|\alpha_0\right) R_1$ units of funds from outside investors. Finally, the firm must set aside the cost of investment of 1.[5]

3 Analysis

We denote by k the proportion of domestic firms that fail at date 1. Since firms are symmetric at date 0, the proportion k can be regarded as the state variable at date 1. A firm which had the low return from the first period investment still has the second period investment ahead of it and it can pledge $\tau E\left(\alpha_1|\alpha_0\right) R_1$ units of funds against its future return. Hence, if $\tau\overline{q} \geqslant 1$, where $\overline{q} = E\left(\alpha_1|\alpha_0\right) R_1$, this domestic firm can generate the needed funds for the second period investment and does not need to be liquidated. In order to economize on notation, we denote:

$$\bar{\alpha}_1 \equiv E\left(\alpha_1|\alpha_0\right) \tag{4}$$

In other words, $\bar{\alpha}_1$ is the expected probability of success of the second project conditional on the information at date 1. Hence, for $\bar{\alpha}_1 \geqslant \bar{\alpha}_1^* \equiv 1/\tau R_1$, all domestic firms can undertake the second project.

However, for $\bar{\alpha}_1 < \bar{\alpha}_1^*$, the domestic firm with the low outcome in the first project cannot generate the necessary funds and is put up for sale. Hence, asset sales take place only when $\bar{\alpha}_1 < \bar{\alpha}_1^*$. We summarize these points in terms of the following proposition.

Proposition 1 *There is a critical value of $\bar{\alpha}_1$, given as $\bar{\alpha}_1^* = 1/\tau R_1$, such that, if $\bar{\alpha}_1 \geqslant \bar{\alpha}_1^*$, a firm which had the low return from the first period investment can generate the needed funds for the second period investment. Otherwise, it is put up for sale.*

3.1 Sales and liquidation values

We now turn to the sale of failed firms. Consider an allocation by the social planner where each surviving domestic firm is allocated y units of failed firms' projects at the price $p \cdot y$.

[5] Alternatively, we can allow firms to generate funds against the assets they purchase as well. This does not change our results qualitatively. See Appendix for a discussion. Furthermore, when foreigners have limited funds, due to lack of liquidity, firms may need to suffer a discount in the capital market so that they can only generate funds less than $\tau\overline{q}$ in the capital market.

Since the net present value of the project is $\bar{p}$, if the projects are sold for price $p < \bar{p}$, the surviving firm wishes to buy as much of the failed assets as it can, subject to its resource constraint. Since each unit of the project needs investment of 1, the surviving firms' resource constraint is $y(1+p) \leq \ell$. Hence, for $p < \overline{p}$, the demand schedule for surviving firms is

$$y(p) = \frac{\ell}{1+p} \tag{5}$$

For $p > \overline{p}$, the demand is $y(p) = 0$.

We can derive the demand schedule for foreigners in a similar way. Foreigners can generate only $R_1 - \Delta$ with high effort. Define

$$\underline{p} \equiv \bar{\alpha}_1(R_1 - \Delta) - 1 = \overline{p} - \bar{\alpha}_1\Delta$$

as the expected net present value of the project for foreigners. For $p < \underline{p}$, foreigners are willing to supply all their funds for the asset purchase. Thus, their demand schedule is

$$y(p) = \frac{w}{1+p} \tag{6}$$

For $p > \underline{p}$, the demand is zero. In our benchmark model, we assume that w is infinite so that foreigners have an infinitely elastic demand for the risky project at $p = \underline{p}$. In a later section, we examine limited foreigner funds.

The social planner aims to maximize expected output. Since domestic buyers are better at utilizing the failed assets, the social planner allocates failed assets to surviving domestic firms as much as possible. Only when domestic firms are not be able to pay the threshold price of $\underline{p}$ for foreign investors will foreigners be included in the allocation of failed assets.

The market for failed assets do not clear when $p > \overline{p}$ since price exceeds the net present value even for the domestic buyers. If $p \leqslant \overline{p}$, and the proportion of failed firms is small (in a sense to be made precise), surviving firms have enough funds to pay the full price for all failed firms' assets. In this case, each surviving domestic firm receives

$$\frac{k}{1-k}$$

units of the risky project. Since there are k failed firms and $1-k$ surviving firms, domestic firms take over all failed assets. The surviving domestic firms have just enough resources to take on the failed firms' projects when

$$\tfrac{k}{1-k}\,(1+p) = \ell$$

This gives us a threshold value for k when the assets of failed firms can be absorbed by domestic buyers at the full price of $\bar{p}$. Specifically, for $k \leq \underline{k}$, where

$$\underline{k} \equiv \frac{\ell}{\ell + 1 + \overline{p}} \tag{7}$$

the social planner sets the price at its full value of $p = \overline{p}$, and allocates $\frac{k}{1-k}$ to each surviving domestic firm.

For values of k higher than $\underline{k}$, surviving firms cannot pay the full price $\bar{p}$ for failed firms' assets but can still pay a price above the lower threshold $\underline{p}$, which is the fair value of the project in the eyes of foreigners. Below $\underline{p}$, foreigners will wish to enter. Formally, for $k \in (\underline{k}, \overline{k}]$, where

$$\overline{k} \equiv \frac{\ell}{\ell + 1 + \underline{p}} \tag{8}$$

the social planner sets the price at

$$p = \frac{\ell}{k} - (1 + \ell)$$

and each surviving domestic firm receives $k/(1-k)$ units of the risky project, and all failed assets are acquired by surviving domestic firms. In this region of k, surviving firms use all available funds to purchase failed firm assets and the price falls as the proportion of failures increases. This effect is basically the cash-in-the-market pricing as in Allen and Gale (1994, 1998) and is also akin to the industry-equilibrium hypothesis of Shleifer and Vishny (1992) who argue that when industry peers of a firm in distress are financially constrained, the peers may not be able to pay a price for assets of the distressed firm that equals the value of these assets to them.

For $k > \overline{k}$, the resources of the surviving domestic firms are so low that they cannot absorb all assets at price above $\underline{p}$. The price must fall further in order to clear the market. Enter the foreigners. When price falls below $\underline{p}$, foreigners have a positive demand and are willing to supply their funds for the asset purchase. With the injection of foreigners' funds, prices find the floor at $\underline{p}$.

The resulting price function is formally stated in the following proposition and is illustrated in Figure 5.

Proposition 2 *The price as a function of the proportion of failed firms is*

$$p(k) = \begin{cases} \overline{p} & \text{for} \quad k \leqslant \underline{k} \\ \dfrac{\ell}{k} - 1 + \ell & \text{for} \quad k \in (\underline{k}, \overline{k}] \\ \underline{p} & \text{for} \quad k > \overline{k} \end{cases} . \tag{9}$$

3.2 FPI versus FDI

We now come to the core of our theoretical result. We will examine how the foreign portfolio investment (FPI) into domestic firms interacts with the foreign direct investment (FDI) into domestic firms.

In order to state our results in an economical way, we impose some structure on the intertemporal link in the aggregate uncertainty. In particular, we make the simplifying assumption that

$$E\left(\alpha_1|\alpha_0\right) = \alpha_0 \tag{10}$$

so that the realization of α_0 is the best predictor of the likelihood of success next period. Hence, $\bar{\alpha}_1 = \alpha_0$. The idea is that the macroeconomic fundamentals that determine the success of investment projects exhibit persistence. When the economy deteriorates this period, the prospect of high returns diminishes next period. Our results do not rely on this strong form of persistence and more general forms of intertemporal dependence can be accommodated, but (10) simplifies the algebraic expressions that emerge from our analysis.

We will further restrict our attention to the case where low return in the first project leads to failure of the firm. In other words,

$$k = 1 - \alpha_0$$

Without loss of generality, we can treat the incidence of failure k as our state variable. In this case, we have:

$$\overline{p} = (1-k)R_1 - 1 \quad \text{and} \quad \underline{p} = (1-k)(R_1 - \Delta) - 1, \tag{11}$$

$$\ell = R_0 + \tau(1-k)R_1 - 1. \tag{12}$$

Note that both $\overline{p}$ and $\underline{p}$ are decreasing in the proportion of failures k. The thresholds $\underline{k}$ and $\overline{k}$ satisfy:

$$(1-\underline{k})\,\ell = \underline{k}\,(1+\overline{p}) \quad \text{and} \quad \left(1-\overline{k}\right)\ell = \overline{k}\,\left(1+\underline{p}\right) \tag{13}$$

We can show that the equalities in (13) give us unique values of $\underline{k}$ and $\overline{k}$, where $\underline{k} < \overline{k}$.[6] This gives us the following Corollary (see Figure 6).

[Figure 6 here]

[6] See Appendix for the proof.

Corollary 1 *For $k = 1 - \alpha_0$, the price is as follows:*

$$p = \begin{cases} (1-k)R_1 - 1 & for \quad k \leqslant \underline{k} \\ \dfrac{\ell}{k} - (1+\ell) & for \quad k \in (\underline{k}, \overline{k}] \\ (1-k)(R_1 - \Delta) - 1 & for \quad k > \overline{k} \end{cases}, \tag{14}$$

where $\overline{p}$ and $\underline{p}$ are given in equations in expression (11), $\underline{k}$ and $\overline{k}$ are the unique values that satisfy equations in (13), and ℓ is given in equation (12).

As the macroeconomy worsens (low α_0), the price of assets fall. This occurs due to two separate reasons. First, as the macroeconomy weakens, the prospects for the second period project worsen (low $\bar{\alpha}_1$) so that the fundamental value $\overline{p}$ of the assets fall. Also, the proportion of failures (k) increases when the economy is poor, and for high enough proportion of failures ($k > \underline{k}$) this leads to cash-in-the-market prices due to lack of liquidity in domestic markets.

Recall that for $\bar{\alpha}_1 \geqslant \bar{\alpha}_1^*$, even domestic firms that had the low return from the first period investment can generate the needed funds so that there are no asset sales. The more interesting case is when $\bar{\alpha}_1 < \bar{\alpha}_1^*$. In this case, the surviving domestic firms acquire failed firm assets funded by two sources. the first is the cash from the initial project. The second are the funds raised from outsiders (FPI).

Total FPI is determined by the borrowing capacity (BC) of the domestic firms, given by

$$BC = (1-k)\tau\overline{q}$$

Note that BC is decreasing in k. The worse is the economy, the lower is the borrowing capacity of the domestic economy. As long as $k < \overline{k}$, the price for failed firms' assets is above $\underline{p}$ so that foreigners do not wish to buy the failed assets directly. In other words, when $k < \overline{k}$, foreign direct investment (FDI) is equal to 0. Figure 7 illustrates.

[Figure 7 here]

Note that surviving firms may not need to utilize the entire borrowing capacity since the profits from the first period investment may be enough to keep the price at $\overline{p}$ for low proportion of failures. In particular, for $k \leqslant \underline{\underline{k}}$, where $\underline{\underline{k}} = \frac{R_0 - 1}{\overline{p} + R_0 - 1}$, surviving firms do not need to generate any additional funds so that the actual capital flow, denoted by C, is 0. For $k \in (\underline{\underline{k}}, \underline{k}]$, surviving firms generate funds for asset purchases which is given as $C = k(1+\overline{p}) - (1-k)(R_0 - 1)$, which is increasing in k. And for $k > \overline{k}$, surviving firms use up their entire borrowing capacity so that $C = BC$.

However, for $k > \overline{k}$, all failed firms' assets cannot be purchased by surviving firms at the price $\underline{p}$ and profitable options emerge for foreigners for asset purchases. Formally, for $k > \overline{k}$,

surviving firms can purchase only $\frac{(1-k)\ell}{\underline{p}}$ units of failed firms' assets and the rest, which is equal to $k - \frac{(1-k)\ell}{\underline{p}}$ units, is acquired by foreigners at a price of $\underline{p}$. Hence, for $k > \overline{k}$, we have $k\underline{p} - (1-k)\ell$ units of foreign funds that enter the domestic economy in the form of FDI, that is, FDI $= k(\ell + \underline{p}) - \ell$.

Note that FDI is (weakly) increasing in k while the borrowing capacity of the domestic economy is decreasing in k. Hence, there is a negative relationship between capital flows and foreign direct investment - between FPI and FDI. We summarize our finding as follows. Figure 7 illustrates.

Proposition 3 *For $\bar{\alpha}_1 < \bar{\alpha}_1^*$, we have:*

(i) BC $= (1-k)\tau\overline{q}$*, so that BC is decreasing in k.*

(ii) *For $k \geqslant \overline{k}$,* FDI $= k(\ell + \underline{p}) - \ell$*, so that* FDI *is increasing in k. For $k < \overline{k}$,* FDI $= 0$.

(iii) *For $k \geqslant \overline{k}$, $C =$* BC*, and for $k < \overline{k}$, we have $C = k(\overline{p} + R_0) - (R_0 - 1)$ so that C* is increasing in k.

With proposition 3, we have our key theoretical result. In the midst of a crisis where there is widespread corporate bankruptcy, we have the juxtaposition of (i) decreased portfolio investment in the surviving firms and (ii) increased FDI into the crisis-stricken economy.

The intuition for our result can be explained as follows. When current conditions deteriorate, the prospect of future investment also darkens. Hence, even if a domestic firm survives the initial investment, its borrowing capacity is much diminished. It is precisely when the surviving firms' borrowing capacity is low that there is increased supply of failed assets searching for buyers. The domestic economy takes a double blow: low future prospects, and high current distress. It is the combination of these two factors that opens the door to foreign investors. They find it profitable to enter, even though their ability to manage domestic assets are less good.

4 Extensions

4.1 Buying Equity versus Buying Firms

So far, we have examined the case where foreigners have funds of $w \geqslant 1 + \underline{p}$ so that they can purchase all domestic firms at the price $\underline{p}$ and will still have enough funds to finance all second period projects. We relax this assumption and allow for limited funds for foreigners,

that is, $w \in \left(1, 1+\underline{p}\right)$. This allows us to examine the relationship between the cost of capital and illiquidity spillover between the asset and equity markets of domestic firms.

When the incidence of failures is large, the price of assets falls below the threshold value of foreigners, $\underline{p}$. Since purchasing assets at such prices becomes profitable for foreigners, in equilibrium they need to be compensated for purchasing shares of surviving firms. As a result, the share price of surviving firms falls below their fundamental value $\overline{q}$. In other words, limited foreigner absorption capacity for failed firms has an impact on domestic cost of equity. The fire-sale affects not only the price of failed firms' assets but also the price of shares of surviving firms. The discount that surviving firms suffer in issuing equity is higher when the crisis is more severe - high k.

When foreigner funds are limited, we have a fourth region for $k > \overline{\overline{k}}$, where $\overline{\overline{k}} > \overline{k}$, and

$$\overline{\overline{k}} = \frac{(R_0 - 1) + w}{\underline{p} + R_0}, \tag{15}$$

so that even with the injection of foreigners' funds, the price cannot be sustained at $\underline{p}$ and the price is again strictly decreasing in k.

Recall that in the benchmark model with unlimited foreigners' funds, surviving firms issue τ units of shares at a price $\overline{q}$ to generate funds of $\tau\overline{q}$ from foreigners. However, with limited foreigners' funds, for $k > \overline{\overline{k}}$, the price for failed firms' assets falls below $\underline{p}$ so that even foreigners can make positive profits by purchasing and running these assets. As a result, for $k > \overline{\overline{k}}$, foreigners would not be willing to pay the full price of $\overline{q}$ for a share of a surviving firm and surviving firms have to suffer some discount when they issue shares which leads to an increase in the cost of capital resulting from lack of liquidity.

Let s be the proportion of shares issued by a surviving firm. Because of moral hazard we have: $s \leqslant \tau$. If a surviving firm issues s unit of shares at the price q and purchases m units of assets at the price p, it makes an expected profit of $m\left(\overline{p} - p\right) - s\left(\overline{q} - q\right)$.

Note that in any equilibrium, q cannot exceed $\overline{q}$. Thus, we have $q \leqslant \overline{q}$, and surviving firms issue equity just enough for the asset purchase, no more. Using this, we can state a surviving firm's maximization problem as:

$$\max_{m,s} \quad m\left(\overline{p} - p\right) - s\left(\overline{q} - q\right) \tag{16}$$

$$\text{s.t.} \qquad s \cdot q + R_0 - 1 \geqslant mp \tag{17}$$

$$s \leqslant \tau. \tag{18}$$

For $q \leqslant 1 + p$, surviving firms cannot make positive profits by issuing equity to purchase assets. Thus, when $q \leqslant 1 + p$, $s = 0$ and $m = \frac{R_0 - 1}{p}$. When $q > 1 + p$, surviving firms make positive profits from asset purchase using the funds they generate by issuing equity. Hence, they would like to issue as much equity as possible, that is, $s = \tau$.

We can state foreigners' maximization problem in a similar way:

$$\begin{aligned} \max_{x,y} \quad & x\left(\underline{p}-p\right)+y\left(\overline{q}-q\right) \\ \text{s.t.} \quad & xp+yq \leqslant w \end{aligned} \tag{19}$$

where x and y represent the proportion of assets and the proportion of shares in surviving firms purchased by foreigners, respectively.

When the share price of surviving firms, q, is relatively low compared to the price of failed firms' assets, p, foreigners prefer to purchase shares of surviving firms. However, if p becomes low compared to q, then foreigners may prefer to acquire the assets themselves.

When $p > \underline{p}$, foreigners do not want to purchase failed firms' assets and $x(q,p) = 0$. When $p < \underline{p}$, foreigners choose x to maximize:

$$x\left(\underline{p}-p\right)+\left(\frac{w-xp}{q}\right)\left(\overline{q}-q\right) \tag{20}$$

$$= \quad x\left(\underline{p}-\frac{p\overline{q}}{q}\right)+w\left(\frac{\overline{q}}{q}-1\right). \tag{21}$$

Thus, if $p < \underline{p}$ and $\underline{p}\ q > \overline{q}\ p$, then foreigners use all their funds for the asset purchase, that is $x = \frac{w}{p}$. When $p < \underline{p}$ and $\underline{p}\ q < \overline{q}\ p$, foreigners use all their funds for the equity purchase, that is $y = \frac{w}{q}$, and when $\underline{p}\ q = \overline{q}\ p$, foreigners are indifferent between the equity and the asset purchase.

In equilibrium, demand for shares of surviving firms and assets of failed firms should equal their supply. Hence, we have the market clearing conditions:

$$(1-k)s = y(q,p) \qquad \text{(equity market)} \tag{22}$$

$$(1-k)m + x(p_0,p) = k \qquad \text{(asset market)} \tag{23}$$

We focus on the outcome where the participation of foreigners in the equity market is maximum, which results in the maximum price for assets. However, even in this case, we show that for a large proportion of failures, the share price of surviving firms falls below their fundamental value. Furthermore, for low values of foreigners' funds, during severe crises, the capital market completely breaks down.

The price functions for failed firms' assets and for shares of surviving firms are formally stated in the following proposition and are illustrated in Figure 8.[7]

[Figure 8 here]

[7] Proposition 4 states the results for the case $w \geqslant \tau\overline{q}$. Similar results hold for $w < \tau\overline{q}$.

Proposition 4 *For limited foreigners' funds, in equilibrium, we have:*

$$p = \begin{cases} \overline{p} & for \quad k \leqslant \underline{k} \\ \dfrac{\ell}{k} - (1+\ell) & for \quad k \in (\underline{k}, \overline{k}] \\ \underline{p} & for \quad k \in (\overline{k}, \overline{\overline{k}}] \\ \frac{(R_0-1)+w}{k} - R_0 & for \quad k > \overline{\overline{k}} \end{cases} \tag{24}$$

and

$$q = \begin{cases} \overline{q} & for \quad k \leqslant \overline{\overline{k}} \\ \mu p & for \quad k > \overline{\overline{k}} \text{ and } w \geqslant w^* \\ \mu p & for \quad k \in (\overline{\overline{k}}, k^*] \text{ and } w < w^* \\ \text{Market breaks down} & for \quad k > k^* \text{ and } w < w^* \end{cases}, \tag{25}$$

where $\mu = \dfrac{\overline{q}}{\underline{p}}$, $w^* = \dfrac{\overline{q}}{\overline{q} - \underline{p}}$, *and* $k^* = \dfrac{\left(\overline{q} - \underline{p}\right)\left(R_0 - 1 + w\right)}{\underline{p} + \left(\overline{q} - \underline{p}\right) R_0}$.

When foreigners' wealth is low ($w < w^*$), the price for failed firms' assets falls sufficiently. This, in turn, leads to high discounts in the capital market and for $k > k^*$, the discount is so high that surviving firms cannot generate the needed funds by issuing shares, that is, $q < 1 + p$. Hence, the capital market breaks down completely (see Figure 9).

[Figure 9 here]

Thus, for $w < w^*$, at $k = k^*$, the domestic economy experiences a structural break where foreign funds enter the domestic market only through FDI, that is, $BC = C = 0$. Formally, for $k \in (\overline{\overline{k}}, k^*]$, even though they need to suffer some discount, surviving firms can generate funds in the capital market and they can purchase $\frac{(1-k)[(R_0-1)+\tau q]}{p}$ units of failed firms' assets. The rest is acquired by foreigners, that is, FDI $= k - \frac{(1-k)[(R_0-1)+\tau q]}{p}$. However, for $k > k^*$, the capital market breaks down and the surviving firms are restricted to their first period profits for the asset purchase, that is, they can only purchase $\frac{(1-k)(R_0-1)}{p}$ units of failed firms' assets. Hence, at $k = k^*$, we have a structural break where FDI jumps to $k - \frac{(1-k)(R_0-1)}{p}$. Thus, for $w < w^*$, we have

$$FDI = \begin{cases} 0 & for \quad k \leqslant \overline{k} \\ k - \frac{(1-k)[(R_0-1)+\tau q]}{p} & for \quad k \in (\overline{k}, k^*] \\ k - \frac{(1-k)(R_0-1)}{p} & for \quad k > k^* \end{cases}. \tag{26}$$

4.2 Differential efficiency among foreigners

It is possible that actually some foreigners are more efficient than domestic firms but they may not be able to enter the domestic market due to barriers to entry for reasons such as protection for domestic industries and other political economy reasons. As a result, even efficient foreigners can enter these markets only when prices fall sufficiently. Here, we show that in the presence of barriers to entry, during crises, first the efficient foreigners enter, which may be beneficial for crisis-stricken countries. However, for severe crises, the price may fall so much that even inefficient foreigners may enter to take advantage of fire sales.[8]

To model this, we introduce differential levels of efficiency among foreigners and a fixed cost of entry to the domestic markets. Suppose that foreigners have funds of $1+\underline{p}$, uniformly distributed among themselves, so that they can purchase all domestic firms at a price of $\underline{p}$ and can take all second period investments using their funds. Suppose that a proportion $z < 1$ of foreigners are of efficient type with total funds of $w_e = z(1+\underline{p})$. Efficient foreigners can generate a return of $R_1 + \rho$, where $\rho > 0$, from the second period investment when the return is high. The remaining foreigners, a proportion $1-z$, are inefficient and can only generate $R_1 - \epsilon$, where $\epsilon > 0$. Hence, in the absence of entry costs, efficient foreigners are willing to pay a price of $\overline{\overline{p}}$ for failed firms, where

$$\overline{\overline{p}} = \alpha_1 (R_1 + \rho) - 1 > \overline{p}. \tag{27}$$

Suppose that there is a fixed cost γ of entry to the domestic market, where $\gamma > \overline{\overline{p}} - \overline{p}$. Hence, even efficient foreigners can enter only when prices fall below the price $\widetilde{p} = \overline{\overline{p}} - \gamma$.

To keep the notation simple and aligned with the benchmark model, we assume that

$$\underline{p} = \bar{\alpha}_1 (R_1 - \rho) - 1 - \gamma, \tag{28}$$

so that inefficient foreigners enter the domestic market only when price is below $\underline{p}$.

As in the benchmark case, for $k \leq \underline{k}$, the regulator sets the auction price at $p = \overline{p}$ and only domestic firms purchase failed firms. For moderate values of k, surviving firms cannot pay the full price for all failed firms' assets but can still pay at least the threshold value of $\widetilde{p}$, below which efficient foreigners have a positive demand. Formally, for $k \in (\underline{k}, \widetilde{k}]$, where

$$\widetilde{k} = \frac{\ell}{\ell + (1+\widetilde{p})}, \tag{29}$$

the regulator sets the price at $p = \frac{\ell}{k} - (1+\ell)$, and again, all assets are acquired by surviving firms.

[8] See Krugman (1998) and Loungani and Razin (2001) for a discussion.

For $k > \widetilde{k}$, surviving firms cannot pay the threshold price of $\widetilde{p}$ for all assets and profitable options emerge for efficient foreigners. At this point, efficient foreigners have a positive demand and are willing to supply their funds for the asset purchase. With the injection of efficient foreigners' funds, prices can be sustained at $\widetilde{p}$ for a while. In particular, for $k \in (\widetilde{k}, \widetilde{\widetilde{k}}]$, where

$$\widetilde{\widetilde{k}} = \frac{\ell + w_e}{\ell + 1 + \widetilde{p}}, \tag{30}$$

the price stays at $\widetilde{p}$. However, for $k > \widetilde{\widetilde{k}}$, the injection of efficient foreigners' funds is not enough to keep the price at $\widetilde{p}$ and the price starts to fall again. In particular, for $k \in (\widetilde{\widetilde{k}}, \widehat{k}]$, where

$$\widehat{k} = \frac{\ell + w_e}{\ell + 1 + \underline{p}}, \tag{31}$$

the price is again strictly decreasing in k and is given by $p^* = \frac{\ell + w_e}{k} - (1 + \ell)$.

For $k > \widehat{k}$, surviving firms and efficient foreigners cannot pay the threshold price of $\underline{p}$ for all assets, inefficient foreigners have a positive demand and are willing to supply their funds for asset purchase. With the injection of inefficient foreigners' funds, price is sustained at $\underline{p}$.

This price function is stated below and is illustrated in Figure 10.

Proposition 5 *The price as a function of the proportion of failed firms is as follows:*

$$p^*(k) = \begin{cases} \overline{p} & for \quad k \leqslant \underline{k} \\ \frac{\ell}{k} - (1 + \ell) & for \quad k \in (\underline{k}, \widetilde{k}] \\ \widetilde{p} & for \quad k \in (\widetilde{k}, \widetilde{\widetilde{k}}] \\ \frac{\ell + w_e}{k} - (1 + \ell) & for \quad k \in (\widetilde{\widetilde{k}}, \widehat{k}] \\ \underline{p} & for \quad k > \widehat{k} \end{cases} . \tag{32}$$

An interesting observation is that when the crisis is not very severe, that is, for $k \in (\widetilde{k}, \widehat{k}]$, the crisis is efficient in the sense that it helps remove barriers for efficient foreigners to enter domestic markets. However, for very severe crises, while efficient foreigners enter these markets, also, inefficient foreigners enter to take advantage of fire sale prices, which results in a misallocation of domestic assets leading to welfare losses for domestic economies.

4.3 Recovery and flipping of assets

A common observation in many crises episodes is that during crises outsiders (foreigners in our model) purchase assets at fire-sale prices but once the economy recovers and insiders (domestic firms in our model) restore their financial health, assets change hands, going back their most efficient users. We model this using a simple extension of our benchmark model. Suppose that we have another period, that is, we have date $t = 3$. Firms can take a risky investment at $t = 2$, similar to the two investments in the benchmark model. In particular, firms invest one unit in a risky technology at $t = 2$, where the return is realized at $t = 3$. The random return from these investments is denoted by $\widetilde{R}_2$, where $\widetilde{R}_2 \in \{0, R_2\}$, and $\bar{\alpha}_2$ is the probability of the high return from the investment conditional on information at date 2. And, foreigners cannot generate R_2 in the high state but only $R_2 - \Delta_2$.[9] Hence, insiders are willing to pay a price of $\overline{p}_2 = \bar{\alpha}_2 R_2 - 1$, whereas outsiders value these assets at $\underline{p}_2 = \bar{\alpha}_2(R_2 - \Delta_2) - 1$.

Suppose that a proportion σ of assets were purchased by outsiders at $t = 1$. Hence, insiders manage a proportion $1 - \sigma$ of assets. Also, suppose that a fraction k_1 of insiders have the low return from their investment taken at $t = 1$. An insider that had the high return has funds of $\ell_1 = R_1 - 1 + \tau\bar{\alpha}_2 R_2$ to be used for asset purchase. If a high proportion of insiders have the high return, then insiders have enough funds to pay the full price of $\overline{p}_2$ for failed firms as well as the firms that have been acquired by outsiders at $t = 1$, and assets change hands back to the efficient users. In particular, for $k_1 \leqslant \underline{k}_1$, where

$$\underline{k}_1 = \frac{\ell_1 - \sigma(\ell_1 + \overline{p}_2)}{(1-\sigma)(\ell_1 + \overline{p}_2)}, \tag{33}$$

insiders purchase all failed firms and also buy back the assets that have been purchased by outsiders, at the fundamental price $\overline{p}_2$. This is associated with a full recovery from the crisis. Note that, $\partial \underline{k}_1 / \partial \sigma > 0$ so that full recovery is more difficult after a severe crisis.

For moderate values of k_1, surviving firms cannot pay the full price for all failed firms' and outsiders' assets but can still pay at least the threshold value of $\underline{p}_2$. So, for $k \in (\underline{k}_1, \overline{k}_1]$, where

$$\overline{k}_1 = \frac{\ell_1 - \sigma(\ell_1 + \underline{p}_2)}{(1-\sigma)(\ell_1 + \underline{p}_2)}, \tag{34}$$

the regulator sets the price at $p_2^* = \frac{(1-\sigma)(1-k_1)\ell}{(1-\sigma)k_1 + \sigma} - 1$, and again, all assets are acquired by insiders.[10]

[9] Note that outsiders have operated these assets for one period so thay may learn how to run these assets efficiently. Therefore, we allow for Δ_2, possibly $\Delta_2 < \Delta$.

[10] For sligthly higher values of k_1, insiders can buy back only a fraction of the assets, that is, the recovery is partial. For higher values of k_1, more assets may be sold to outsiders, resulting in a deepening of the crises.

5 Empirical evidence

We organize our discussion of related literature and motivating evidence around three key observable implications of our model: (i) FDI flows surge precisely when there is an outflow of portfolio capital; (ii) FDI inflows during financial crises are associated with the acquisition of stakes that grant control, rather than simply acquisition of a cashflow stakes; and (iii) "flipping" of assets acquired in fire sales once prices rebound.

FDI vs. FPI during crises: On the first implication of our model, we have already discussed briefly Table 1 and Figures 1 and 2 in the introductory remarks. Here, we relate Figures 1b and 2b showing the switch in the sign of the correlation between FPI and FDI to our theoretical analysis, captured in Figures 7 and 9. Consider, for example, Figure 7. This figure shows that in normal times (low values of k), FPI, characterized by C, and FDI will be positively correlated, even if weakly so. However, during crises (high values of k), FPI and FDI become negatively correlated. Also, relative to normal times, crises are associated with higher levels of FDI, implying that the negative correlation between FDI and FPI should be coincident with higher levels of FDI. Figure 9, in addition, shows that when foreign capital that can fly into the domestic economy is limited, during severe crises, FPI may dry up completely but FDI will be significant.

Figures 1b and 2b showing the correlation between FPI and FDI for South Korea and Philippines, respectively, capture these patterns. There is not only a switching of the sign of the correlation between normal and crisis periods, but more of the crises data points correspond to higher levels of FDI.

In existing empirical evidence, Krugman (1998) argues that the Asian financial crisis, marked by massive flight of short-term capital and large-scale sell-offs of foreign equity holdings, has at the same time been accompanied by a wave of inward direct investment. While this inward investment to some extent reflected policy changes towards foreign ownership, it also reflected the perception of multinational firms that they could buy Asian companies at fire-sale prices.[11] Krugman shows that a similar, though probably less marked, boom in

[11] Krugman's article provides interesting headlines from newspapers that talk about foreign entry due to fire-sale prices in crisis-stricken countries: "Korean companies are looking ripe to foreign buyers" (New York Times, Dec 27, 1997), "Some U.S. companies see fire sale in South Korea"(Los Angeles Times, Jan 25, 1998), "Some companies jump into Asia's fire sale with both feet" (Chicago Tribune, Jan 18, 1998), "While some count their losses in Asia, Coca-Cola's chairman sees opportunity" (Wall Street Journal, Feb 6, 1998). Krugman provides further anectodal evidence for the fact that these sales were wide-spread across all industries, such as some related news about General Motors considering buying stakes in South Korean manufacturers of both automobiles and parts; Ford planning to increase its stake in Kia Motors; Seoul Bank and Korea First Bank being auctioned off to foreign bidders; Procter & Gamble purchasing a majority share of Ssanyong Paper Co., a producer of sanitary napkins, diapers, and kitchen towels; and Royal Dutch Shell

inward direct investment took place in Latin America, especially in Mexico during 1995 and also for Argentina. His primary conclusion is that surging foreign direct investment resulting from fire sales has been an empirical regularity during recent financial crises.

A report prepared for the United Nations Conference on Trade and Development in October 1999 (UN (1999) from here on) provides further evidence for Krugman's observations. The report shows that inflows into South Korea showed a big increase in 1998, five-fold compared to its average performance during the first half of the decade, followed by Thailand with an almost four-fold jump to $7 billion over the same period (see See Box 1 on page 15). The report says that when compared with foreign bank lending and foreign portfolio equity investment before and during the financial crisis, FDI flows into the crisis-stricken Asian countries had been remarkably resilient and FDI had been flowing into a wide range of industries in these countries. In Thailand, the only country for which systematic data by industry are available, significant FDI flows to financial institutions (which were about 10 times higher in 1997 than in 1996, and continued at a similar level in 1998) reflected significant buy-outs by foreign firms. During this period, the machinery and transportation equipment industry in Thailand had also witnessed increasing FDI inflows, both in absolute and in relative terms. The report argues that one of the main reasons for the resilience of FDI is that transnational corporations were taking advantage of cheaper asset prices in the crisis-stricken countries.

In a recent study, Aguiar and Gopinath (2005) provide a systematic empirical counterpart to the hypothesis raised by Krugman (1998). Given the importance of their findings for our paper, we describe them in detail. Overall, Aguiar and Gopinath show that the stability of FDI inflows into emerging markets during crisis years contrasts with the sharp reversals in portfolio flow and bank lending. In particular, the investment flows into Asia following the crisis late 1990s and Mexico following the crisis in 1995 were suggestive of foreign firms taking advantage of low prices of real assets. They also document evidence that the high FDI flows into the crisis-stricken Asian countries had many of the features of fire-sales: median offer price to book ratios were substantially lower for cash-strapped firms' purchase, especially in 1998 when national players had low liquidity, resulting in a boost in mergers and acquisitions (M&As) involving foreign players.

Specifically, they use a firm-level dataset to show that the number of foreign M&As in East Asia increased by 91% between 1996 and the crisis year of 1998 while domestic M&As declined by 27% over the same period. In regard to the price paid for an acquired firm, the median ratio of offer price to book value declined from 3.5 in 1996 to 1.3 in 1998. They also find that firm liquidity (proxied by cash flow or sales) played a significant and sizeable role in

negotiating to buy Hanwha Group's oil refining company, the group that had already sold its half of a joint venture in chemicals to the German company BASF.

explaining both the increase in foreign acquisitions and the decline in the price of acquisitions during the crisis: While during non-crisis years high cash flow for a firm was weakly associated with the likelihood of its acquisition, in 1998 additional cash implied a lower probability of acquisition. Furthermore, in support of the hypothesis that cash-strapped firms sold at a steeper discount during the crisis, their cross-sectional regressions find that an additional dollar of cash in a firm had a larger impact on sale price in 1998 than in other years. In fact, the elasticity of price-to-book with respect to cash flow is roughly 0.7 in 1998 while negligible during the other years of the sample. Given that liquidity shocks are typically thought to be short-lived, they argue this is further support for the fire-sale hypothesis, raised by Krugman.

Majority stakes: The second implication of our model is that as opposed to portfolio investments, FDI inflows during financial crises are associated with the acquisition of stakes that grant control, rather than simply acquisition of cashflow stakes. Acharya, Shin and Yorulmazer (2007) provide evidence in support of this by studying the M&A activity in the financial sector in the South East Asian countries during the period of 1996-2000. Like Aguiar and Gopinath (2005), they show (in their Table 2) that the crisis year of 1998 witnessed greater foreign acquisitions, but crucially that unlike non-crisis years, these acquisitions represented stakes of greater than 50 percent, and often the entire 100 percent. In contrast, the stakes during non-crisis years were far smaller and almost always lower than 50 percent. [12]

Chari, Ouimet and Tesar (2004) investigate shareholder value gains from developed-market acquisitions of emerging-market targets and show that acquirer returns increase when the cost of capital, proxied by sovereign bond spreads, increase, which is a common feature of financial crises. They show that including a dummy for whether the acquirer had the majority control after the acquisition renders the coefficient on the spread insignificant. However, combined with the evidence of Acharya, Shin and Yorulmazer (2007) and Aguiar and Gopinath (2005), we can say that it is more likely that the developed-market acquirers can get the majority control during crisis periods, and we can interpret their findings as further evidence for our results.

This ownership cum control view of FDI has also been taken by some recent studies analyzing the relative advantages of FDI and foreign portfolio investments (FPI) from the investors' viewpoint.[13] Goldstein and Razin (2006), for example, build a theoretical model where FDI investors take both ownership and control positions in the domestic firms and, hence, are in effect the managers of the firms under their control. Thus, when they invest directly through FDI, investors get more information about the fundamentals of the investment, and thereby can manage the project more efficiently, compared to their counterparts

[12] Also, UN (1999) shows that cross-border majority M&As in Asia increased by 28 percent in value in 1998.

[13] For an introduction to this issue, see Albuquerque (2003).

who invest indirectly through FPI. However, this generates a lemons problem in that when direct investors try to sell the investment before maturity, a low resale price results due to asymmetric information between the owner and the potential buyers. Hence, investors with high expected liquidity needs who may experience a greater extent of forced sales are more likely to choose less control, that is, they would prefer FPI over FDI. They also show that an increase in transparency between owners and managers, that is, an increase in corporate governance standards, improves the efficiency of portfolio investments and thus attracts more FPI.[14] Our overall focus is different from their analysis in that we are concerned with the negative correlation of FPI and FDI (especially) during crisis, rather than on the overall composition of foreign investment.

Flipping: Finally, on our third implication, there is ample evidence that during crises, outsiders (foreigners in our model) purchase assets to take advantage of fire-sale prices, but that once the economy recovers, assets change hands, going back their most efficient users. In summary, assets are "flipped."

Using the SDC Platinum data on mergers and acquisitions, Figure 3 provides succinct evidence for such flipping in the banking and financial institutions sector during the South East Asian crisis. It defines a "flip" as the subsequent sale (2001 onwards) for an acquisition that occurred during the crisis period (1996-2000). We have employed the standard definition of a controlling acquisition as corresponding to a purchase of at least 10% of the target. The last acquirer during the crisis period is then used to classify all acquisitions into Domestic acquisitions and Foreign acquisitions.[15] The figure plots the cumulative percentage of flipped deals in each class as a function of the number of years since the acquisition in the crisis period. While hardly any domestic deals get flipped in the first year, close to 2% of foreign deals get flipped, and the gap between the two only widens as more time elapses, especially so after the fifth year. By ten years since acquisition, close to 14% of foreign deals get flipped as compared to less than 4% of domestic deals.

A few additional facts about the flipped deals are interesting and confirm our implications. First, on average as well as based on medians, the flip involves a sale of at least as much as the original acquisition of the target, and generally 25% greater, for both domestic and foreign flips. Second, over 60% of the flips by foreign acquirers involve sales to domestic acquirers. Third, the result on greater flipping by foreign acquirers during crisis is robust to employing 25% or 50% stakes being employed as the thresholds for identifying controlling acquisitions.

[14] In a related paper, Goldstein, Razin and Tong (2007) empirically test the prediction of the theoretical model that source countries with higher probability of aggregate liquidity crises export relatively more FPI and less FDI, using data from 140 source countries for the period 1990-2004. They show that liquidity shocks have strong effects on the composition of foreign investment.

[15] There are a total of 122 flips in our data, out of which 96 are by domestic acquirers and 26 by foreign acquirers. The total number of domestic and foreign acquisitions during the crisis is 884 and 98, respectively.

And, finally, the result is much the same if the plot in Figure 3 is based on cumulative assets of targets involved in the flipped deals instead of simply the number of deals flipped.

While this evidence is quite telling, we also provide a discussion of some recent interesting anecdotes, mostly from South Korea, where foreign private equity firms acquired Korean banks during the restructuring period of the Asian financial crisis and sold them when the economy and the asset prices recovered.

Lone Star Funds, a Dallas-based buyout company, paid $1.4 billion in October 2003 for 50.5 percent of the Korea Exchange Bank (KEB). In January 2006, Lone Star announced plans to sell its controlling stake in KEB, the value of which has more than tripled since to about $4.9 billion. An article in the International Herald Tribune (January 13, 2006)[16] argues that KEB shares surged to a six-year high as a recovery in consumer spending spurred economic growth and lenders cleaned up bad loans, and that rising stock markets in Asia offered buyout firms an opportunity to exit investments.[17] The article also quotes Vincent Chan, a Hong Kong-based managing director at Jafco, a publicly traded Japanese venture capital firm: "It's a good time to sell if the price is right. Private equity funds like this seek to exit whenever the market is good."Another newspaper article in the Financial Times (April 5, 2007)[18] reports Lone Star Funds' plans to sell Kukdong Engineering & Construction and Star Lease, two South Korean companies. The article quotes John Grayken, chairman of Lone Star: "As the companies have been turned around, it is now time for them to be taken to the next level by a more strategic buyer. This is a normal step in the investment cycle of a private equity fund."

Another interesting episode is with the experience of Newbridge Capital, a US private equity group that paid the Korean government $480m for the 49 percent shares of the Korea First Bank, South Korea's eighth-largest bank. An article in the Financial Times (January 09, 2005)[19] reveals that the private equity group agreed to sell its shares to Standard Chartered for an offer valuing the bank at about $3.3bn in cash. Newbridge Capital is reported to have made a nearly three-fold return on its initial investment.[20] In a similar episode, the consortium of Carlyle Group, a Washington D.C. based global private equity investment firm, and J.P. Morgan Chase sold 36.6 percent of KorAm Bank, South Korea's sixth-largest bank, to Citigroup Inc. in cash in February 2004 for a deal that valued the bank at $2.73 billion. The consortium of Carlyle and J.P. Morgan Chase has been reported to have made

[16] International Herald Tribune, January 13, 2006, "Lone Star to sell its stake in Korea Exchange Bank".

[17] The same article points out that Lone Star had sold stakes in golf courses, a bank and a credit card company in Japan in the preceding four months.

[18] Financial Times, April 5, 2007, "Lone Star looks at sale of S. Korean companies".

[19] Financial Times, Jan 09, 2005: "Standard Chartered to acquire Korea First Bank for $3.3bn".

[20] Newbridge also exercised its rights to require the South Korean government, which controls the remaining 51 percent, to sell its shares as part of the same deal.

a return of 2.3 times its original KorAm investment of $430 million in 2000.

6 Resolution

We now examine a more active role for the social planner as the fiscal authority in the resolution of the financial crisis. In practice, the role of the government in the resolution of widespread financial distress has been very important, especially after major banking crises. Examples include the Resolution Trust Corporation (RTC) in the U.S. following the savings and loans crisis, the Bank Support Authority (BSA) in Sweden following the 1992 financial crisis, and the Korea Asset Management Company (KAMCO) following the Asian crisis of 1997.

Such intervention entails fiscal commitment by the social planner (the fiscal authority, in this case). There is also a question of incentives for the incumbent management. If the government agency takes full ownership of the failed firm, the existing management may not have as much incentive to exert high effort. Thus, the optimal resolution strategy weighs up the efficiency benefits from injecting funds directly to buy up failing assets against (a) the fiscal costs of intervention and (b) the incentive costs of the government stake.

To simplify the analysis, we will suppose that the government supports domestic firms by injecting funds directly in return for a possible ownership stake. We take this as a metaphor for the setting up of a public restructuring agency that can purchase assets at price set by the government. We proceed to analyze the regulator's decision by making the following assumptions.

(i) The government incurs a fiscal cost of $f(z)$ when it injects z units of funds into these firms, with $f(0) = 0$. We assume this cost function is strictly increasing and convex: $f' > 0$ and $f'' > 0$.[21]

(ii) If the government decides not to recapitalize a failed firm, the firm is sold at the market-clearing price. Thus, when the regulator recapitalizes b of the k failed firms, the fiscal cost incurred is $f(b)$. The crucial difference between recapitalization and sales is that recapitalization entails an opportunity cost to the regulator in fiscal terms.

The government's objective is to maximize the total expected output of the economy net

[21] The provision of immediate funds to recapitalize firms entails fiscal costs for the regulator (assumed to be exogeneous to the model). These fiscal costs can be linked to a variety of sources: (i) distortionary effects of tax increases required to fund recapitalizations; and, (ii) the likely effect of huge government deficits on the country's exchange rate, manifested in the fact that banking crises and currency crises have often occurred as "twins" in many countries (especially, in emerging market countries). Ultimately, the fiscal cost we have in mind is one of immediacy: Government expenditures and inflows during the regular course of events are smooth, relative to the potentially rapid growth of liabilities during crisis periods.

of any recapitalization or liquidation costs. The government does not intervene when $k \leqslant \overline{k}$. For $k > \overline{k}$, the government's problem is to choose b to maximize[22]:

$$E(\Pi(b)) = \bar{\alpha}_1 R_1 - f(b) - \left(k - \frac{(1-k)\ell}{(1+\underline{p})} - b\right)\alpha_1 \Delta, \tag{35}$$

where $\left(k - \frac{(1-k)\ell}{(1+\underline{p})} - b\right)\alpha_1\Delta$ is the misallocation cost resulting from sales to foreigners. The first order condition for the government is

$$f'(b) = \bar{\alpha}_1 \Delta$$

Since the marginal cost $f'(b)$ is increasing in b, there is an upper bound, denoted by $\overline{b}$, up to which the recapitalization costs are smaller than misallocation costs. Formally, $\overline{b}$ is obtained as

$$\overline{b} = g\left(\bar{\alpha}_1 \Delta\right)$$

where g is the inverse of f'. Since the maximum proportion of firms that can be acquired by the surviving domestic firms is $(1-k)\frac{\ell}{1+\underline{p}}$, the regulator recapitalizes $b^*(k)$ firms, where

$$b^*(k) = \min\left\{\overline{b},\ k - (1-k)\tfrac{\ell}{1+\underline{p}}\right\}. \tag{36}$$

We summarize the optimal resolution policy as follows.

Proposition 6 *For $\bar{\alpha}_1 \geqslant \bar{\alpha}_1^*$, the regulator does not intervene. For $\bar{\alpha}_1 < \bar{\alpha}_1^*$, the optimal policy is as follows:*

(i) When $k \leqslant \overline{k}$, surviving domestic firms purchase all failed firms and the regulator does not intervene.

(ii) When $k > \overline{k}$, the regulator recapitalizes $b^*(k)$ of the k failed firms, where $b^*(k)$ is given by (36).

We have so far not addressed the issue of the size of the government's stake in the recapitalization. In the appendix, we consider an extension of the model above that examines two further issues. First, the government can take an equity share β in the recapitalized firm(s). If the recapitalized firm has a high return from the second investment (which has a probability of α_1), then the regulator gets back βR_1 at $t = 2$. However, such a stake has consequences

[22] Note that the return R_t is decreasing in the share β the regulator takes in a recapitalized firm. Hence, the regulator does not take any share in the recapitalized firms. See Section 7 we analyze the effect of regulatory capture in the share the regulator takes in recapitalized firms.

for the incentives of the incumbent managers. Second, we also allow the possibility that government intervention has political economy costs in the form of concerns over regulatory capture. These additional features make the final conclusion on the optimal resolution policy quite subtle. The details are in the appendix.

7 Concluding Remarks

Our theoretical framework focuses attention on the key difference between portfolio capital flows and FDI arising from the difference in terms of their implications for control. The recognition of the role for control has important implications for our understanding of financial flows in economic development. For instance, one of the key predictions of our model would be that the FDI inflows that happen during financial crises should be associated with the acquisition of stakes that grant control, rather than simply acquisition of a cashflow stakes. Indeed, there is considerable evidence that FDI inflows at the time of the Asian financial crisis were associated with equity stakes that went over the 50% threshold, thereby crossing the control threshold. The theoretical framework also highlights the negative relationship between the two types of flows. FDI flows take over precisely when portfolio flows dry up.

After the Asian financial crisis, the evils of short term debt financing were much decried, and stable FDI financing was held up as the model for how development can be financed. Our results suggest that the prescription to use FDI as a matter of course has limited usefulness as a general policy dictum. Ironically, it is only when matters are very bad that FDI really comes into its own. The role of foreign takeovers has generated much controversy in policy circles as well as in the media. Our paper is a small step in trying to come to grips with the underlying economics.

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Appendix

Generating funds against purchased assets: A surviving firm has R_0 units of funds from the first period investment. If this firm purchases m units of assets, it can pledge a total of $[(1+m)(\tau\alpha_1 R_1)]$ units of funds . The firm needs $(1+(1+p)m)$ units of funds for the asset purchase and the financing of its own as well as the purchased projects. Hence, we have the financial constraint of the firm as

$$R_0 + (1+m)(\tau\overline{q}) \geqslant 1 + (1+p)m. \tag{37}$$

Thus, the firm can purchased at most m^* units of failed firms' assets at the price p, where

$$m^* = \left(\frac{\ell}{1+p-\tau\overline{q}}\right), \text{ and } \ell = (R_0 - 1) + (\tau\overline{q}). \tag{38}$$

Proof of uniqueness of $\underline{k}$ and $\overline{k}$: From equation (13), at $k = \underline{k}$, we have:

$$(1-k)\,\ell = k(1+\overline{p}). \tag{39}$$

For $k = (1-\alpha_1)$, we can write this as

$$(R_0 - 1) + \tau(1-k)R_1 = kR_1. \tag{40}$$

Note that the left hand side is decreasing in k whereas the right-hand side is increasing in $\underline{k}$. Thus, there exists a unique $\underline{k}$ that satisfies equation (13).[23] The same analysis can be used to show the existence of a unique $\overline{k}$. $\diamondsuit$

Proof of Proposition 4:

[23]Note that we need $(R_0 - 1) \leqslant R_1$ for $k < \underline{k}$.

The steps of the proof are organized in a way that lays down the results for different regions of the proportion (k) of failed firms.

Note that because of moral hazard, maximum units of equity that can be issued by a surviving firm is τ. Thus, for $w \geqslant \tau\overline{q}$, the funds within the foreigners is sufficient to keep the share price $q(k)$ at $\overline{q}$, had they decided to use their funds for the purchase of these shares.

(1) For $k \leqslant \underline{k}$, liquidity within the surviving firms and the liquidity they can raise by issuing shares to foreigners is sufficient to sustain the price for the failed firms' assets at $\overline{p}$, that is, $(1-k)\ell \geqslant k(1+\overline{p})$.

Since $p^*(k) = \overline{p} > \underline{p}$, we have $x = 0$ and $m = \left(\frac{k}{1-k}\right)$. Each surviving firm issues enough equity, at $q(k) = \overline{q}$, to purchase $\left(\frac{k}{1-k}\right)$ units of failed firms' assets at $p^*(k) = \overline{p}$. Thus, we have

$$(R_0 - 1) + s\overline{q} = \left(\frac{k}{1-k}\right)(1+\overline{p}), \text{ which gives us:}$$

$$s = \left(\frac{k\,(\overline{p}+R_0) - (R_0-1)}{(1-k)\,\overline{q}}\right) \quad \text{and} \quad y = \left(\frac{k\,(\overline{p}+R_0) - (R_0-1)}{\overline{q}}\right).$$

(2) For $\underline{k} < k \leqslant \overline{k}$, liquidity within the surviving firms and the liquidity they can raise through equity issuance from foreigners is sufficient to sustain $p^*(k)$ at least at $\underline{p}$, that is, $(1-k)\ell \geqslant k(1+\underline{p})$.

Since $p^*(k) \geqslant \underline{p}$, we have $x = 0$ and $m = \left(\frac{k}{1-k}\right)$. Each surviving firm issues enough equity, at $q(k) = \overline{q}$, to purchase $\left(\frac{k}{1-k}\right)$ units of failed firms' assets at $p^*(k) = \left(\frac{\ell}{k} - (1+\ell)\right)$, that is,

$$\begin{aligned}(R_0 - 1) + s\overline{q} &= \left(\frac{k}{1-k}\right)(1+p^*(k)), \text{ which gives us} \\ s &= \tau \quad \text{and} \quad y = (1-k)\tau.\end{aligned}$$

(3) For $\overline{k} < k \leqslant \overline{\overline{k}}$, liquidity within the surviving firms and the liquidity they can raise through equity issuance from foreigners plus the liquidity left with the foreigners (since $w > \tau\overline{q}$), which add up to $[(1-k)R_0 + w]$, is sufficient to sustain $p^*(k)$ at least at $\underline{p}$. Each surviving firm issues the maximum possible equity, at $q(k) = \overline{q}$, which gives us $s = \tau$ and $y = (1-k)\tau$. Note that each surviving firm can acquire $m = \left(\frac{\ell}{1+\underline{p}}\right)$ units of failed firms' assets and the rest is acquired by foreigners, that is, $x = \left(k - \frac{(1-k)\ell}{1+\underline{p}}\right)$.

(4) For $k > \overline{\overline{k}}$, total liquidity within the surviving firms and the liquidity they can raise through equity issuance from foreigners plus any liquidity left with foreigners is no longer sufficient to sustain $p^*(k)$ at $\underline{p}$. Since $p^*(k) < \underline{p}$, foreigners may prefer to participate in the market for failed firms' assets.

If $p^*(k) < \underline{p}$ and $\underline{p}\ q(k) > \overline{q}\ p^*(k)$, then foreigners use all their funds for the asset purchase, that is $x = \left(\frac{w}{p^*(k)}\right)$.

If $p^*(k) < \underline{p}$ and $\underline{p}\ q(k) < \overline{q}\ p^*(k)$, then foreigners use all their funds for the equity purchase, that is $y = \left(\frac{w}{q(k)}\right)$, and if $\underline{p}\ q(k) = \overline{q}\ p^*(k)$, foreigners are indifferent between the purchase of surviving firms' shares and the failed firms' assets.

Now, let $\mu = \left(\frac{\overline{q}}{\underline{p}}\right)$. Whether foreigners buy shares of the surviving firms or the assets of the failed firms, their entire funds w eventually end up in the asset market. Hence, for $k > \overline{\overline{k}}$, the price for failed firms' assets is given as:

$$p^*(k) = \left(\frac{(1-k)(R_0-1)+w}{k}\right) - 1. \tag{41}$$

If the price $q(k)$ of a share is higher then $\mu p^*(k)$, then foreigners are better off buying the assets of failed firms, rather than buying shares of the surviving firms, that is, $y = 0$ and $x = \left(\frac{w}{p^*(k)}\right)$. Hence, we cannot have an equilibrium where $q(k) > \mu p^*(k)$ and $y = 0$.

First, we look at the equilibrium where surviving firms can generate some funds in the capital market and show that they need to suffer some discount. Foreigners are willing to purchase shares of surviving firms, that is, $y > 0$, only when $q(k) \leqslant \mu p^*(k)$ and surviving firms are willing to issue equity, that is, $s > 0$, only when $q(k) \geqslant (1 + p^*(k))$. For $\mu p^*(k) \geqslant (1 + p^*(k))$, there exists such an equilibrium. Note that $\mu p^*(k) \geqslant (1 + p^*(k))$ if and only if

$$\left(\frac{\overline{q}}{\underline{p}} - 1\right)\ p^*(k) \geqslant 1. \tag{42}$$

Note that $p^*(k)$ is decreasing in k and assumes its minimum value of $(w-1)$ at $k = 1$. Hence, for $w \geqslant w^*$, where $w^* = \left(\frac{\overline{q}}{\overline{q}-\underline{p}}\right)$, we can have an equilibrium where surviving firms can generate funds in the capital market.

Note that, depending on the relative bargaining power of surviving firms and foreigners, $q(k)$ may vary. Under our assumption that the participation of foreigners in the equity market is maximum, we get $q(k) = \mu p^*(k) < \overline{q}$. Note that as k increases, both the price of assets $(p^*(k))$ and the price of shares $(q(k))$ decrease and move hand-in-hand. As a result of limited liquidity and fire-sale prices in the asset market, surviving firms can generate capital only at a discount, where the discount is higher when the crisis is more severe (high k).

Next, we analyze the equilibrium where the capital market completely shuts down. For $q(k) > \mu p^*(k)$, we have $y = 0$. For the equity market to clear in this case, we need $s = 0$. This is possible when $q(k) < (1+p^*(k))$. Hence, we can have an equilibrium where the capital

market completely shuts down when $\mu p^*(k) < (1 + p^*(k))$. Note that $\mu p^*(k) < (1 + p^*(k))$ if and only if

$$\left(\frac{\overline{q}}{\underline{p}} - 1\right)\ p^*(k) < 1. \tag{43}$$

Recall that $p^*(k)$ is decreasing in k. Hence, for $w < w^*$, there exists a critical proportion of failures k^*, where

$$k^* = \left(\frac{\left(\overline{q} - \underline{p}\right)\left((R_0 - 1) + w\right)}{\underline{p} + \left(\overline{q} - \underline{p}\right) R_0}\right), \tag{44}$$

such that, for $k > k^*$, the capital market completely shuts down, that is, $y = 0$ and $s = 0$.

Resolution with Regulatory Capture

We slightly modify the way we model moral hazard, which helps us analyze the inefficiencies that may arise at the resolution stage. Suppose that the effort firm owners exert and, in turn, the return from the investments is decreasing in owners' share of future profits in a continuos fashion. In particular, when owners have a share of θ of future profits, they generate a return of $R_t(\theta)$, where $R_t' > 0$, and $R_t(1) = R_t$ and $R_t(0) > \frac{1}{\alpha_t}$.[24]

Note that the return from the risky investment is highest when owners have the entire share of future profits, since $\frac{dR_t}{d\theta} > 0$. However, the regulator may enjoy some private benefit from having a stake in these firms such as providing jobs to their cronies in these firms.

In our model foreigners are inefficient in running domestic firms, when domestic owners run these firms efficiently. However, due to the private benefits the regulator (government, politician) enjoys, the resolution of failures may result in an outcome that is worse than the outcome when foreigners acquire these firms. We model this in the following simple way.

[24] One way of providing a micro foundation for this is through the level of effort e managers put into these projects, where the high return from the project increases in e, that is, $\frac{dR}{de} > 0$. Let the cost of effort be given by $\left(\frac{\gamma e^2}{2}\right)$. Hence the firm chooses the effort level that maximizes the net profit, that is, the firm's problem is

$$\max_e \quad V = \theta\alpha R(e) - \frac{\gamma e^2}{2}.$$

For $R''(e) < 0$, the first-order condition (FOC) gives the level of effort e^* that maximizes the expected profit, where $e^* = \left(\frac{\theta\alpha}{\gamma}\right) R^{'}(e^*)$. We have

$$sign\left(\frac{\partial e^*}{\partial \theta}\right) = sign\left(\frac{\partial^2 V}{\partial \theta \partial e}\right) = sign\left(R'(e)\right).$$

Hence, we have $\frac{\partial e^*}{\partial \theta} > 0$ when $R'(e) > 0$.

Suppose that the regulator gets some utility from his capture in a recapitalized firm, which can be written as $\beta(R_t(\beta)$.[25] We assume that the regulator's utility is a convex combination of the net expected total output and his capture in recapitalized firms. In particular, the regulator's problem is to choose b and β to maximize:

$$E(\Pi(b,\beta)) = \lambda\left[(1-b)(\alpha_1 R_1) + b(1-\beta)(\alpha_1 R_1(\beta)) - f(b) - \left(k - \frac{(1-k)\ell}{(1+\underline{p})} - b\right)\alpha_1\Delta\right] + (1-\lambda)b(\beta(\alpha_1 R_1(\beta))), \quad (45)$$

where $\lambda \in [0, 1/2]$.

The regulator recapitalizes b of the k failed firms, taking a share of β in each recapitalized firm, incurring a fiscal cost of $f(b)$, where the total output generated by the recapitalized firms is $[b(1-\beta)(\alpha_1 R_1(\beta))]$.[26] The misallocation cost from sales to foreigners is given as $\left(k - \frac{(1-k)\ell}{(1+\underline{p})} - b\right)(\alpha_1\Delta)$.

Note that for $\lambda = 1/2$, the regulator does not care about his capture and maximizes the net expected total output. For $\lambda < 1/2$, the regulator has some concern for his capture, where this concern increases as λ decreases.

The FOCs for the regulator's maximization problem can be written as:

$$\Pi_b : \lambda[-\alpha_1 R_1 + (1-\beta)(\alpha_1 R_1(\beta)) - f'(b) + (\alpha_1\Delta)] + (1-\lambda)(\beta(\alpha_1 R_1(\beta))) = 0 \quad (46)$$

$$\Pi_\beta : \lambda[-b(\alpha_1 R_1(\beta)) + b(1-\beta)(\alpha_1 R_1'(\beta))] + (1-\lambda)b[\alpha_1 R_1(\beta) + \beta(\alpha_1 R_1'(\beta))] = 0 \quad (47)$$

We have the following proposition.

Proposition 7 *The resolution policy with regulatory capture is as follows:*

(i) When $k \leqslant \overline{k}$, surviving domestic firms purchase all failed firms and the regulator does not intervene.

(ii) When $k > \overline{k}$, the regulator recapitalizes $\widehat{b}^*(\lambda, k)$ failed firms, where

$$\widehat{b}^*(\lambda, k) = \min\left\{\widehat{b}(\lambda), [k - (1-k)y(\underline{p})]\right\}. \quad (48)$$

and takes a share of $\widehat{\beta}(\lambda)$ in each recapitalized firm, where $\widehat{b}(\lambda)$ and $\widehat{\beta}(\lambda)$ satisfy the FOCs given by equations (46) and (47). The firms to be recapitalized are chosen randomly with equal probability. We have $\frac{\partial\widehat{\beta}}{\partial\lambda} < 0$ and $\frac{\partial\widehat{b}}{\partial\lambda} < 0$. Furthermore, $\lim_{\lambda\longrightarrow 0}\widehat{b} = \infty$ and $\lim_{\lambda\longrightarrow 0}\widehat{\beta} = -\frac{R_t(\beta)}{R_t'(\beta)} > 0$.

[25] To simplify notation, we use $R_t(\beta)$ rather than $R_t(\theta)$, where $\theta = (1-\beta)$. Hence, $R_t' < 0$ and $R_t(0) = R_t$, from now on.

[26] Note that as a result of regulatory capture, the regulator may choose to recapitalize firms even when $k \leqslant \overline{k}$. For simplicity, we rule out this option and restrict the regulator to intervene only when $k > \overline{k}$.

Note that as the regulator's concern for her capture increases, that is, as λ decreases, she takes larger shares in recapitalized firms, that is, her share $\widehat{\beta}(\lambda)$ is decreasing in λ. And, as λ decreases, she prefers to recapitalize a larger proportion of failed firms, that is, $\widehat{b}(\lambda)$ is decreasing in λ (see Figures 12 and 13).

Furthermore, as λ approaches 0, the regulator becomes concerned only about her capture. As a result, she takes a share $\widehat{\beta} = -\left(\frac{R_t(\beta)}{R_t'(\beta)}\right)$ in each recapitalized firm that maximizes her capture in a recapitalized firm, and to maximize her overall capture, she is willing to recapitalize all failed firms (that cannot be purchased by surviving firms).

Welfare analysis

We now compare welfare with regulatory capture and welfare with no regulatory intervention. Without any regulatory intervention, all failed firms that cannot be purchased by surviving firms are sold to foreigners. This results in an expected welfare of $E(\Pi^f)$ for $k > \overline{k}$, which is given as

$$E(\Pi^f(k)) = \alpha_1 R_1 - \left(k - \frac{(1-k)\ell}{(1+\underline{p})}\right)(\alpha_1 \Delta). \tag{49}$$

With regulatory capture, the regulator recapitalizes $\widehat{b}^*(\lambda, k)$ firms and takes a share of $\widehat{\beta}(\lambda)$ in each of them, where $\widehat{b}^*(\lambda, k)$ and $\widehat{\beta}(\lambda)$ are as given in Proposition 7. This gives us

$$E(\Pi^c(k)) = (1-\widehat{b^*})(\alpha_1 R_1) + \widehat{b^*}\left(\alpha_1 R_1(\widehat{\beta})\right) - f(\widehat{b^*}) - \left(k - \frac{(1-k)\ell}{(1+\underline{p})} - \widehat{b^*}\right)(\alpha_1 \Delta). \tag{50}$$

We have

$$E(\Pi^c) - E(\Pi^f) = -\widehat{b^*}\left(\alpha_1\left(R_1 - R_1(\widehat{\beta})\right)\right) - \left[f(\widehat{b^*}) - \widehat{b^*}(\alpha_1\Delta)\right]. \tag{51}$$

Note that the first expression is negative. Hence a sufficient condition for $E(\Pi^c) < E(\Pi^f)$ is

$$\frac{f(\widehat{b^*})}{\widehat{b^*}} \geqslant \alpha_1 \Delta, \tag{52}$$

that is, the average fiscal cost of a recapitalization being higher than the misallocation cost. We have following formal Proposition.

Proposition 8 *For* $\frac{f(\widehat{b^*})}{\widehat{b^*}} \geqslant (\alpha_1\Delta)$, *where* $\widehat{b}^*(\lambda, k)$ *is defined as in equation (48), we have* $E(\Pi^f) > E(\Pi^c)$. *For* $f(1) > (\alpha_1\Delta)$, *there is a critical* $\widetilde{b} < 1$ *such that* $\frac{f(\widetilde{b})}{\widetilde{b}} = \alpha_1\Delta$. *Let* $\widetilde{k} = \frac{\widetilde{b}+y(\underline{p})}{1+y(\underline{p})} < 1$, *and let* $\widetilde{\lambda}$ *be such that* $\widehat{b}(\widetilde{\lambda}) = \widetilde{b}$. *For* $f(1) > \alpha_1\Delta$, *we have the following result: for* $k > \widetilde{k}$ *and* $\lambda < \widetilde{\lambda}$, *we have* $\frac{f(\widehat{b^*})}{\widehat{b^*}} > \alpha_1\Delta$, *and, therefore,* $E(\Pi^f) > E(\Pi^c)$.

While sales to foreigners result in misallocation costs, recapitalization by a regulator that is concerned about her capture results in inefficiencies. Hence, if the regulator is sufficiently concerned about her capture (for $\lambda < \widetilde{\lambda}$), the regulator resorts to excessive recapitalization and recapitalizes more than a proportion $\widetilde{b}$ of failed firms (see Figure 14).[27] This, in turn, results in a worse outcome compared to sales to foreigners from a social welfare standpoint.

Proof of Proposition 7: From the FOC for b in equation (46), we have

$$(\alpha_1\Delta) - f'(b) = -\alpha_1 \left[\left(\frac{\beta + \lambda - 2\lambda\beta}{\lambda} \right) R_1(\beta) - R_1 \right] \tag{53}$$

Using the Envelope Theorem we get:

$$sign\left(\frac{\partial \widehat{b}}{\partial \lambda}\right) = sign\left(\frac{\partial^2 \Pi}{\partial b \partial \lambda}\right). \tag{54}$$

We have

$$\frac{\partial^2 \Pi}{\partial b \partial \lambda} = \left[-\alpha_1 R_1 + (1-\beta)(\alpha_1 R_1(\beta)) - f'(b) + (\alpha_1\Delta)\right] - \beta(\alpha_1 R_1(\beta)). \tag{55}$$

Plugging in the expression for $[(\alpha_1\Delta) - f'(b)]$ from the FOC in equation (53), we get

$$\begin{aligned} \frac{\partial^2 \Pi}{\partial b \partial \lambda} &= -\alpha_1 R_1 + (1-2\beta)(\alpha_1 R_1(\beta)) - \alpha_1 \left[\left(\frac{\beta + \lambda - 2\lambda\beta}{\lambda} \right) R_1(\beta) - R_1 \right] & (56) \\ &= -\alpha_1 R_1(\beta) \left(\frac{\beta}{\lambda} \right) < 0. & (57) \end{aligned}$$

Hence, we have $\frac{\partial \widehat{b}}{\partial \lambda} < 0$. That is, as λ decreases, the regulator's concern for her capture increases and this results in the regulator recapitalizing more failed firms.

As λ approaches 0, the regulator cares only about her capture and chooses to bail out all failed firms.

From the FOC for β given in equation (47), we have

$$R_t(\beta) = -\left[\frac{\lambda + \beta - 2\lambda\beta}{1 - 2\lambda} \right] R_t'(\beta) \tag{58}$$

Using the Envelope Theorem we get:

$$sign\left(\frac{\partial \widehat{\beta}}{\partial \lambda}\right) = sign\left(\frac{\partial^2 \Pi}{\partial \beta \partial \lambda}\right). \tag{59}$$

[27] Note that recapitalizing a proportion of firms that is greater than $\widetilde{b}$ is only possible for a sufficiently large proportion of failures, that is, for $k > \widetilde{k}$.

We have

$$\frac{\partial^2 \Pi}{\partial \beta \partial \lambda} = b\alpha_1 \left[-2R_1(\beta) + (1-2\beta)\left(R_1'(\beta)\right)\right]. \tag{60}$$

Plugging in the expression for $R_1(\beta)$ from the FOC in equation (58), we get

$$\frac{\partial^2 \Pi}{\partial \beta \partial \lambda} = b\alpha_1 \left[\left(\frac{2\left[\lambda + \beta - 2\lambda\beta\right] + (1-2\beta)(1-2\lambda)}{(1-2\lambda)}\right)\left(R_1'(\beta)\right)\right] = \left(\frac{b\alpha_1}{1-2\lambda}\right) R_1'(\beta) < 0. \tag{61}$$

Hence, we have $\frac{\partial \widehat{\beta}}{\partial \lambda} < 0$. That is, as λ decreases, the regulator's concern for her capture increases and this results in the regulator taking a larger share in recapitalized firms.

For $\lambda = 1/2$, the regulator does not care about her capture. In that case, we have the FOC as $R_t'(\beta) = 0$ and the regulator takes a share of $\beta^* = 0$ (Proposition 6). And as λ approaches 0, the regulator cares only about her capture and the FOC becomes $R_t(\beta) = -\beta R_t'(\beta)$, where $\beta = -\frac{R_t(\beta)}{R_t'(\beta)} > 0$. $\diamondsuit$

Proof of Proposition 8: Let $g(b) = \left(\frac{f(b)}{b}\right)$, where $g(b)$ is the average fiscal cost of recapitalizing b firms. We have

$$\frac{dg}{db} = \frac{f'(b)b - f(b)}{b^2} > 0, \tag{62}$$

since f is convex and $f(0) = 0$. Hence, if $f(1) > (\alpha_1 \Delta)$, then there is a critical value of b, denoted by $\widetilde{b}$, such that $g(\widetilde{b}) = (\alpha_1 \Delta)$, and $g(b) > (\alpha_1 \Delta)$ for all $b > \widetilde{b}$. Hence, if the regulator recapitalizes $b > \widetilde{b}$ firms, we have $E(\Pi^f) > E(\Pi^c)$.

Note that the regulator is restricted to capitalize firms that cannot be purchased by domestic firms, that is,

$$\widehat{b}^*(\lambda, k) \leqslant [k - (1-k)y(\underline{p})]. \tag{63}$$

Note that $[k - (1-k)y(\underline{p})] > \widetilde{b}$, only if $k > \widetilde{k}$, where

$$\widetilde{k} = \left(\frac{\widetilde{b} + y(\underline{p})}{1 + y(\underline{p})}\right). \tag{64}$$

Recall that $\widehat{b}(\lambda)$ is decreasing in λ from Proposition 7. Hence, $\widehat{b}(\lambda) > \widetilde{b}$, only if $\lambda < \widetilde{\lambda}$, where $\widehat{b}(\widetilde{\lambda}) = \widetilde{b}$.

Thus, for $f(1) > (\alpha_1 \Delta)$, combining these two results, we get: for $k > \widetilde{k}$ and $\lambda < \widetilde{\lambda}$, $\left(\frac{f(\widehat{b}^*)}{\widehat{b}^*}\right) > (\alpha_1 \Delta)$, and, therefore, $E(\Pi^f) > E(\Pi^c)$. $\diamondsuit$

Table 1: Correlation between Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) in South East Asia during crisis (1996-2000) and non-crisis years

COUNTRYNAME	THAILAND	PHILIPPINES	MALAYSIA	KOREA	INDONESIA
1980-1995, 2001-2005					
Correl(FDI,FPI)	0.51	0.66	0.00	0.74	0.72
Correl(FDI,FPI Debt)	0.05	0.73	-0.20	0.68	0.78
1996-2000					
Correl(FDI,FPI)	-0.52	-0.61	-0.11	-0.43	0.59
Correl(FDI,FPI Debt)	-0.45	-0.75	-1.00	-0.85	0.85

Source: IMF International Financial Statistics

FDI is line 78bed (Direct investment in the Reporting Economy), which represents flows of direct investment capital into the country. This includes equity capital, reinvested earnings, other capital, and financial derivatives associated with various intercompany transactions between affiliated enterprises. Excluded are flows of direct investment capital for exceptional financing, such as debt-for-equity swaps.

FPI is line 78bgd (Portfolio Investment Liabilities), which include transactions with nonresidents in financial securities of any maturity (such as corporate securities, bonds, notes, and money market instruments) other than those included in direct investment, exceptional financing, and reserve assets. Under this we have:

Debt securities liabilities (line 78bnd) cover (i) bonds, debentures, notes, etc. and (ii) money market or negotiable debt instruments.

Figure 1a: FDI and FPI for S Korea (1990-2005)

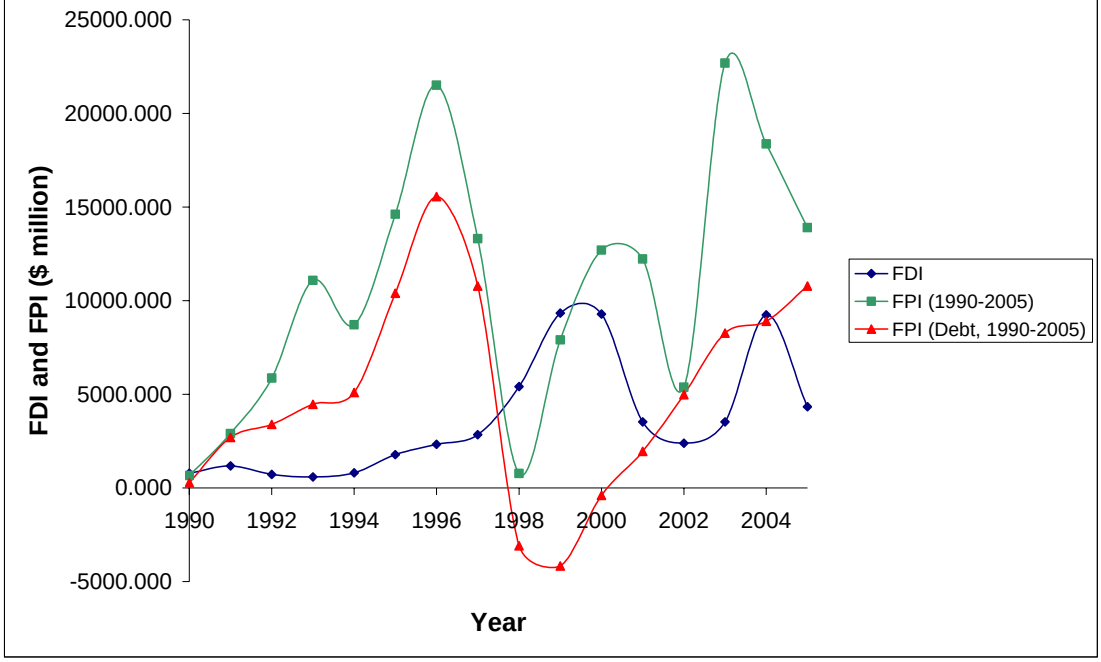


Figure 1b: FPI Debt vs FDI for S Korea: Crisis (1996-2000) and Other (1991-1995,2001-2005)

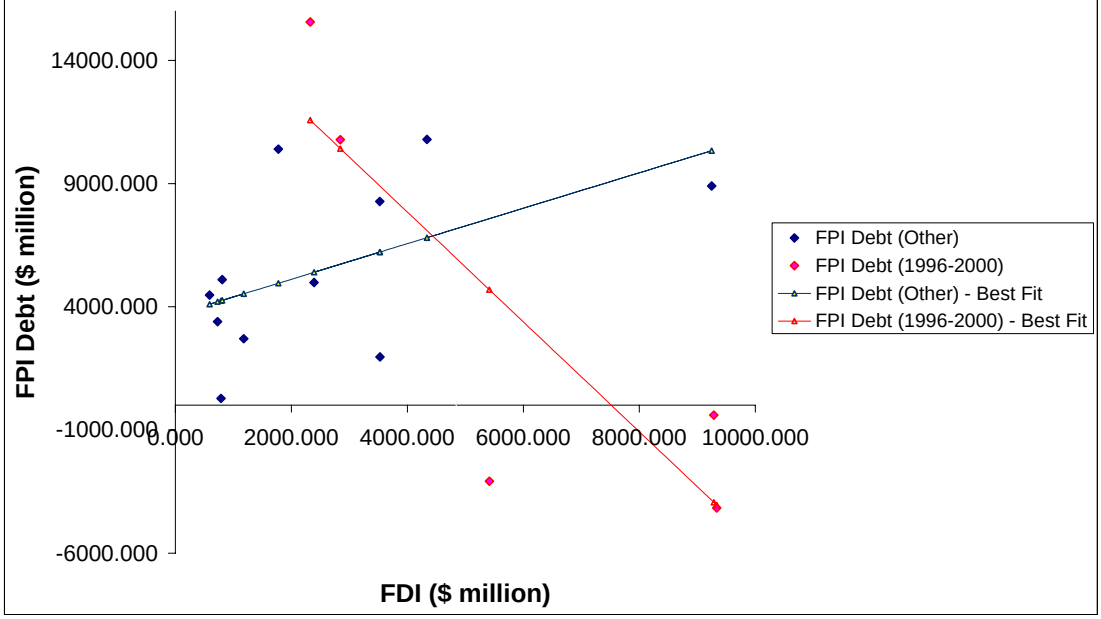


Figure 2a: FDI and FPI for Philippines (1990-2005)

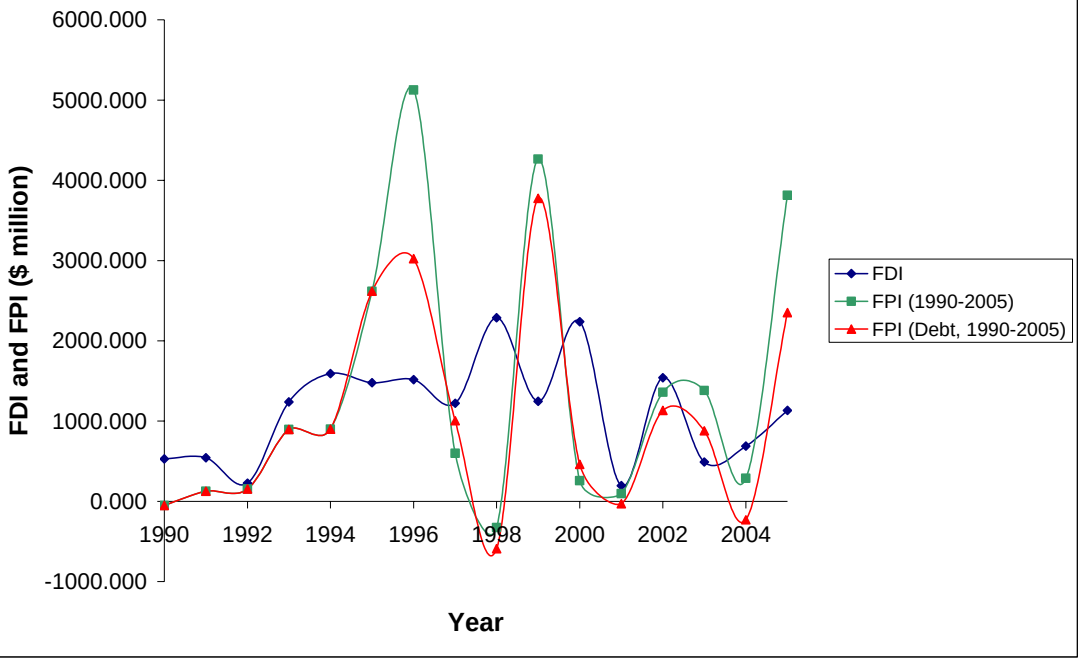


Figure 2b: FPI Debt vs FDI for Philippines: Crisis (1996-2000) and Other (1991-1995,2001-2005)

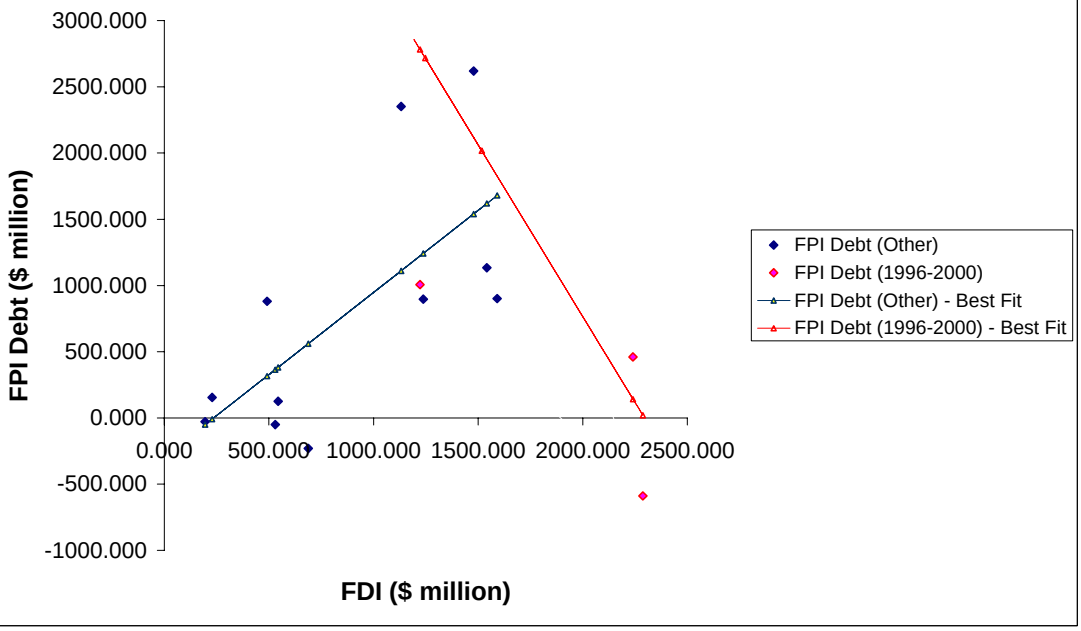
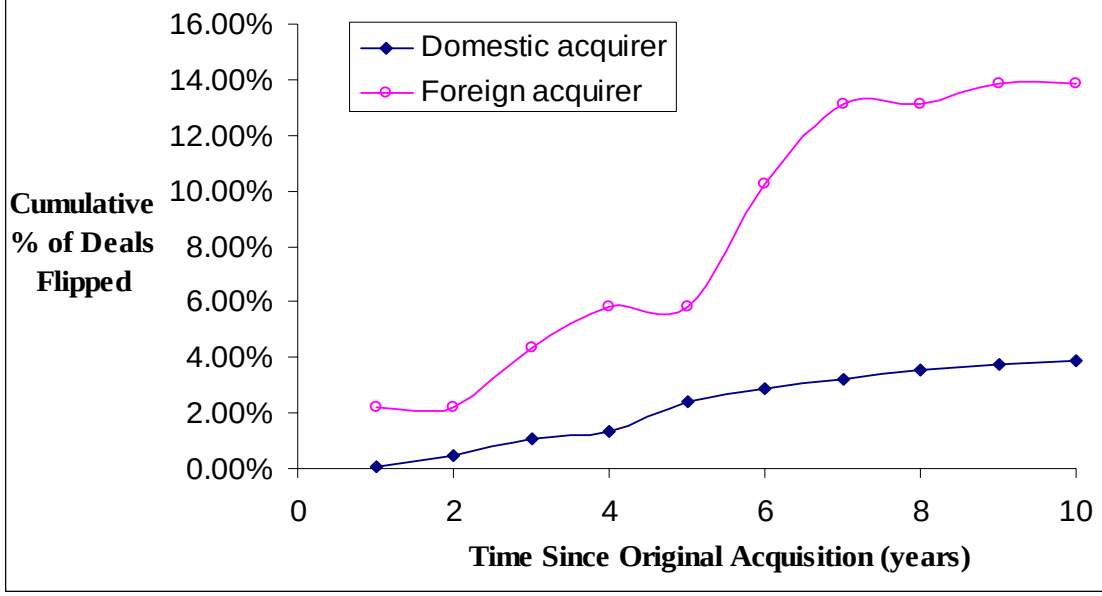


Figure 3: Evidence on flipping (subsequent sale) of acquisitions in South East Asia during 1996-2000



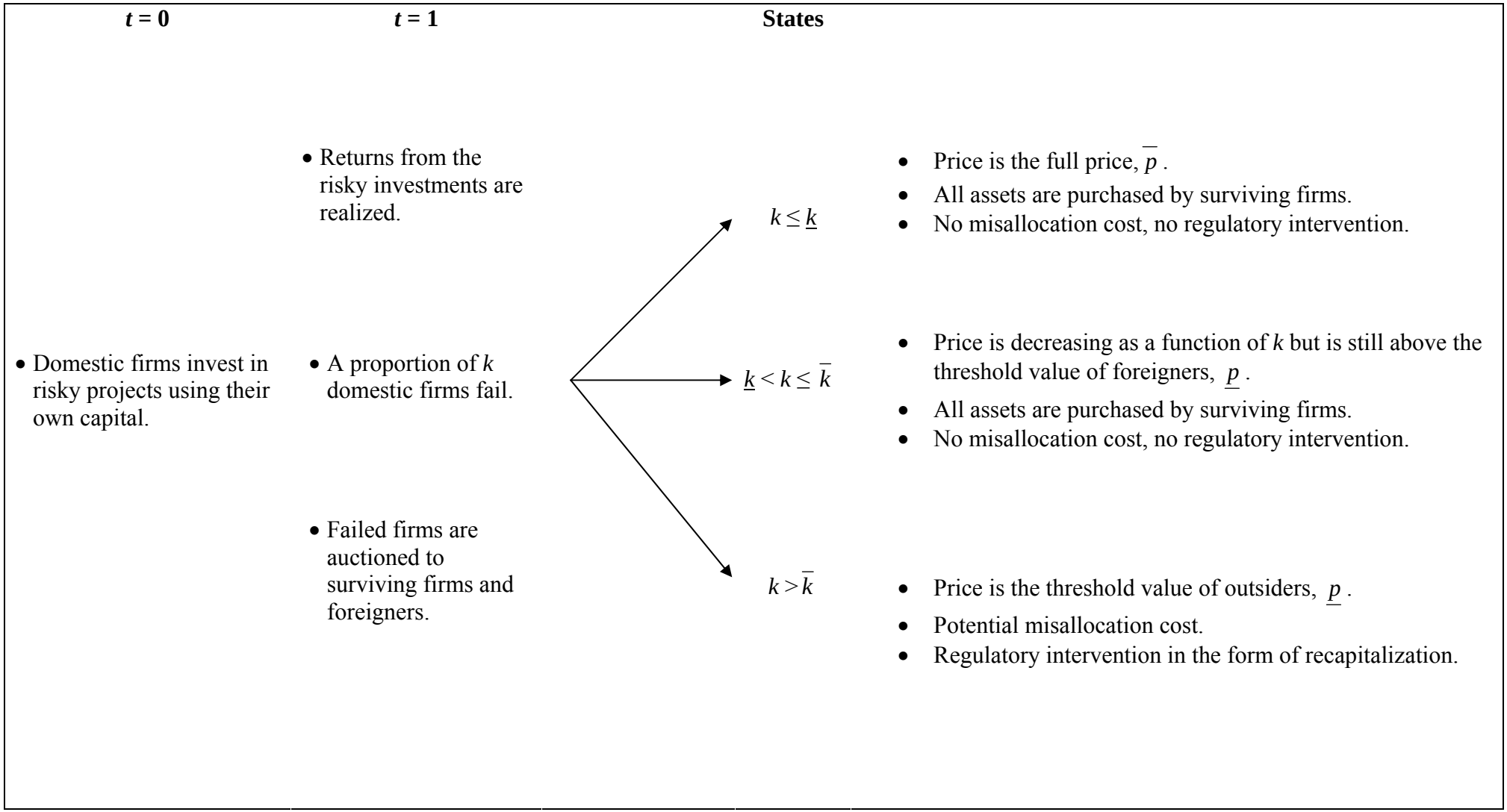


Figure 4: Timeline of the model.

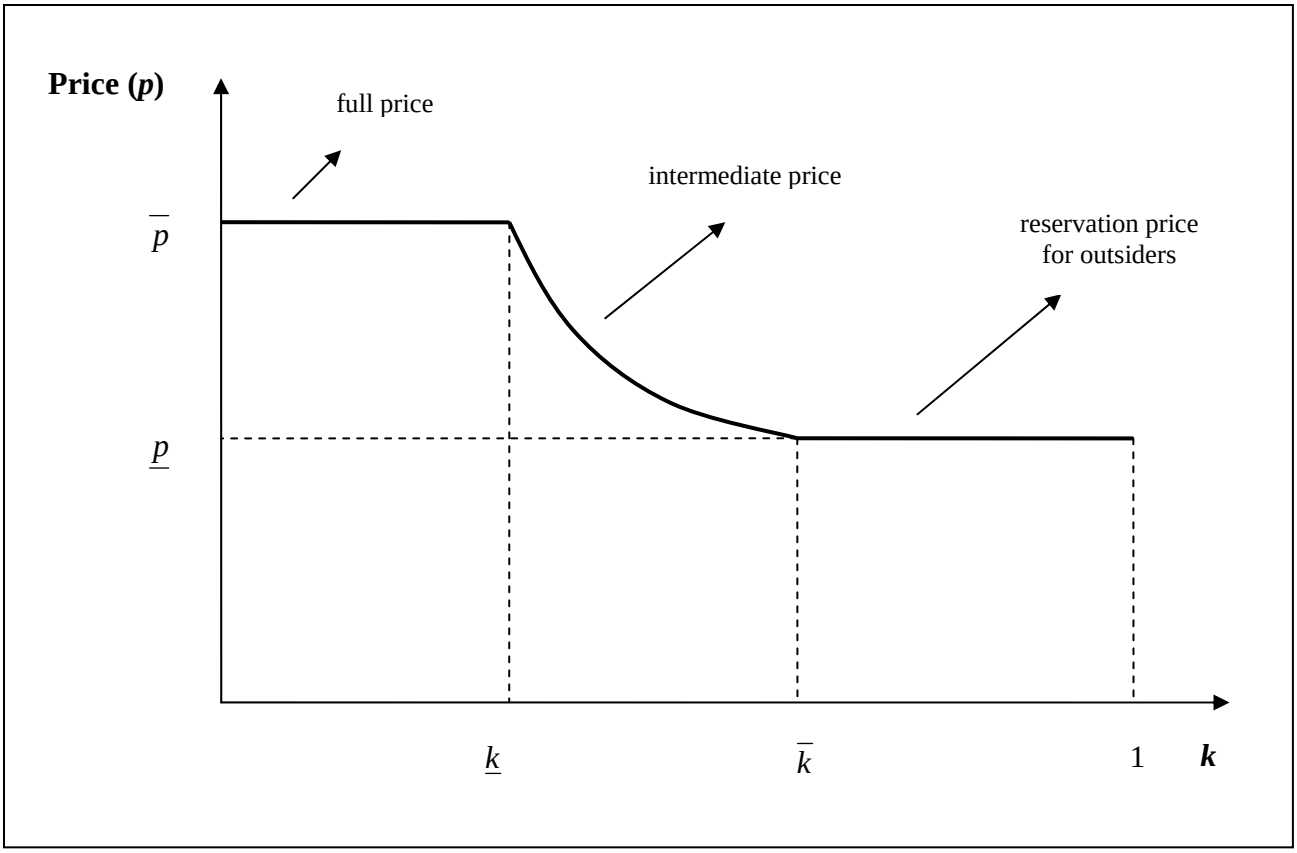


Figure 5: Price in Proposition 2.

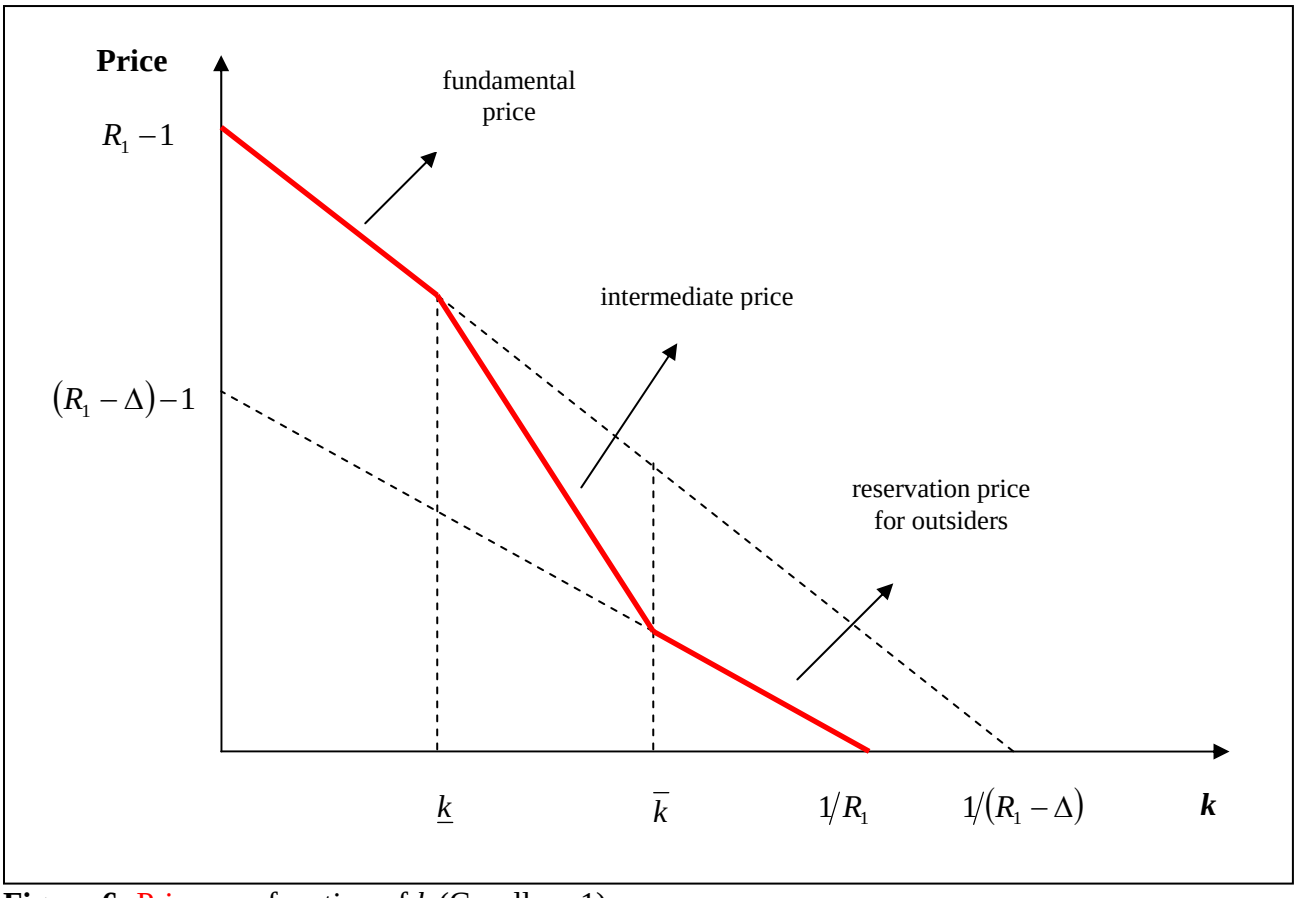


Figure 6: Price as a function of *k* (Corollary 1).

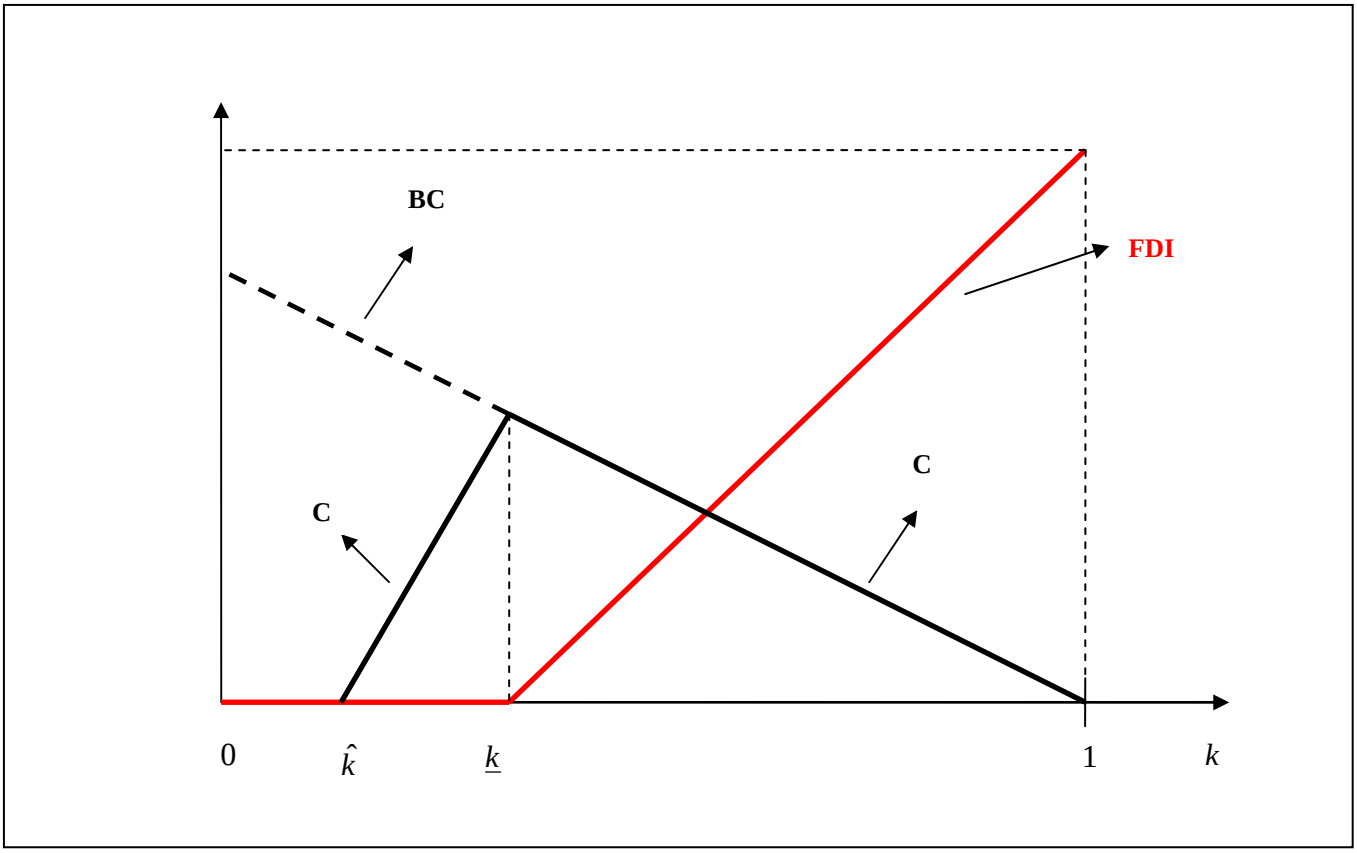


Figure 7: Capital flight and FDI (Proposition 3).

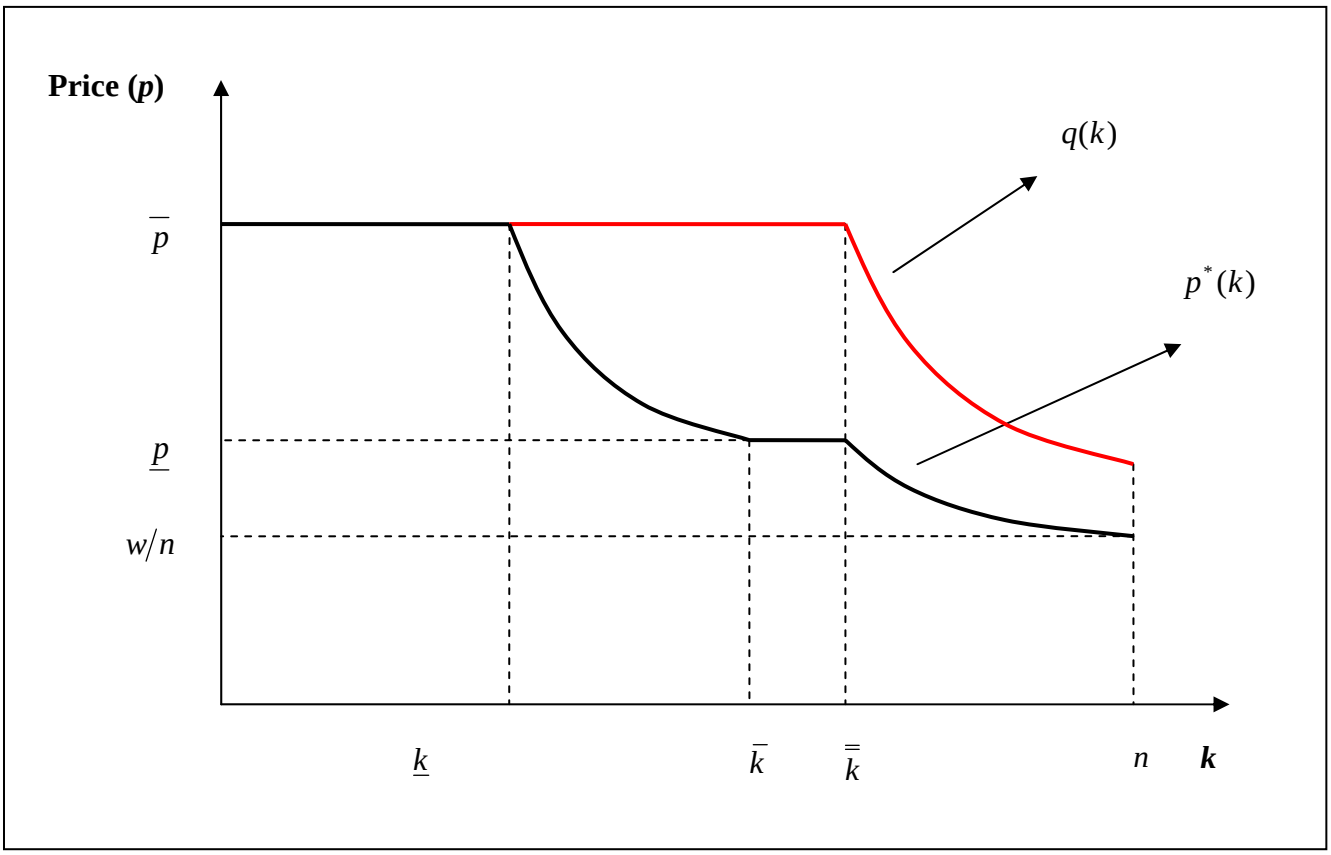


Figure 8: Prices with limited outsider funds.

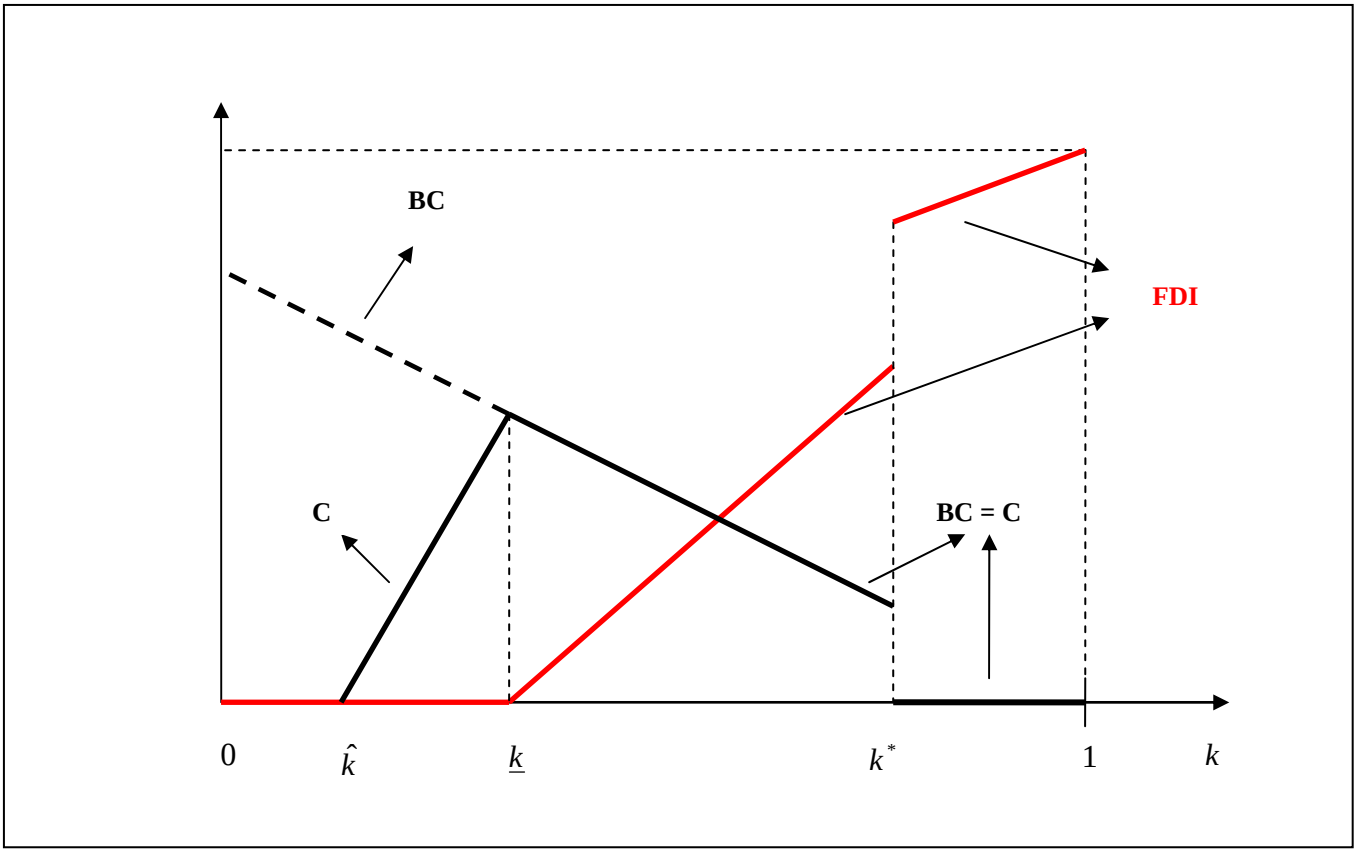


Figure 9: Capital flight and FDI (Proposition 4).

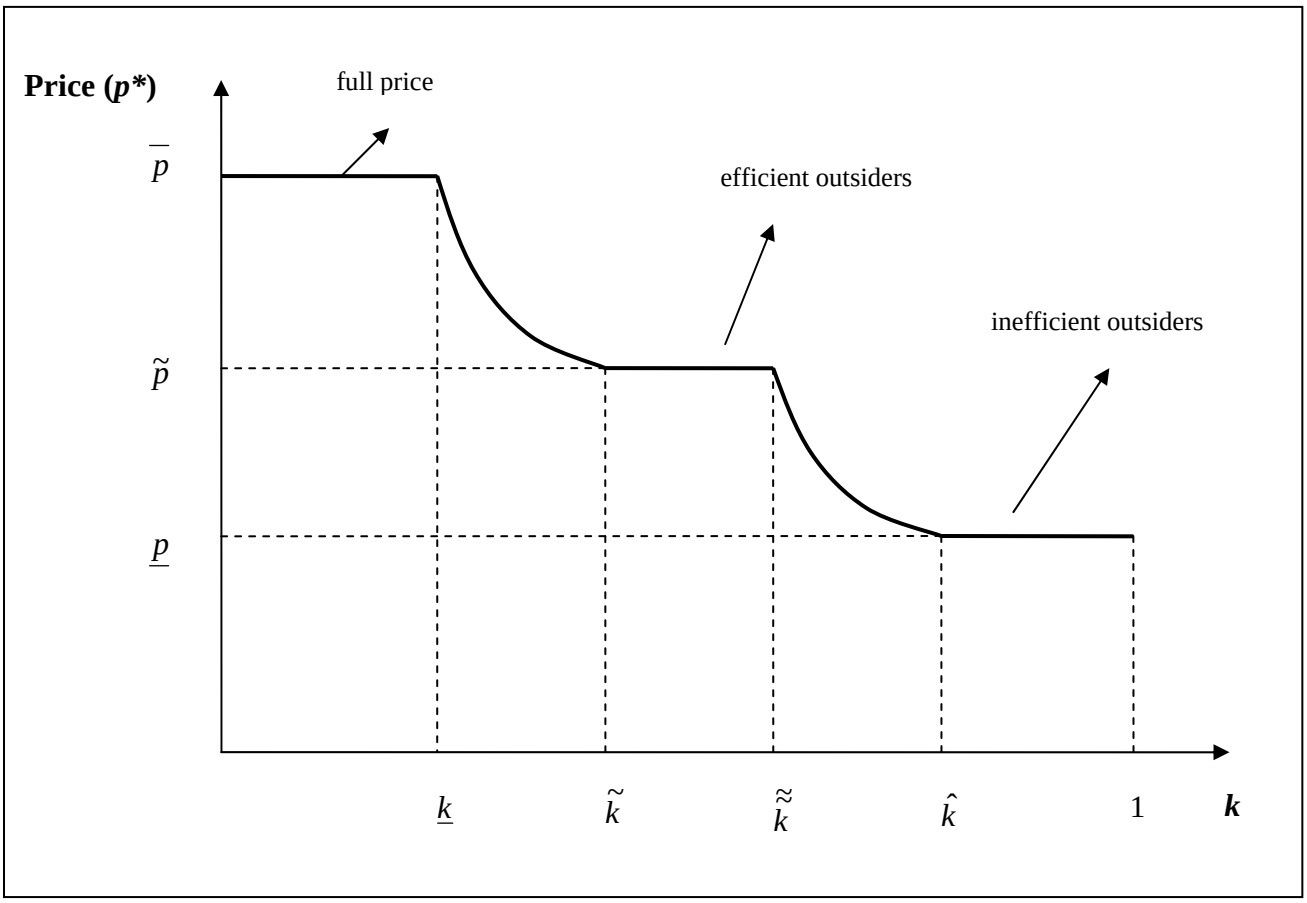


Figure 10: Price with differential efficiency levels of foreigners.

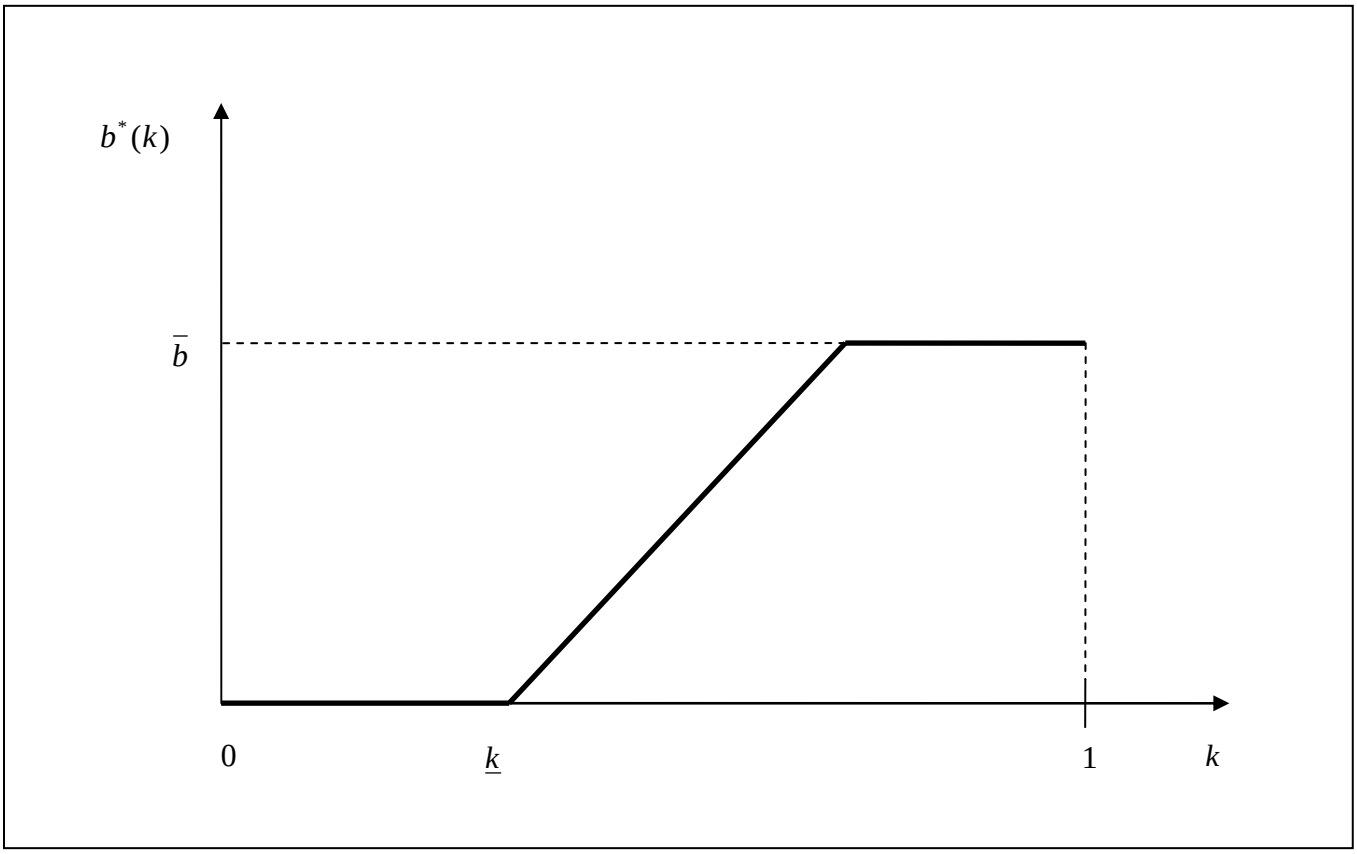


Figure 11: Regulator's recapitalization strategy (no capture).

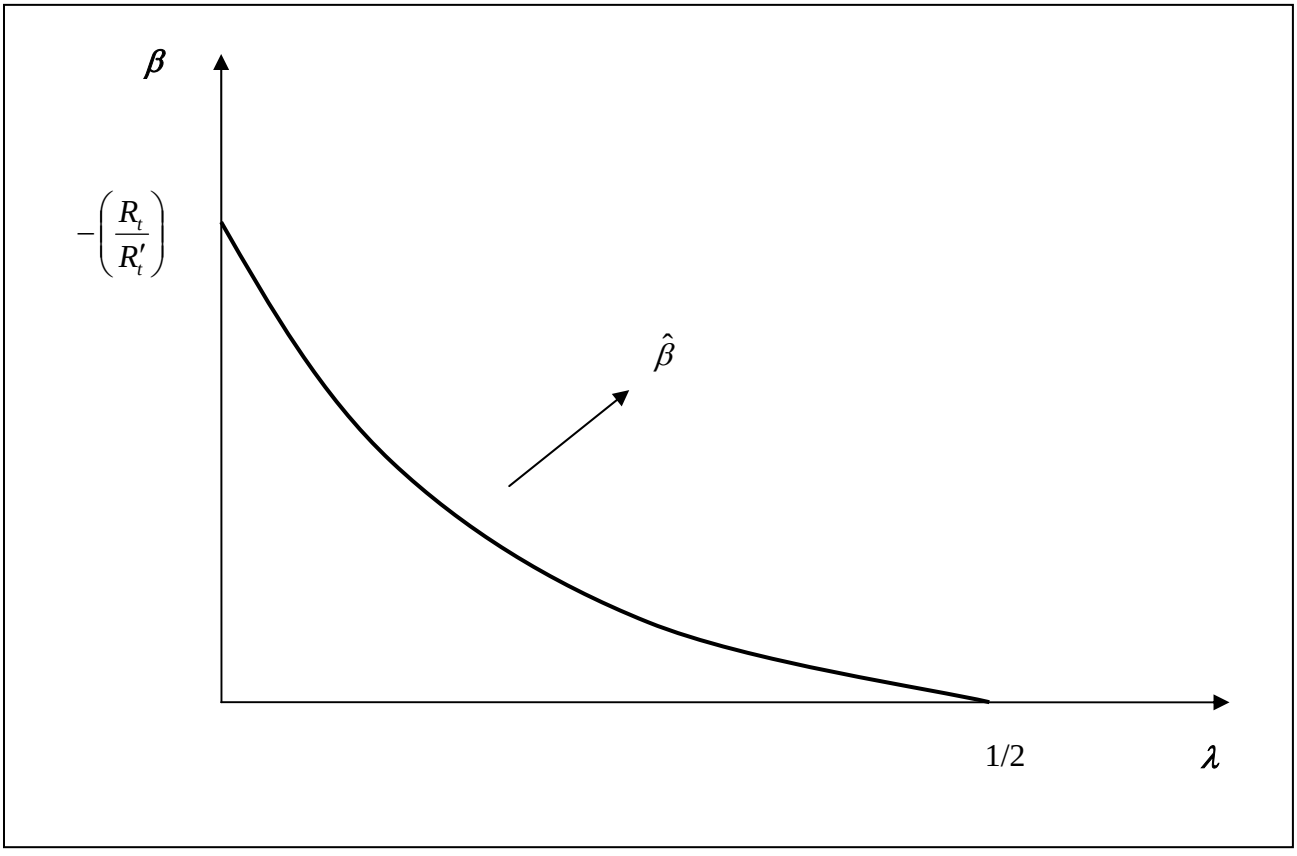


Figure 12: Regulator's share as a function of λ.

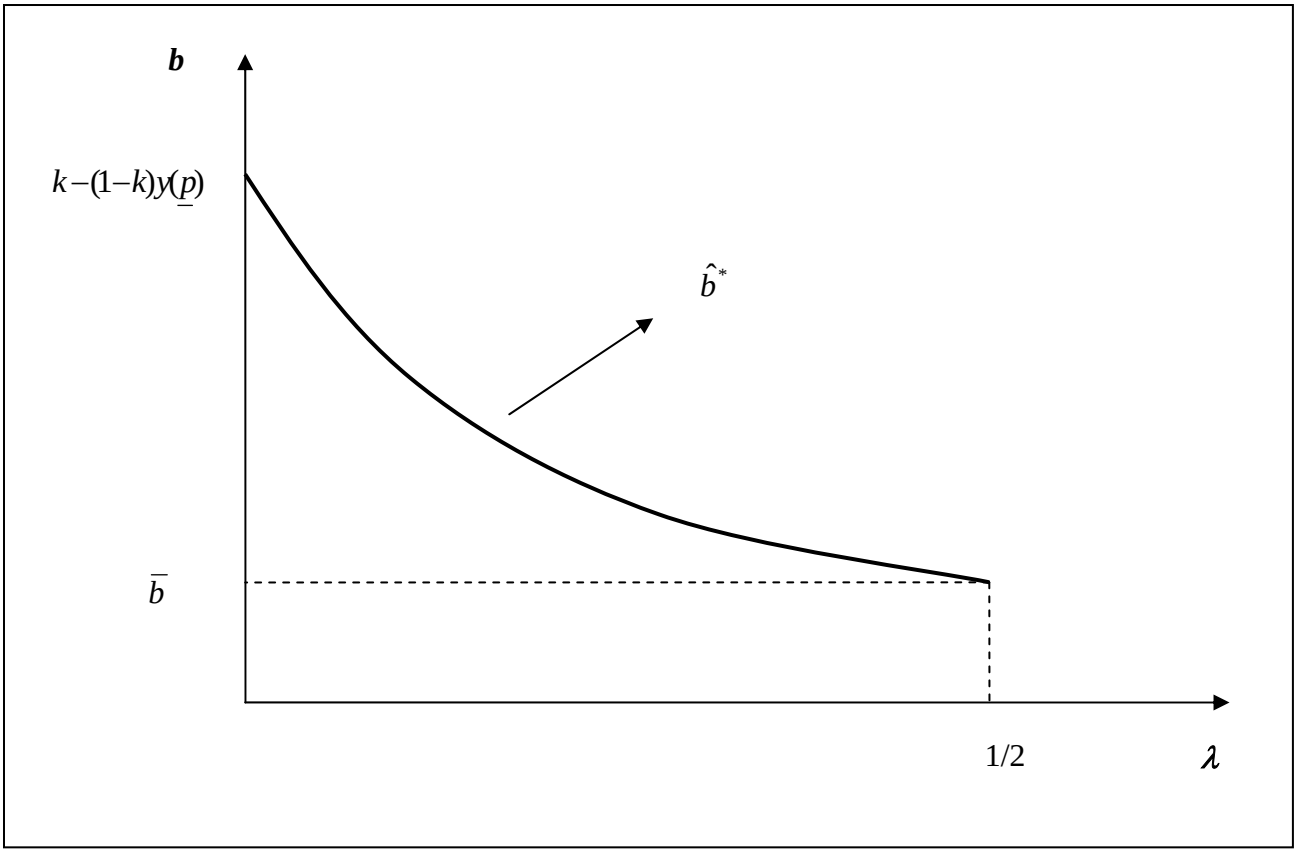


Figure 13: Regulator's recapitalization strategy (for *k* such that $k-(1-k)y(\underline{p})>\bar{b}$).

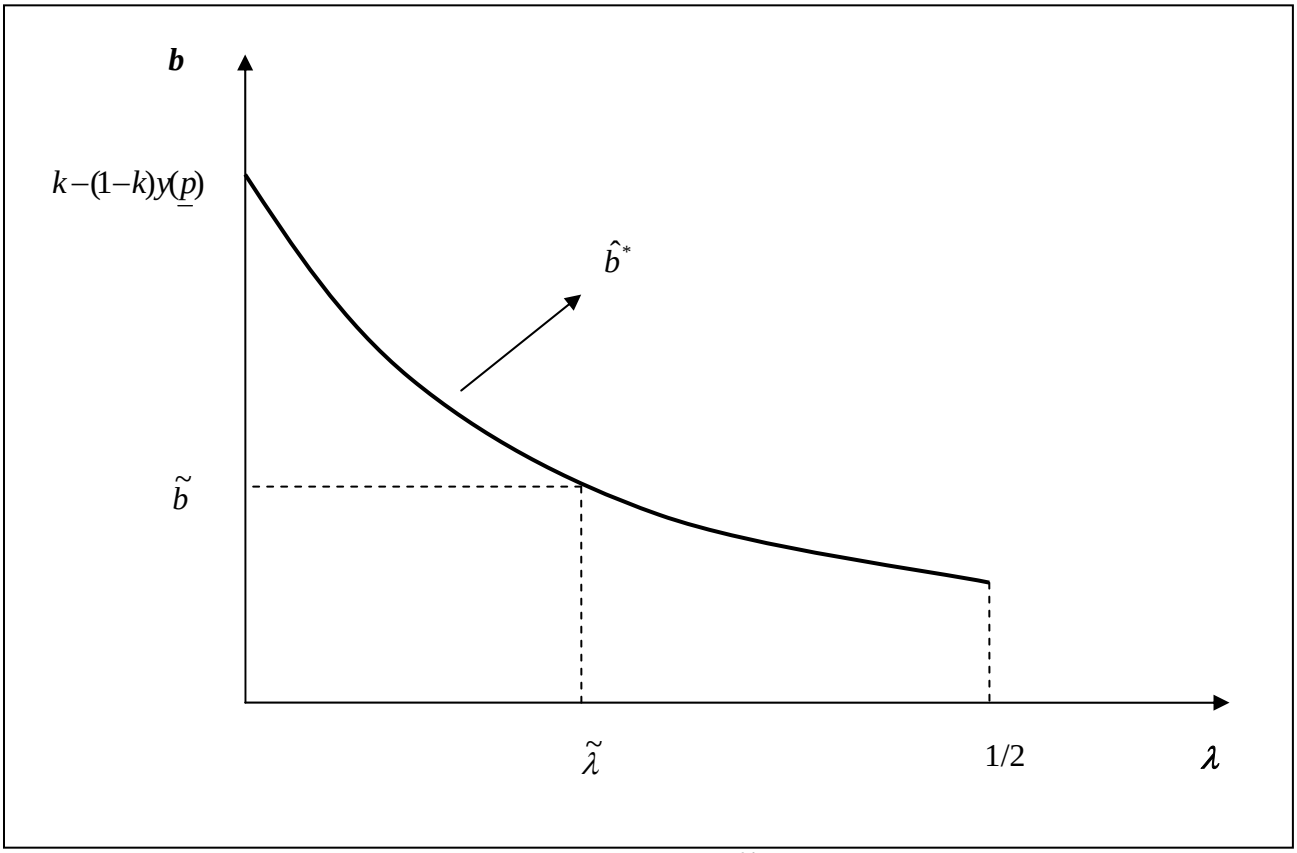


Figure 14: Regulator's recapitalization strategy (for $k>\tilde{k}$).