

# Fire-Sale FDI<sup>1</sup>

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# Fire-Sale FDI

## Abstract

Financial crises are often accompanied by an outflow of foreign portfolio investment and an inflow of foreign direct investment (FDI). We provide an agency-theoretic framework that explains this phenomenon. We show that during crises, agency problems affecting domestic firms are exacerbated, and, in turn, external financing constrained. Transfer of control in the form of direct ownership of failed firms' assets by alternate users can circumvent agency problems, but during crises, efficient owners (e.g. other domestic firms) face similar financing constraints. The result is a transfer of ownership to foreign firms, including inefficient ones, at fire-sale prices. Such fire-sale FDI is associated with a flipping of acquired firms back to domestic owners once the crisis abates. These features of fire-sale FDI find empirical support.

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## 1 Introduction

### 1.1 Motivation

One characteristic feature of capital flows during some financial crises is the contrast between capital *outflows* associated with portfolio investments, and the simultaneous *inflows* in the form of 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.

Consider Table 1 which reports the correlation between FDI and foreign portfolio investment (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.<sup>1</sup> This pattern is further illustrated in Figure 1 for South Korea.<sup>2</sup> Figure 1a plots the time-series of FDI and FPI flows for the two countries during 1990-2005. The sharp rise in FDI around 1996-1998 is markedly coincident with the steep drop in FPI. Figure 1b graphically illustrates 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 a regime shift in the relationship between FDI and FPI.

A recent paper by Aguiar and Gopinath (2005) also documents evidence for inflow of such FDI using data on mergers and acquisitions for Asian countries that underwent the Asian financial crisis. Krugman (1998) shows that a similar, though probably less marked, boom in inward direct investment took place in Latin America, especially in Mexico during 1995 and also for Argentina. His primary conclusion is that surging FDI resulting from fire sales has been an empirical regularity during recent financial crises.<sup>3</sup>

While a positive correlation between FDI and FPI is consistent with intuitive priors, for example, due to trends in financial liberalization, commonality between domestic and foreign shocks or strategic complementarity between FDI and FPI,<sup>4</sup> the divergent behavior of FDI and FPI shown above poses a puzzle for economists. On the surface, a 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 an outflow of portfolio investments strongly suggests a qualitative difference between portfolio flows and FDI flows.

Our paper outlines a theoretical framework that proposes an explanation of this empirical regularity, explaining why during a crisis, adversely affected firms become financially constrained and engage in fire sales that transfer control of assets to foreign firms, potentially even inefficient ones. In particular, the framework generates the following combination of empirical implications: (1) During a financial crisis, FDI flows surge even as portfolio flows reverse, in contrast to the positive juxtaposition of the two observed during normal times; (2) During crisis times, acquisitions are associated with higher levels of shares acquired in target

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<sup>1</sup>In spite of the fact that we have a limited time-series (there are only five annual data points for the crisis period), several of the correlation coefficients are statistically different (at at least 10% level of confidence) between the non-crisis and crisis years. This is the case for FDI and FPI correlation for Thailand, Philippines and Korea (for the last two, this is also the case for FDI and FPI Debt correlation). Individually, the non-crisis period's FDI and FPI correlation is significantly *positive* at 1% level for all countries except Malaysia, and the same holds for FDI and FPI Debt correlation except for Thailand and Malaysia; in contrast, the crisis period's FDI and FPI Debt correlation is significantly *negative* at 5% level for all countries except Thailand and Indonesia.

<sup>2</sup>Philippines shows a very similar pattern. The figure for Philippines is available from the authors.

<sup>3</sup>In addition to fire sales in the domestic economy, the access of foreigners to "cheap financial capital" would increase arbitrage opportunities for foreigners through FDI flows. See Baker, Foley and Wurgler (2009).

<sup>4</sup>See, for example, Pfeffer (2008).

firms. FDI inflows during crisis times, on average, are associated with foreigners acquiring controlling stakes, whereas FDI inflows during normal times are associated with smaller stakes; (3) Finally, and most distinctively, FDI acquisitions made during crisis times are subsequently “flipped” by the foreign acquirer - that is, re-sold quickly - to domestic buyers once financial conditions improve in the crisis-stricken country. In contrast, there is no systematic evidence of flipping of FDI acquisitions made during normal times. This difference arises because acquisitions in normal times do not feature fire-sale discounts and are thus unlikely to be made by inefficient foreign or out-of-industry acquirers.

Using data on FPI and FDI flows and mergers and acquisitions for countries that underwent the Asian financial crisis of 1997-1998, we verify that all of the above empirical implications are borne out in the data. The result on flipping is perhaps the most significant finding relative to the existing literature. Our paper presents a rather different perspective as compared to the well-known paper by Aguiar and Gopinath (2005), who propose a model where foreign acquirers have an advantage in both financing and technology, whereby foreigners have the financial resources to acquire domestic assets and *also* superior technology to run these assets efficiently.<sup>5</sup> The flipping result suggests that this may not be able to capture the full story, as it would not explain the subsequent flipping if foreigners were the natural holders of the assets. In our model, some foreigners have comparative advantage in financing but *not* in technology, and hence, have incentives to sell assets back to efficient owners once the crisis abates. This flipping result is not only an empirical curiosity. It goes to the heart of the policy debates and normative issues associated with the welfare consequences of FDI during crisis times. Therefore, we view the theoretical modeling as being essential for the proper understanding of such welfare questions. A more detailed description of our theoretical and empirical work follows.

## 1.2 Theoretical results

The paper builds on the model of a financial crisis of Acharya and Yorulmazer (2008), which only features a market for asset sales, with the important addition of a capital market into the model. This crucial addition allows us to analyze the interplay between FDI (control) and FPI (ownership), and is essential for all the results we derive in this paper. Formally, we consider a two-period model with a measure 1 of domestic firms, and foreign investors. Two

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<sup>5</sup>While foreign investors may bring in superior technology, superior capital financing, or both, the literature on the effect of foreign investments on development and growth of the domestic economic has mixed results. Aitken and Harrison (1999) show that only small domestic enterprises realize productivity gains from acquisitions by foreigner investors and foreign investment negatively affects the productivity of other domestic firms. Furthermore, various studies show that foreign investments only generate economic growth in certain environments where the domestic country has a highly educated workforce (Borensztein et al., 1998), a sufficiently developed financial markets (Alfaro et al., 2004), to cite a few.

central assumptions drive our results: (i) domestic firms are more efficient users of domestic assets than foreigners as long as domestic firms take good projects (we relax this assumption in Section 4.3 and allow for differential efficiency among foreigners, where some foreigners are more efficient than the domestic firms); and (ii) there is a possibility of moral hazard in that domestic firm owners derive private benefits from bad projects; hence, domestic owners take good projects only if they retain a large enough share of future profits.

Domestic firms have two risky investment opportunities with maturity of one period, one at  $t = 0$  and one at  $t = 1$ . Domestic firms start with one unit of capital, which they use to undertake the risky investment at  $t = 0$ . The entire capital of the firms with the low return from the first-period investment is wiped out. Due to moral hazard, firms can pledge only a fraction of their expected return from the second investment. When the prospects for the second investment is favorable, expected return is high and the failed firms can generate the needed funds, even if they can pledge only a fraction due to moral hazard. However, for weaker prospects, even though the second investment can be a positive NPV project, the amount that can be pledged may not be enough to generate the one unit of capital needed to undertake the second period project. In that case, a failed firm cannot undertake the second period investment and is put up for sale. In other words, when the agency problem is severe, firms with adverse first-period shock are rendered as financially constrained, and a transfer of control is necessary for their second period investment to be feasible.

Surviving firms, if any, and foreign investors are the potential acquirers of failed firms' assets. Surviving domestic firms use some of the return from the first investment to undertake their own second period investment, but are also left with some spare liquidity. Hence, they rely less on external financing and agency problems are mitigated when there is transfer of control of failed firms' assets. The spare liquidity and the external finance surviving firms can raise against the second period investment constitute the total liquidity they can use for asset purchases. The external finance constitutes (at least partly) the economy's FPI.

Up to a critical proportion of failures, surviving firms' liquidity is enough to purchase all failed firms' assets at the "fundamental" price: surviving firms compete for assets and price stays at the fundamental price. Beyond this critical proportion, additional assets cannot be absorbed by the available liquidity of surviving firms at the fundamental price. Thus, the market-clearing price declines with further failures. For large proportion of failures, the price of failed firms' assets falls sufficiently low so that even inefficient foreigners find it profitable to acquire domestic assets, giving rise to fire-sale FDI. Furthermore, as the proportion of failures increases, the proportion of surviving firms decreases, which results in a decrease in the total borrowing capacity of the domestic economy, and thus the FPI. Hence, during crisis periods, we see the seemingly puzzling negative correlation between FDI and FPI.

To derive sharp empirical implications, we consider three extensions of our benchmark

model. In the first extension, we show that FDI acquisitions made during crisis times at fire-sale prices are subsequently re-sold (flipped) to domestic buyers once the crisis abates and prices rebound. Second, we assume that the foreign capital that can enter the domestic economy is also limited. In this case, once the proportion of failures is sufficiently large, even the total liquidity of surviving firms and foreigners is not enough to clear the market for asset sales at the threshold value of foreigners. Thus, there is a further decline in the market-clearing price as the proportion of failures increases. Since purchasing assets at such prices becomes profitable for foreigners, in equilibrium they need to be compensated *also* for purchasing shares of surviving firms. As a result, the share price of surviving firms falls below their fundamental value and surviving firms have to suffer some discount when they issue shares, that is, surviving firms can raise equity financing only at discounts. Furthermore, when the foreign capital that can enter the domestic economy is low, the discount in the capital market can be so high that surviving firms cannot generate the needed funds to undertake the second period investments. This, in turn, leads to a complete breakdown of the capital market or drying up of FPI, and the domestic economy experiences a structural break where foreign funds enter the domestic economy *only* through FDI. Third, we extend the model to allow for differential efficiency among foreigners. In particular, some foreigners can be more efficient than domestic firms but they may not be able to enter the domestic market due to various costs of entry. Hence, in the presence of such costs, crisis can allow efficient foreigners to enter, which may be beneficial for crisis countries. However, for severe crises, the price may fall so low that even inefficient foreigners may enter.

### 1.3 Empirical results

As emphasized already, our distinctive contribution is in developing empirical implications. There are three important empirical implications of our model. First, as explained above, FDI flows surge precisely when there is an outflow of portfolio capital. This pattern was illustrated in Figure 1 for South Korea and will be discussed further in the text.

Second, acquisitions during crises should be associated with acquisition of larger shares in target firms, and these acquisitions would likely grant control, rather than being simply acquisitions of cash-flow stakes. We present evidence supporting this hypothesis. In Section 5.2, we study the M&A activity in the countries hit by the Asian crisis during the period 1991-2000, and show that the crisis period of 1996-2000 witnessed an increase in the shares acquired in target firms, both for foreign and Southeast Asian acquirers.

Finally, and perhaps most distinctively compared to the previous literature, our theory predicts the “flipping” of assets acquired at fire sales once the crisis abates and prices rebound. Using the SDC Platinum data on mergers and acquisitions, Figure 2A provides succinct evidence for such flipping during the Southeast Asian crisis (also see Figure 2B). It defines a

“flip” as the subsequent sale (2001 onwards) of an acquisition that occurred during the crisis period (1996-2000). Employing the standard definition of FDI 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.<sup>6</sup> There is clear evidence of greater flipping for targets acquired by foreign firms compared to those acquired by domestic firms during the crisis. While domestic firms in our model do not have a reason to flip the deals acquired during crisis, their flipping rate serves as a control for the “natural” rate of flipping of deals acquired during crisis.

For example, in Figure 2, we observe that foreign deals are flipped more often than domestic deals starting from year one, and the gap between the two only widens as more time elapses, especially after the fourth year. By ten years since acquisition, 10.07% of foreign deals get flipped compared to 5.75% of domestic deals. We provide detailed, difference-of-difference style, evidence that such flipping is *not* observed for the period of 1991-1995 preceding the crisis (Figure 3A), and observed *only* for foreign acquisitions during the crisis period of 1996-2000 (Figure 3B). Furthermore, this differential result holds only for nations embroiled in the South East Asian crisis but not for other nations in the region. We establish these results non-parametrically as well as in probit estimates of the likelihood of flipping.

Before proceeding, we would like to stress two points. First, that our paper is an attempt to specifically model and explain *fire-sale* FDI. There is clearly FDI during non-crisis periods, and we believe that its determinants can be factors other than assets being available at steep discounts. Differentiating the FDI determinants in non-crises and crises periods, formally and econometrically, is potentially an interesting topic for further research.

Second, we believe that our model finds ready application to the credit crisis of 2007-2009 in the United States and Europe. The banking sector has been systemically affected and financial investors have “flown away”, making it difficult for banks to raise capital. Not surprisingly, banks have raised capital at steep discounts and at least 15% of this capital-raising has been from the sovereign wealth funds from Asia. Since sovereign wealth funds have until now been passive investors, their investments in banks are perhaps also best characterized as fire-sale FDI. Interestingly, they are also investing in more experienced investors such as private equity funds, and co-investing in deals where these funds invest. Indeed, recognizing the usefulness of entry of such experienced investors, regulations in the United States have been relaxed to make it easier for private equity to invest in banking companies.<sup>7</sup> The entry of these experts funded by passive foreign investors is entirely consistent with our model’s primary message that during distress, a firm may have to give up control in order to be able

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<sup>6</sup>The convention for distinguishing between FPI and FDI is whether the ownership stake is above or below the 10% threshold, where a stake higher (lower) than 10% is classified as FDI (FPI).

<sup>7</sup>See the article “Fed Eases Private-Equity Rule” by Steven Sloan in *American Banker*, 23 September 2008.

to raise external finance, and that industry-wide distress leads to fire sales, giving incentives to outsiders to enter and buy or take control of assets.

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. In Section 5, we present in detail existing and new evidence supporting the three key implications of our model. Section 6 concludes.<sup>8</sup>

## 2 Model

The timeline of our benchmark model is outlined in Figure 4. We have an economy with three dates, indexed by  $t \in \{0, 1, 2\}$ . We have a domestic economy with a measure 1 of ex-ante identical firms. Firms are risk-neutral and maximize the sum of expected profits over time. Firms have a unit of endowment at date  $t = 0$  and nothing else at other dates.

Each firm has two consecutive investment opportunities, one at date  $t = 0$  and the other at date  $t = 1$ . Each date  $t$  project requires one unit of input at date  $t$  and yields a random outcome at date  $t + 1$ . Provided that a firm exerts effort, the random return  $\tilde{R}_t$  on its date  $t$  project is  $R_t$  (0) with probability  $\alpha_t$  ( $1 - \alpha_t$ ), where  $R_t > 1$  is a constant. The returns across firms are independent, so that by law of large numbers, exactly a proportion  $\alpha_t$  of the firms have return  $R_t$ , and a proportion  $1 - \alpha_t$  have the low return 0.

There is potential for moral hazard at the individual firm level. 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. This may not be the case however at date 1 when the firm may require to raise external financing. We assume that if the firm does not exert effort, then when the return is high, it cannot generate  $R_1$  but only  $(R_1 - \bar{\Delta})$  and its owners enjoy a non-pecuniary benefit of  $B \in (0, \bar{\Delta})$ . 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  $\theta$  and get the incentive compatibility constraint as:

$$\alpha_1 \theta R_1 \geq \alpha_1 (\theta (R_1 - \bar{\Delta}) + B). \quad (\text{IC})$$

Hence, firm owners need a minimum share of  $\bar{\theta} = B/\bar{\Delta}$  to exert effort.<sup>9</sup>

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<sup>8</sup>Proofs not contained in the text are contained in an appendix that is available from the authors upon request.

<sup>9</sup>Alternatively, we could have assumed that when the firm does not exert effort, the value of the high return is  $R_1$ , but the probability of having the high return is lower, say  $\alpha_1^L < \alpha_1$ , and its owners enjoy a non-pecuniary benefit of  $B$ , with  $(\alpha_1 - \alpha_1^L) R_1 > B$ . In that case, the incentive compatibility constraint can be written as  $\alpha_1 \theta R_1 \geq \alpha_1^L [\theta R_1 + B]$ . Hence, firm owners need a minimum share of  $\bar{\theta} = \frac{\alpha_1^L B}{(\alpha_1 - \alpha_1^L) R_1}$  to exert



Therefore, the firm can pledge at most a fraction  $\tau = 1 - \bar{\theta}$  of its future income if it is required to exert effort. Note that, once the firm is left with a share that is less than  $\bar{\theta}$ , it can pledge the entire future return of  $\alpha_1(R_1 - \bar{\Delta})$ , if needed to raise maximal amount of external finance. For  $\bar{\Delta} > \sqrt{BR_1}$ , this is less than  $\alpha_1(1 - \bar{\theta})R_1$ , the amount that can be pledged when the firm exerts effort. Throughout, we assume that  $\bar{\Delta} > \sqrt{BR_1}$ . Hence, the net present value for a domestic firm from the risky investment when it exerts effort is  $\bar{p} = \alpha_1 R_1 - 1$ .

In addition to domestic firms, there is a group of risk-neutral foreign investors who have total funds of  $w$  that can be used to purchase or finance domestic firms. In the benchmark model, we assume that  $w$  is unlimited so that foreign investors have sufficient funds to acquire and finance all domestic firms. In Section 4.2, we analyze the case with limited foreigner funds. Foreigners do not have the skills to generate the full value from domestic assets, an assumption we relax in Section 4.3. This assumption 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  $\Delta > 0$ . Finally, we assume that  $\alpha_1(R - \Delta) \geq 1$ , as otherwise the analysis would be uninteresting.

The notion that foreigners may not be able to run domestic assets as efficiently as the domestic firms is akin to the notion of *asset-specificity*, introduced in the corporate-finance literature by Williamson (1988) and Shleifer and Vishny (1992). This literature suggests that firms, whose assets cannot be readily redeployed by firms outside of the industry (or country), are likely to experience lower liquidation values because they may suffer from “fire-sale” discounts, especially when firms within an industry get simultaneously into financial or economic distress. 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 (2007) 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)).

If the return from the first-period investment is high, then the firm operates one more period and makes the second-period investment using some of its proceeds from the first investment. If the return is low, then the firm’s entire capital is wiped out. In that case, if the firm cannot raise financing for the second investment, then it is put up for sale, where the potential buyers are the surviving domestic firms (if any) and foreigners.<sup>10</sup>

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effort. Therefore, the firm can pledge at most a fraction  $\tau = 1 - \bar{\theta}$  of its future income if it is required to exert effort. For simplicity, we model moral hazard using returns, rather than probabilities, and assume that the returns are not verifiable. While this does not change any of our results, it simplifies our expressions considerably.

<sup>10</sup>Here, we do not model the bankruptcy of the firm. One can assume some fixed costs for staying in business such as overhead costs like rent for office space, labor costs etc. A firm needs to cover these costs to stay in business, otherwise, it needs to be sold.

Domestic firms that had the high return from the first period investment are potential acquirers of failed firms' assets. Because of moral hazard, the surviving domestic firms cannot pledge all their future income, but only a fraction  $\tau$ . Hence, the total resources available to a surviving domestic firm at date 1 to purchase failed firm assets is

$$\ell = (R_0 - 1) + \tau\bar{q}, \tag{1}$$

where  $\bar{q} = \alpha_1 R_1$  is the expected return from the second period investment. The firm has  $R_0$  from the first period investment but needs to set aside the cost of investment of 1, and can raise  $\tau\bar{q}$  units of funds from outside investors.<sup>11</sup>

### 3 Analysis

We analyze the model proceeding backwards from the second period to the first period. We denote the proportion of firms that fail at  $t = 1$  by  $k$ . Since firms are identical 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 and it can pledge  $\tau\bar{q}$  units of funds against its future return. For  $\tau\bar{q} \geq 1$ , that is, for  $\alpha_1 \geq \alpha_1^* = \frac{1}{\tau R_1}$ , this domestic firm can generate the needed funds for the second period investment and does not need to be liquidated. However, for  $\alpha_1 < \alpha_1^*$ , the domestic firm with the low return from the first investment cannot generate the necessary funds and is put up for sale. In other words, when the agency problem gets severe, firms with adverse first-period shock are rendered as financially constrained, and a transfer of control is necessary for their second period investment to be feasible.<sup>12</sup> Hence, asset sales take place only when  $\alpha_1 < \alpha_1^*$ .

Note that for  $\alpha_1 > \frac{1}{R_1 - \Delta}$ , domestic firms and foreigners are willing to pay a positive price for failed firms' assets. Hence, for  $\frac{1}{R_1 - \Delta} < \alpha_1^*$ , that is, for  $\Delta < \bar{\theta}R_1$ , foreigners and surviving firms are not willing to finance failed firms, but are willing to purchase them. We summarize these points in terms of the following proposition.

**Proposition 1** *There is a critical value of  $\alpha_1$ , given as  $\alpha_1^* = \frac{1}{\tau R_1}$ , such that, if  $\alpha_1 \geq \alpha_1^*$ , 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.*

Next, we analyze the sale of failed firms' assets and the resulting price function.

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<sup>11</sup>Alternatively, we can allow firms to generate funds against the assets they purchase as well. This does not change our results qualitatively. See footnote 17 in Section 4.2 for a discussion.

<sup>12</sup>We can allow for partial liquidation. In particular, the domestic firm can use  $\tau\bar{q}$  units for the second period investment and liquidate the rest. This would not change our results qualitatively.

### 3.1 Sales and liquidation values

In examining the sale of failed firms, several interesting issues arise. First, surviving firms and foreigners may compete to acquire failed firms. Second, unless the game for asset acquisition is specified with reasonable restrictions, an abundance of equilibria arises. Third, surviving firms in fact may not have enough resources to acquire all failed firms.

To keep the analysis tractable we make the following assumptions:

(i) All failed firms' assets are pooled and competitively auctioned to the surviving firms and the foreigners.

(ii) Denoting the surviving firms as  $i \in [0, (1 - k)]$  and the foreigners as  $i = 2$ , each surviving firm and foreigners submit a schedule  $y_i(p)$  for the amount of assets they are willing to purchase as a function of the price  $p$  at which a unit of the asset is being auctioned, where  $y_i(p) \in [0, k]$ .

(iii) The price  $p$  clears the market subject to the natural constraint that assets allocated to surviving firms and foreigners add up at most to the proportion of failed firms, that is,  $y_2(p) + \int_{i=0}^{1-k} y_i(p) \leq k$ . Given the allocation inefficiency of selling assets to foreigners, it turns out that if the surviving firms and the foreigners pay the same price for the failed firms' assets, maximum amount of failed firms' assets are allocated to the surviving firms.

(iv) We focus on the symmetric outcome where all surviving firms submit the same schedule, that is,  $y_i(p) = y(p)$  for all  $i \in [0, (1 - k)]$ .

First, we derive the demand schedule for surviving firms. The expected profit of a surviving firm from the asset purchase can be calculated as:  $y(p)[\bar{p} - p]$ . Note that for each unit of asset purchased, the acquiring firm needs 1 unit of funds to undertake the second period investment. The surviving firm wishes to maximize these profits subject to the resource constraint  $y(p) \cdot (1 + p) \leq \ell$ .

Hence, for  $p < \bar{p}$ , surviving firms are willing to purchase the maximum amount of assets using their resources. Thus, their demand schedule is  $y(p) = \frac{\ell}{1+p}$ . For  $p > \bar{p}$ , the demand is  $y(p) = 0$ , and for  $p = \bar{p}$ , surviving firms are indifferent between any value of  $y(p)$ .

We can derive the demand schedule for foreigners in a similar way. Note that, foreigners can generate only  $(R_1 - \Delta)$  in the high state. Let  $\underline{p} = \alpha_1(R_1 - \Delta) - 1 = \bar{p} - \alpha_1\Delta$ , the expected profit for the foreigners from the risky asset in the second period. For  $p < \underline{p}$ , foreigners are willing to supply all their funds for the asset purchase. Thus, their demand schedule is  $y_2(p) = \frac{w}{1+p}$ . For  $p > \underline{p}$ , the demand is  $y_2(p) = 0$ , and for  $p = \underline{p}$ , foreigners are indifferent between any value of  $y_2(p)$ . Note that, in the benchmark model, we assume that  $w$  is unlimited so that foreigners always have enough funds to purchase all domestic firms at the price  $\underline{p}$  and take all the second period investments.

Next, we turn to the allocation of the failed firms' assets and the price function that results. We know that in the absence of financial constraints, the efficient outcome is to sell failed firms' assets to surviving firms. However, surviving firms may not be able to pay the threshold price of  $\underline{p}$  for all assets. If prices fall further, these assets become profitable for foreigners and they participate in the auction.

For  $p > \bar{p}$ ,  $y(p) = y_2(p) = 0$  and the market for failed firms' assets does not clear. If  $p \leq \bar{p}$ , and the proportion of failed firms is sufficiently small, surviving firms have enough funds to pay the full price for all failed firms' assets. Hence, for  $k \leq \underline{k}$ , where

$$\underline{k} = \frac{\ell}{\ell + (1 + \bar{p})}, \quad (2)$$

the price is set at  $p^* = \bar{p}$ .<sup>13</sup> At this price, surviving firms are indifferent between any quantity of assets purchased and a share  $y(p^*) = \frac{k}{1-k}$  is allocated to each surviving firm.

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  $\underline{p}$ , below which foreigners have a positive demand. Formally, for  $k \in (\underline{k}, \bar{k}]$ , where

$$\bar{k} = \frac{\ell}{\ell + (1 + \underline{p})}, \quad (3)$$

the price is set at  $p^* = \frac{\ell}{k} - (1 + \ell)$ , and again, all assets are acquired by surviving firms. Note that, in this region, surviving firms use all available funds 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  $k > \bar{k}$ , surviving firms cannot pay the threshold price of  $\underline{p}$  for all assets and profitable options emerge for foreigners, where foreigners 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*

$$p^*(k) = \begin{cases} \bar{p} & \text{for } k \leq \underline{k} \\ \frac{\ell}{k} - (1 + \ell) & \text{for } k \in (\underline{k}, \bar{k}] \\ \underline{p} & \text{for } k > \bar{k} \end{cases} . \quad (4)$$

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<sup>13</sup>Note that, the surviving firms as a whole have just enough resources to purchase (and finance) all failed firms at a price of  $p$  when  $\left(\frac{k}{1-k}\right)(1+p) = \ell$ . Using this, we can derive the threshold  $\underline{k}$  in equation (2).

So far, we treated failures in the first period ( $k$ ) and prospects of firms in the second period ( $\alpha_1$ ) independently. However, these two are likely to be affected by a common macroeconomic factor so that when macroeconomic performance is poor, a larger proportion of firms go into distress (high  $k$ ) and firms' prospects deteriorate (low  $\alpha_1$ ). It is also possible that the return  $R_0$  can be affected by the same macroeconomic factor in the same way as  $\alpha_1$ , which would only strengthen our results. More formally, let  $\phi$  be a parameter that represents the underlying macroeconomic factor such that an increase in  $\phi$  represents a better macroeconomic performance overall. Hence, we have  $\frac{\partial k}{\partial \phi} < 0$  and  $\frac{\partial \alpha_1}{\partial \phi} > 0$ . As the macroeconomy worsens (low  $\phi$ ), the price of assets falls because of two separate reasons. First, the prospects for the second period project worsen (low  $\alpha_1$ ) so that the fundamental value  $\bar{p}$  of the assets falls. Second, the proportion of failures ( $k$ ) increases when the economy is weak, and for high enough proportion of failures, there is cash-in-the-market prices due to lack of liquidity in domestic markets.

### 3.2 FDI versus FPI during crises

Next, we present our main theoretical result where we examine how foreign portfolio investment into domestic firms interacts with foreign direct investment, and in particular the inverse relation between these two forms of foreign financing during crisis periods.

Recall that for  $\alpha_1 \geq \alpha_1^*$ , 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  $\alpha_1 < \alpha_1^*$ , where only surviving domestic firms can generate funds in the capital market. Hence, the total borrowing capacity of the domestic economy, denoted by  $BC$ , is equal to  $[(1 - k)\tau\bar{q}]$ . Note that  $BC$  is decreasing in  $k$ , that is, the more severe the crisis, the lower the borrowing capacity of the domestic economy. And, for  $k < \bar{k}$ , the price for failed firms' assets is higher than  $\underline{p}$  so that foreigners do not purchase any domestic assets, that is,  $FDI$  is equal to 0.<sup>14</sup>

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

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<sup>14</sup>Note that our model can easily be extended to allow for differential efficiency among foreigners where efficient foreigners always enter domestic markets, resulting in a positive level of FDI for all values of  $k$ . See Section 4.3 for such an extension. Since our focus in this paper is FDI flows during crisis periods, we refrain from such a feature in the benchmark model to keep the model simple.

For  $k > \bar{k}$ , all failed firms' assets cannot be purchased by surviving firms at the price  $\underline{p}$  and profitable options emerge for foreigners. Formally, for  $k > \bar{k}$ , surviving firms can purchase only  $\frac{(1-k)\ell}{1+\underline{p}}$  units of failed firms' assets and the rest, which is equal to  $\left(k - \frac{(1-k)\ell}{1+\underline{p}}\right)$  units, is acquired by foreigners at a price of  $\underline{p}$ . Hence, for  $k > \bar{k}$ , we have  $FDI = k(1 + \underline{p} + \ell) - \ell$ .

Note that  $FDI$  is (weakly) increasing in  $k$  while the borrowing capacity  $BC$  of the domestic economy is decreasing in  $k$ , resulting in a negative correlation between capital flows and foreign direct investment. We have the following Proposition. Also see Figure 6.

**Proposition 3** *For  $\alpha_1 < \alpha_1^*$ , we have:*

- (i)  $BC = (1 - k)\tau\bar{q}$  and  $\frac{\partial BC}{\partial k} < 0$ .
- (ii) For  $k \geq \bar{k}$ , we have  $FDI = k(1 + \underline{p} + \ell) - \ell$ , and  $\frac{\partial FDI}{\partial k} > 0$ . For  $k < \bar{k}$ , we have  $FDI = 0$ .
- (iii) For  $k \leq \underline{k}$ , we have  $C = 0$ . For  $k \geq \underline{k}$ , we have  $C = BC$ , and for  $k \in (\underline{k}, \bar{k})$ , we have  $C = k(\bar{p} + R_0) - (R_0 - 1)$ , and  $\frac{\partial C}{\partial k} > 0$ .

Proposition 3 states our key theoretical result: In the midst of a crisis, we have the juxtaposition of decreased portfolio investment into domestic firms and increased FDI. During crisis periods the borrowing capacity of surviving domestic firms as a whole diminishes, resulting in a decrease in FPI. In addition, during these periods, the supply of failed firms' assets searching for buyers surges. This, in turn, results in cash-in-the-market prices for domestic assets and makes domestic assets profitable for foreigners even though their ability to manage these assets is limited. Hence, we observe an increase in FDI during crisis periods.

## 4 Extensions

To derive sharp and testable empirical implications, we provide three interesting extensions of our benchmark model. First, we analyze the recovery of the domestic economy and the subsequent flipping of assets acquired by foreigners during the crisis back to their more natural users. In the second extension, we analyze how illiquidity can lead to spillover effects from the real to the financial side of the economy, which can eventually lead to a complete shutdown of the domestic capital market. Finally, we allow for differential levels of efficiency among foreigners and analyze effects of financial crisis and barriers of entry on foreign entry.

## 4.1 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 to their most natural users. We model this using a simple extension of our benchmark model. Suppose that we have a third 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  $\tilde{R}_2$ , where  $\tilde{R}_2 \in \{0, R_2\}$ , and  $\alpha_2$  is the probability of the high return from the investment at date 2. Foreigners cannot generate  $R_2$  in the high state but only  $(R_2 - \Delta_2)$ .<sup>15</sup> Hence, insiders are willing to pay a price of  $\bar{p}_2 = (\alpha_2 R_2 - 1)$ , whereas outsiders value these assets at  $\underline{p}_2 = \alpha_2(R_2 - \Delta_2) - 1$ .

Suppose that a proportion  $\sigma$  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  $\ell_1 = [(R_1 - 1) + \tau\alpha_2 R_2]$  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  $\bar{p}_2$  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  $k_1 \leq \underline{k}_1$ , where

$$\underline{k}_1 = \frac{\ell_1 - \sigma(\ell_1 + 1 + \bar{p}_2)}{(1 - \sigma)(\ell_1 + 1 + \bar{p}_2)}, \quad (5)$$

insiders purchase all failed firms and also buy back the assets that have been purchased by outsiders, at the fundamental price  $\bar{p}_2$ . This is associated with a full recovery from the crisis. Note that,  $\frac{\partial \underline{k}_1}{\partial \sigma} < 0$  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 pay at least the threshold value of  $\underline{p}_2$ . So, for  $k \in (\underline{k}_1, \bar{k}_1]$ , where

$$\bar{k}_1 = \frac{\ell_1 - \sigma(\ell_1 + 1 + \underline{p}_2)}{(1 - \sigma)(\ell_1 + 1 + \underline{p}_2)}, \quad (6)$$

the price is  $p_2^* = \left( \frac{(1-\sigma)(1-k_1)\ell_1}{(1-\sigma)k_1 + \sigma} - 1 \right)$ , and all assets are acquired by insiders.<sup>16</sup>

<sup>15</sup>Note that outsiders have operated these assets for one period so they may learn how to run these assets efficiently. Therefore, we allow for  $\Delta_2$ , possibly  $\Delta_2 < \Delta$ .

<sup>16</sup>For slightly 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.

## 4.2 Illiquidity and capital market breakdown

So far, we have examined the case where foreigners have unlimited funds 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,  $w \in (1, 1 + \underline{p})$ . 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 foreigner funds are limited, we have a fourth region for  $k > \bar{\bar{k}}$ , where  $\bar{\bar{k}} > \bar{k}$ , and

$$\bar{\bar{k}} = \frac{(R_0 - 1) + w}{\underline{p} + R_0}, \quad (7)$$

so that even with the injection of foreigners' funds, the price cannot be sustained at  $\underline{p}$  and is again strictly decreasing in  $k$  (see Figure 7). For  $k > \bar{\bar{k}}$ , 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  $\bar{q}$ . The aggregate shortage of liquidity affects not only the price of failed firms' assets but also the price of shares of surviving firms.

To put this argument more formally, recall that in the benchmark model with unlimited foreigners' funds, surviving firms issue  $\tau$  units of shares at a price  $\bar{q}$  to generate funds of  $\tau\bar{q}$  from foreigners. However, with limited foreigners' funds, for  $k > \bar{\bar{k}}$ , 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  $k > \bar{\bar{k}}$ , foreigners would not be willing to pay the full price of  $\bar{q}$  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. Below, we analyze this formally.

Let  $s$  be the proportion of shares issued by a surviving firm. Because of moral hazard we have:  $s \leq \tau$ .<sup>17</sup> 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  $[m(\bar{p} - p) - s(\bar{q} - q)]$ .

Note that in any equilibrium,  $q$  cannot exceed  $\bar{q}$ . Thus, we have  $q \leq \bar{q}$ , and surviving firms issue equity just enough for the asset purchase, not more. Using this, we can state a

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<sup>17</sup>We can also allow firms to generate funds against the assets they acquire, which does not change any of our results qualitatively. In that case, the analysis is as follows. A surviving firm has  $R_0$  units of funds from the first investment. If this firm purchases  $m$  units of assets, it can pledge a total of  $[(1 + m)\tau q]$  units of funds, where  $q$  is the price per unit of share issued. The firm needs  $[1 + (1 + p)m]$  units 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  $R_0 + (1 + m)\tau q \geq 1 + (1 + p)m$ . Thus, the firm can purchase at most  $m^* = \frac{\ell}{1 + p - \tau q}$  units of failed firms' assets at the price  $p$ .



surviving firm's maximization problem as:

$$\max_{m,s} m(\bar{p} - p) - s(\bar{q} - q) \quad (8)$$

$$\text{s.t.} \quad s \cdot q + R_0 - 1 \geq mp \quad (9)$$

$$s \leq \tau. \quad (10)$$

For  $q \leq (1 + p)$ , surviving firms cannot make positive profits by issuing equity to purchase assets. Thus, when  $q \leq 1 + p$ , we have  $s = 0$  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:

$$\max_{x,y} x(\underline{p} - p) + y(\bar{q} - q) \quad (11)$$

$$\text{s.t.} \quad xp + yq \leq w$$

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:

$$x(\underline{p} - p) + \left(\frac{w - xp}{q}\right)(\bar{q} - q) = x\left(\underline{p} - \frac{p\bar{q}}{q}\right) + w\left(\frac{\bar{q}}{q} - 1\right). \quad (12)$$

Thus, if  $p < \underline{p}$  and  $\underline{p}q > \bar{q}p$ , then foreigners use all their funds for the asset purchase, that is  $x = \frac{w}{p}$ . When  $p < \underline{p}$  and  $\underline{p}q < \bar{q}p$ , foreigners use all their funds for the equity purchase, that is  $y = \left(\frac{w}{q}\right)$ , and when  $\underline{p}q = \bar{q}p$ , 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:

$$(1 - k)s = y(q, p) \quad (\text{equity market}) \quad (13)$$

$$(1 - k)m + x(q, p) = k \quad (\text{asset market}) \quad (14)$$

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, for a large proportion of failures, the share price of surviving firms falls below  $\bar{q}$ . Furthermore, for low values of foreigners' funds, during severe crises, the capital market completely breaks down.

The price functions for failed firms' assets ( $p^*(k)$ ) and for shares of surviving firms ( $q^*(k)$ ) are formally stated in the following proposition and are illustrated in Figure 7.<sup>18</sup>

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

$$p^*(k) = \begin{cases} \bar{p} & \text{for } k \leq \underline{k} \\ \frac{\ell}{k} - (1 + \ell) & \text{for } k \in (\underline{k}, \bar{k}] \\ \underline{p} & \text{for } k \in (\bar{k}, \bar{\bar{k}}] \\ \frac{(R_0-1)+w}{k} - R_0 & \text{for } k > \bar{\bar{k}} \end{cases} \quad (15)$$

and

$$q^*(k) = \begin{cases} \bar{q} & \text{for } k \leq \bar{\bar{k}} \\ \mu p^*(k) & \text{for } k > \bar{\bar{k}} \text{ and } w \geq w^* \\ \mu p^*(k) & \text{for } k \in (\bar{\bar{k}}, k^*] \text{ and } w < w^* \\ \text{Market breaks down} & \text{for } k > k^* \text{ and } w < w^* \end{cases}, \quad (16)$$

where  $\mu = \frac{\bar{q}}{\underline{p}}$ ,  $w^* = \frac{\bar{q}}{\bar{q} - \underline{p}}$ , and  $k^* = \frac{(\bar{q} - \underline{p})(R_0 - 1 + w)}{\underline{p} + (\bar{q} - \underline{p})R_0}$ .

As Proposition 4 shows, when the proportion of failures is large, cash-in-the-market pricing creates profitable options for foreigners for asset purchases. Hence, in equilibrium, share price of surviving firms falls below their fundamental value  $\bar{q}$  to compensate foreigners for purchasing shares. In other words, surviving firms can raise equity financing only at discounts. Thus, limited funds within the whole system affects not only the price of failed firms' assets but also the price of shares of surviving firms. Furthermore, the discount surviving firms need to suffer in issuing equity is higher when the crisis is more severe (high  $k$ ).

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,  $q^*(k) < 1 + p^*(k)$ . Hence, the capital market breaks down completely (see Figure 8). 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  $k \in (\bar{\bar{k}}, k^*]$ , even though surviving firms need to suffer some discount, they can generate funds in the capital market and can purchase  $\frac{(1-k)[(R_0-1)+\tau q^*(k)]}{1+p^*(k)}$  units of failed firms' assets. The rest is

<sup>18</sup>Proposition 4 states the results for the case  $w \geq \tau \bar{q}$ . Similar results hold for  $w < \tau \bar{q}$ .

acquired by foreigners, that is,  $FDI = k(1 + p^*(k)) - (1 - k)[(R_0 - 1) + \tau q^*(k)]$ . However, for  $k > k^*$ , the capital market breaks down completely and the surviving firms are restricted to their first period profits for the asset purchase, that is, they can only purchase  $\frac{(1-k)(R_0-1)}{1+p^*(k)}$  units of failed firms' assets. Hence, at  $k = k^*$ , we have a structural break and  $FDI$  jumps to  $w$  since for  $k > k^*$ , all foreign funds enter the domestic economy in the form of FDI. Using the prices  $p^*(k)$  and  $q^*(k)$  in Proposition 4, for  $w < w^*$ , we get

$$FDI = \begin{cases} 0 & \text{for } k \leq \bar{k} \\ k(1 + \underline{p}) - (1 - k)\ell & \text{for } k \in (\bar{k}, \bar{\bar{k}}] \\ w - (1 - k)[\tau q^*(k)] & \text{for } k \in (\bar{\bar{k}}, k^*] \\ w & \text{for } k > k^* \end{cases}. \quad (17)$$

### 4.3 Differential efficiency among foreigners

It is possible that some foreigners are more efficient than domestic firms but they may not be able to enter the domestic market due to various costs of entry related with 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 such costs of 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 low that even inefficient foreigners may enter to take advantage of fire sales.<sup>19</sup>

To model this, we introduce differential levels of efficiency among foreigners and a 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  $\bar{\bar{p}}$  for failed firms, where  $\bar{\bar{p}} = \alpha_1(R_1 + \rho) - 1 > \bar{p}$ . Suppose that there is a cost of entry to the domestic market, where foreigners incur a cost of  $\gamma$  per unit of domestic asset acquired, with  $\gamma > \bar{\bar{p}} - \bar{p}$ . Hence, even efficient foreigners can enter only when prices fall below the price  $\tilde{p} = \bar{\bar{p}} - \gamma$ . To keep the notation simple and aligned with the benchmark model, we assume that  $\underline{p} = (\alpha_1(R_1 - \epsilon) - 1) - \gamma$ , so that inefficient foreigners enter the domestic market only when price is below  $\underline{p}$ .

<sup>19</sup>See Krugman (1998) and Loungani and Razin (2001) for a discussion.

As in the benchmark case, for  $k \leq \underline{k}$ , the price is set at  $p = \bar{p}$  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  $\tilde{p}$ , below which efficient foreigners have a positive demand. Formally, for  $k \in (\underline{k}, \tilde{k}]$ , where  $\tilde{k} = \frac{\ell}{\ell+1+\tilde{p}}$ , the price is set at  $p = \frac{\ell}{k} - (1 + \ell)$ , and again, all assets are acquired by surviving firms.

For  $k > \tilde{k}$ , surviving firms cannot pay the threshold price of  $\tilde{p}$  for all assets and profitable options emerge for efficient foreigners. Hence, for  $k > \tilde{k}$ , 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  $\tilde{p}$  for  $k \in (\tilde{k}, \tilde{\tilde{k}}]$ , where  $\tilde{\tilde{k}} = \frac{\ell+w_e}{\ell+1+\tilde{p}}$ . However, for  $k > \tilde{\tilde{k}}$ , the injection of efficient foreigners' funds is not enough to keep the price at  $\tilde{p}$  and the price starts to fall again. In particular, for  $k \in (\tilde{\tilde{k}}, \hat{k}]$ , where  $\hat{k} = \frac{\ell+w_e}{\ell+1+p}$ , the price is again strictly decreasing in  $k$  and is given by  $p^* = \frac{\ell+w_e}{k} - (1 + \ell)$ .

For  $k > \hat{k}$ , surviving firms and efficient foreigners cannot pay the threshold price of  $p$  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 9.

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

$$p^*(k) = \begin{cases} \bar{p} & \text{for } k \leq \underline{k} \\ \frac{\ell}{k} - (1 + \ell) & \text{for } k \in (\underline{k}, \tilde{k}] \\ \tilde{p} & \text{for } k \in (\tilde{k}, \tilde{\tilde{k}}] \\ \frac{\ell+w_e}{k} - (1 + \ell) & \text{for } k \in (\tilde{\tilde{k}}, \hat{k}] \\ \underline{p} & \text{for } k > \hat{k} \end{cases} . \quad (18)$$

An interesting observation is that when the crisis is not very severe, that is, for  $k \in (\tilde{k}, \hat{k}]$ , 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.

## 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 cash-flow stakes; and (iii) “flipping” of assets acquired in fire sales once prices rebound.

## 5.1 FDI vs. FPI during crises

On the first implication of our model, we have already discussed briefly Table 1 and Figure 1 in the Introduction. Here, we relate Figure 1b showing the switch in the sign of the correlation between FPI and FDI to our theoretical analysis, captured in Figures 6 and 8. Figure 6, for example, 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 8, 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. Figure 1b showing the correlation between FPI and FDI for South Korea captures these patterns.<sup>20</sup> 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.<sup>21</sup> Krugman shows that a similar, though probably less marked, boom in

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<sup>20</sup>Also see Smith and Valderrama (2009) who look at the degree of substitutability and complementarity between different forms of foreign investments. However, they use 10 year rolling correlations between FDI and FPI rather than focusing on the correlation during crisis and non-crisis periods separately.

<sup>21</sup>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 anecdotal 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 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.

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 (Box 1 on page 15 of the report). The report also 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. 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 flows and bank lending. In particular, investment flows into Asia following the crisis of 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 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.<sup>22</sup>

## 5.2 Acquisitions during crises

The second implication of our model is that during crisis times, acquisitions are associated with higher levels of shares acquired in target firms, and FDI inflows, on average, are associated with foreigners acquiring controlling stakes, whereas FDI inflows during normal times are associated with smaller stakes, not necessarily granting control.

The Asian financial crisis of 1997-8 is an ideal setting for this inquiry. Unlike the textbook financial crises that have a fiscal origin (via the budget deficit of the government), the Asian financial crisis has often been viewed primarily as a liquidity crisis that hit the financial sector, and which was amplified by the currency crisis that fuelled the distress on the banking sector's balance sheet. Both the severity of the crisis, as well as the sharp V-shaped recovery that ensued is indicative of the many of the forces that we have worked out in our theoretical model. For these reasons, we believe the Asian financial crisis and its resolution to be a good testing bed for the applications of our concepts.

Our dataset is from Thompson Financial Securities Data Company's (SDC) mergers and acquisition database. SDC reports detailed information about the target and the acquiring firm, including income statement and balance sheet items, industry, and ownership. Public and private transactions are all included. Given the focus of our paper, we analyze Mergers and Acquisitions (M&A) transactions in which the target firms are in those Asian countries most affected by the crisis, such as Malaysia, Thailand, Indonesia, South Korea and the Philippines, as well as other countries in the region that did not suffer so much - Singapore, Vietnam, Cambodia, Myanmar (Burma), Brunei, and Laos. Our sample includes all acquisitions that were completed during 1991 and 2000. This choice of sample period enables us to compare the patterns in takeovers around the Asian financial crisis (1996-200) with those

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<sup>22</sup>Our conclusions would be further strengthened if the exchange rate of a country is also hit by the financial crisis. This is because the dollar price of the target firm will fall as the price of the target firm falls in local currency terms and also as the exchange rate moves in favor of the foreign acquirers paying dollars. Indeed, the exchange rate effect on FDI has been observed for the FDI flows into the United States. Froot and Stein (1991) show that FDI flows into the U.S. are negatively correlated with the value of the US dollar, while FPI in the same period is positively correlated with the value of the U.S. dollar (though insignificant). Also, Blonigen (1997), using data from 1975-1992, find evidence in support of the hypothesis that real dollar depreciations make Japanese acquisitions more likely in U.S. industries. The exchange rate movements associated with the Asian financial crisis were much sharper, and so we may expect the exchange rate effects to have been significant.

before the Asian financial crisis (1991-1995). While we have ownership and transaction information on most of the deals, income statement and balance sheet items are missing for a number of deals because many of the targets are private firms. Hence, we primarily focus on ownership and transaction patterns in the data.

In Table 2, we provide a summary of our sample. The deals are categorized by the target's nation and the year of acquisition. In total, we have 6955 completed deals, 67% of which are domestic acquisitions (target and acquirer firms are from the same country) and 33% of which are foreign acquisitions (target and acquirer firms are from different countries). In the sample, 40.3% of target firms are in Malaysia, 22.3% in Singapore, 11.1% in Thailand, 9.0% in South Korea, 8.6% in the Philippines, 7.3% in Indonesia, and less than 1% in Vietnam, Cambodia, Myanmar (Burma), Brunei, and Laos. The median Enterprise value is \$309 million and the median Transaction value is \$8.4 million.<sup>23</sup>

Table 3 breaks up the acquisitions into Domestic acquisitions, Regional acquisitions (within Southeast Asia but not domestic) and Foreign acquisitions. In Panel A, we compare the total number of deals that took place during the financial crisis (1996-2000) with that before the crisis (1991-1995). In Panel B, we compare the total value of the acquisitions (measured by transaction value) between the same two periods. By number of deals (Panel A), domestic acquisitions fell from 72.4% of all acquisitions in 1991-1995 to 67.6% of all acquisitions in 1996-2000, and foreign acquisitions climb from 20.3% of all acquisitions to 25.8% of all acquisitions. These percentages are much more striking by total deal value (Panel B). Based on transaction values, the total value of domestic acquisitions fell from 81.3% of the total value of all acquisitions in 1991-1995 to 60.9% in 1996-2000. The total value of foreign acquisitions, on the other hand, climbed from 15.9% of the total value of all acquisitions in 1991-1995 to 35.1% in 1996-2000. Tests of crisis and pre-crisis values show that the fall of domestic acquisitions and the rise of foreign acquisitions are both highly significant (in deal number and deal value). Figure 10 further supports the findings in Table 3 by illustrating that foreign acquisitions rose sharply after 1996. As measured by deal number, only 13.6% of acquisitions are made by foreign acquirers in 1995. In 1998, foreign acquirers' share jumped to 32%. Again, the magnitude of the rise is even more striking when measured by deal value. As a percentage of total deal value (measured by transaction value), foreign acquisitions accounted for only 7.2% of acquisitions in 1994. But in 1998, this figure increased to 47.3%.

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<sup>23</sup>Enterprise value is a measure of a company's value, and it is calculated as market capitalization plus debt, minority interest and preferred shares, minus total cash and cash equivalents. Enterprise value can be thought as the theoretical takeover price. Transaction value, on the other hand, is the actual price paid by the acquirer to the target for the portion of equity stake acquired. Transaction value and enterprise value can differ for at least two reasons. First, enterprise value measures the value of the entire firm, whereas transaction value measures only the portion of equity acquired. Second, transaction value includes potential synergies from the merger and is affected by the bargaining powers of the parties involved.



This signifies the role of foreign entry following the crisis and the suitability of this period for studying its characteristics and implications.

Next, we provide evidence that acquirers took larger stakes in their target firms during the Asian financial crisis. Table 4 reports the summary statistics for the average shares acquired, shares sought, and shares owned of our sample acquisitions. Looking at the 1991-1995 (non-crisis) period and the 1996-2000 (crisis) period, we observe that a higher percentage of shares was acquired in the crisis period. For Southeast Asian acquirers, the average shares acquired was 63.4% in 1996-2000 and 56.1% in 1991-1995. For foreign acquirers, the average shares acquired was 53.3% in 1996-2000 and 47.2% in 1991-1995. A test of the means across the two periods show that the increase in shares acquired in 1996-2000 was significant. The reported results for shares sought and shares owned are very similar. These figures also increased significantly during the financial crisis. Figure 11 plots the yearly average of shares acquired across 1991-2000. We observe that the average shares acquired by both foreign and domestic acquirers in every year after 1996 are higher than those in every year before 1996. In particular, the average shares acquired were at their highest levels in 1998, which coincides with the peak of the crisis.

We also perform probit regressions, where the dependent variable is the percent shares acquired in South East Asia for the period 1991-2000. As the right-hand-side variables, we use the dummy *Crisis*, which equals 0 if the acquisition took place in 1991-1995 and equals 1 if the acquisition took place in 1996-2000; the dummy *Foreign* that equals 0 if the acquirer is from Southeast Asia and equals 1 if the acquirer is not from Southeast Asia; and the interaction dummy *Foreign \* Crisis*. Results are reported in Table 5, where the standard errors are clustered by the interaction of the target nation and the year of acquisition.

The positive and significant coefficient on the *Crisis* dummy indicates that firms acquired larger shares in their targets during the crisis, which substantiates our earlier results presented in Tables 3 and 4, and Figures 10 and 11. The coefficient on the *Foreign* dummy is negative, which indicates that the foreign acquirers on average take a smaller share compared to the acquirers from Southeast Asia for the whole sample of 1991-2000, which again confirms our earlier results. The insignificant loading on *Foreign \* Crisis* indicates that, in 1996-2000, while both foreign and Southeast Asian acquirers increased their shares acquired, we do not observe significant differences between the increase in shares acquired by foreign and Southeast Asian acquirers. When we repeat the estimation for the deals from the Asian nations that suffered most severely from the crisis (column (4)) and when we add country fixed effects (column (5)), we do not observe any significant changes in the results.

Overall, our empirical findings indicate that acquirers took larger stakes in their target firms during the Asian financial crisis. These findings are supportive of the key assumptions and the results of our theoretical analysis on asset sales during crises, fire sales, and entry of

outsiders and foreign institutions.

In related evidence, 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, increases, which is a common feature of financial crises. While they show that including a dummy for whether the acquirer had the majority control after the acquisition renders the coefficient on the spread insignificant, it should be noted that it is more likely that the acquirers can get the majority control during crisis periods, as evidence provided from our empirical results, and as Aguiar and Gopinath (2005) suggests. Hence, combined with the evidence we provide and Aguiar and Gopinath (2005), we can interpret their findings as further evidence for our results.

This ownership with 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.<sup>24</sup> 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 who invest indirectly through FPI. However, this generates a lemon's 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.<sup>25</sup> 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.

### 5.3 Flipping

We now turn to perhaps the most distinctive prediction of our theory as compared to the previous literature - namely that assets acquired during a crisis are subsequently re-sold, or "flipped", once the crisis abates and prices rebound to the reservation price of the high-value

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<sup>24</sup>For an introduction to this issue, see Albuquerque (2003).

<sup>25</sup>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.

owner of the assets. We provide evidence of such flipping from data on the purchase and re-sale of firms associated with the Asian financial crisis. We examined firms that were first sold during the period 1996-2000, which were then subsequently re-sold to a second acquirer. Our search yielded 272 such firms which changed hands twice or more after 1996.

Figure 2A provides a summary graph for succinct evidence for such flipping in the aftermath of the Asian financial crisis. To be precise, it defines a “flip” as the subsequent sale (2001 onwards) for an acquisition that occurred during the crisis period (1996-2000). We employ the standard definition of a controlling acquisition as corresponding to a purchase of at least 10% of the target, but also a variant which requires the controlling acquisition to be at least 25% of the target. The identity of the first acquirer during the crisis period is then used to classify all acquisitions into Domestic acquisitions and Foreign acquisitions. 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.

There is clear evidence of greater flipping for targets acquired by foreign firms during the crisis period. In Figure 2A, we observe that foreign deals are flipped more often than domestic deals starting from year one, and the gap between the two only widens as more time elapses, especially after the fourth year. By ten years since acquisition, 10.07% of foreign deals get flipped as compared to 5.75% of domestic deals.

Figure 2B presents the evidence on flipping in a slightly different way. It plots the incidence of flipping within the 1996 - 2000 period as well as those re-sales that happened from 2001 onwards. The plots are again sub-divided into those cases where the acquirer’s stake exceeded 10% from those cases where the acquirer’s stake exceeded 25%. The evidence of Figure 2A appears overall robust in Figure 2B, that is, robust to whether re-sales within the crisis period are considered as flips or not.

To provide convincing evidence that more deals are flipped by foreign acquirers than by domestic acquirers *during a financial crisis*, we show that the flipping pattern is not present in non-crisis periods. To this end, we use the data on deals that occurred during the pre-crisis period of 1991-1995 from SDC Platinum and repeated our flipping analysis. We find that foreign acquirers did not flip more often than domestic acquirers during 1991-1995. Figures 3A and 3B are counterparts of Figures 2A and 2B, and they show that the percentage of domestic flip is actually slightly higher than that of foreign flip. This finding is the opposite of that found during the 1996-2000 period, supporting the model’s prediction that foreign buyers flip more often when the initial acquisition took place during the crisis period (when assets are available at fire-sale prices).

As a further robustness check, we divided our sample into deals from Asian countries that suffered severely from the Asian financial crisis (Indonesia, Malaysia, Philippines, Thailand, South Korea) and deals from other Southeast Asian countries that were not as severely

affected by the crisis. Our goal is to show that our main findings are driven by deals from countries that suffered severely from the crisis. Figure 12A shows that, for the severe crisis countries, 10.68% of foreign deals are flipped, much higher compared to the 5.47% of domestic firms that are flipped. Note that this flipping-rate difference is slightly higher than that of the overall sample. On the contrary, Figure 12B shows that, for the mild crisis countries, flipping rates are not different between foreign and domestic acquirers. Finally, Figure 13A and 13B replicate Figure 12A and 13B with the 1991-1995 (pre-crisis) sample period. Just as in the overall sample, we find that in neither the high-crisis nor non-crisis nations, foreign acquirers flipped more than domestic acquirers during 1991-1995.

A few descriptive statistics about the flipped deals are interesting and consistent with the mechanism outlined in our theory. 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, conditional on there being a flip, over 70% of the flips by foreign acquirers involve sales to domestic acquirers (Tables 6A and 6B). Specifically, in our sample, out of 93 flips where the first (during the crises) acquirer is a foreign firm, in 66 cases the second acquirer is a non-foreign firm, that is, a domestic firm. In contrast, out of 157 flips where the first acquirer is a domestic firm, only 27 cases get flipped to a foreign firm (17.2% of the flips by domestic acquirers). Third, the result on greater flipping by foreign acquirers during crisis is also robust to employing a majority stake of 50% being employed as the threshold for identifying controlling acquisitions.

These descriptive figures and tables provided preliminary evidence that foreign buyers flipped more often than domestic buyers during the Asian financial crisis. From an econometric standpoint, the question is whether this difference is statistically significant. We run the following probit regression on acquisitions made during 1996-2000:

$$Pr[Flip = 1] = f(Foreign) + e. \tag{19}$$

The above equation represents the probability of flipping of a deal as a function of whether its acquirer is foreign or domestic. *Flip* equals one if the deal is eventually flipped and equals zero if the deal is not flipped, and *Foreign* is a dummy variable that equals zero if the acquirer is from Southeast Asia (including South Korea) and equals one if the acquirer is not from Southeast Asia.

Table 7 column (1) presents the estimation results. The standard errors are clustered by the interaction of the target nation and the year of acquisition. We observe that the estimated coefficient of *Foreign* is 0.259 and is highly significant. This indicates that the flipping rate of foreign buyers is statistically significantly higher than that of domestic buyers. When we repeat the estimation for the sample of deals from the Asian nations that suffered most severely from the crisis (Indonesia, Malaysia, Philippines, Thailand, South Korea), we find stronger results. Table 7 column (2) shows that the estimated coefficient of *Foreign* is

0.303 for this high-crisis sample.

To substantiate the earlier evidence that foreign firms flipping more is a phenomenon restricted to the financial crisis period, we modify the test as follows:

$$Pr[Flip = 1] = f(Foreign + Crisis + Foreign * Crisis) + e. \quad (20)$$

We estimate this equation using all deals completed from 1991 to 2000. For each deal, *Crisis* equals one if it took place in 1996-2000 and equals zero if it took place in 1991-1995. The *Crisis* variable is then interacted with *Foreign*. Table 7 column (3) reports the estimation result. The standard errors are again clustered by the interaction of the target nation and year of acquisition. We observe that the estimated coefficients of *Foreign* and *Foreign \* Crisis* are -0.10 and 0.357. The coefficient on *Foreign* is insignificant, which suggests that, overall, foreign acquirers did not flip more than domestic acquirers. The positive and significant loading on *Foreign \* Crisis* indicates that it is only in 1996-2000, that foreign acquirers flipped more than domestic acquirers. When we repeat the estimation for the sample of deals from the Asian nations that suffered most severely from the crisis, we find similar results (Table 7 column (4)). We repeat the estimation by adding a country fixed effect in column (5) and country and time fixed effects in column (6). The country fixed effect controls for the target's nation and the time fixed effect controls for the year of acquisition. The results in columns (5) and (6) are very close to that in column (3).

Overall, raw descriptive evidence as well as econometric evidence is supportive that flipping of acquisitions made by foreign firms during a financial crisis is a robust economic phenomenon. Anecdotal evidence from foreign takeovers in the banking sector reinforces these points. In South Korea, the activities of foreign private equity firms in the Korean banking sector has been a contentious issue. 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)<sup>26</sup> 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.<sup>27</sup> 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)<sup>28</sup> reports Lone Star Funds' plans to sell Kukdong En-

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<sup>26</sup>International Herald Tribune, January 13, 2006, "Lone Star to sell its stake in Korea Exchange Bank".

<sup>27</sup>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.

<sup>28</sup>Financial Times, April 5, 2007, "Lone Star looks at sale of S. Korean companies".

gineering & 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 9, 2005)<sup>29</sup> 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.<sup>30</sup> 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 a return of 2.3 times its original KorAm investment of \$430 million in 2000.<sup>31</sup>

During the ongoing sub-prime crisis too, two New York private equity firms, J.C. Flowers & Co. and Cerberus Capital Management, both with long track records for snapping up troubled banks around the world, were potential bidders for Northern Rock, the fifth-largest mortgage lender in the UK that experienced bank runs in September 2007.<sup>32</sup> While such anecdotal evidence cannot be fully conclusive, when combined with our empirical evidence from the SDC database, they reinforce the main message of our paper and highlight the importance of financial distress as a determinant of FDI.

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<sup>29</sup>Financial Times, January 9, 2005: “Standard Chartered to acquire Korea First Bank for \$3.3bn”.

<sup>30</sup>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.

<sup>31</sup>While there may be alternative explanations for foreign investors flipping their domestic acquisitions, empirical and anecdotal evidence does not support such explanations. One possible explanation can be that during a crisis it is much more difficult to ascertain the quality of potential acquisition targets compared the normal times. Hence, foreign investors can make poor choices during crises and sell their assets at the first opportunity. However, the evidence from Aguiar and Gopinath (2005) discussed in Section 5.1 and the (anecdotal) evidence here about the profits foreign investors make through acquisitions and subsequent flipping does not support this alternative explanation. Another possibility is related with the definition of FDI, that is, investments over the 10 percent equity threshold. However, the evidence presented in section 5.2 shows that the acquisitions during the crisis years 1996-2000 represented, on average, stakes greater than 50 percent. Furthermore, our flipping results are robust when we use the 25 percent equity threshold.

<sup>32</sup>See, for instance, *Wall Street Journal*, October 4, 2007: “U.S. firms circle Northern Rock”. The article says that: “A deal, like many distressed sales of banks, would mean they invest some money to prop up the bank, and when the market returns to normal levels, they could profit from selling the bank again.”

## 6 Concluding Remarks

Our theoretical framework focuses attention on the key difference between portfolio capital flows and FDI in terms of their implications for control. This leads to important implications for our understanding of financial flows. For instance, a key prediction of our model is that the FDI inflows that occur during financial crises should be associated with the acquisition of stakes that grant control, rather than simply being acquisition of cash-flow stakes. The theoretical framework also highlights the negative relationship between capital flows and FDI: 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 and the latter is in fact a manifestation of deteriorating fundamentals. The role of such 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, and in the process, documenting the interesting finding that foreign acquisitions are flipped back quickly to domestic firms when crisis abates and fundamentals improve.

Finally, the key messages of our model find more general application, for example, to the ongoing sub-prime crisis where banks have struggled to raise external finance, except at significant dilution costs, and been forced to sell large stakes to experienced investors such as private equity funds or passive, outside investors such as sovereign wealth funds. On the one hand, our model helps understand these flows – that agency problems in distress prevent arm’s length investors from providing much finance, but that transfer of significant control could get around these agency costs. On the other hand, by modeling the critical factors that determine efficiency of such flows, namely the extent of fire-sale discounts and the expertise of buyers relative to distressed insiders, our model offers a framework to analyze normative issues. For example, what are the welfare implications of the relaxation of restrictions in the United States on private equity investments in banking companies? We hope to apply our model to such other contexts in future work.

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

Country	Thailand	Philippines	Malaysia	Korea	Indonesia
<b>1980-1995, 2001-2005</b>					
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
<b>1996-2000</b>					
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.

**Table 2: Summary of Deals by Target Nations**

Target Nation	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total Obs.	Total %	Median Ent. Value (\$mil)	Median Trans. Value (\$mil)	% Domestic Acq.	% Foreign Acq.
Malaysia	130	59	120	183	366	504	431	358	356	298	2805	40.33	342.89	5.91	86.10	13.90
Singapore	91	97	104	123	146	144	144	170	263	269	1551	22.30	241.70	5.55	64.86	35.14
Thailand	22	23	29	37	78	48	90	164	158	124	773	11.11	179.09	10.14	51.62	48.38
South Korea	22	7	12	16	33	44	44	98	179	171	626	9.00	2170.56	38.37	47.76	52.24
Philippines	17	9	30	41	82	99	56	70	112	83	599	8.61	295.49	11.00	55.43	44.57
Indonesia	29	18	29	33	50	84	74	61	53	76	507	7.29	1366.27	16.80	38.86	61.14
Vietnam	0	1	8	10	3	7	6	3	17	5	60	0.86	*	1.27	25.00	75.00
Cambodia	0	0	1	1	1	3	2	1	1	2	12	0.17	*	0.36	16.67	83.33
Myanmar	2	0	2	0	2	1	3	1	0	0	11	0.16	*	4.68	9.09	90.91
Brunei	0	0	1	0	0	0	0	4	1	2	8	0.12	*	1.17	0.00	100
Laos	0	0	1	0	0	0	0	0	0	2	3	0.04	*	10.20	0.00	100
Total	313	214	337	444	761	934	850	930	1140	1032	6955	100	308.93	8.42	67.09	32.91

\* Data is missing.

**Table 3: Summary of Deals by Acquirer Type****Panel A: Total Deal Count**

Acquisition Type	Crisis (1996-2000)		Non-crisis (1991-1995)		Crisis - Non-crisis
	Deals (#)	Deals (%)	Deals (#)	Deals (%)	Diff (Deals (%))
Domestic	3218	67.6%	1448	72.4%	-4.8%***
Within SE Asia (but not domestic)	312	6.6%	146	7.3%	-0.7%
Foreign	1230	25.8%	406	20.3%	5.5%***
Total	4760	100.0%	2000	100.0%	

**Panel B: Total Deal Value ((Transaction Value (\$mil))**

Acquisition Type	Crisis (1996-2000)		Non-crisis (1991-1995)		Crisis - Non-crisis
	Total Value (\$mil)	Total Value (%)	Total Value (\$mil)	Total Value (%)	Diff (Total Value (%))
Domestic	106,388	60.9%	44,329	81.3%	-20.4%***
Within SE Asia (but not domestic)	6,967	4.0%	1,533	2.8%	1.2%**
Foreign	61,352	35.1%	8,668	15.9%	19.2%***
Total	174,707	100.0%	54,530	100.0%	

**Table 4: Summary Statistics of Shares Acquired, Owned, and Sought****Panel A: Southeast Asian Acquirers**

	All			Crisis (1996-2000)			Non-crisis (1991-1995)			Crisis - Non-crisis
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Diff (Mean)
Shares Acquired (%)	61.1	60	36.7	63.4	66.7	36.5	56.1	51	36.6	7.3***
Shares Owned (%)	66.6	75	35.0	69.3	88	34.5	60.6	60	35.5	8.7***
Shares Sought (%)	61.3	60	36.6	63.4	67	36.5	56.8	51	36.3	6.6***

**Panel B: Foreign Acquirers**

	All			Crisis (1996-2000)			Non-crisis (1991-1995)			Crisis - Non-crisis
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Diff (Mean)
Shares Acquired (%)	51.8	49	35.1	53.3	49	35.4	47.2	40	34.0	6.2***
Shares Owned (%)	58.4	51	35.8	60.9	55.1	35.7	50.9	49	35.0	10.0***
Shares Sought (%)	52.4	49	35.1	53.7	50.0	35.4	48.4	44.2	34.1	5.3**

**Table 5: Determinants of Shares Acquired (%)**

This table analyses the shares acquired (%) in acquisitions as a function of the time period (1996-2000 vs. 1991-1995) and the acquire type (domestic vs. foreign). The six columns report the estimation results (coefficients and p-values) of six different probit regressions. Column (1) analyses only acquisitions made in 1996-2000. It models % shares acquired as a function of whether the acquirer is foreign or domestic as follows:

$$Acq\%_i = f(Foreign_i) + e_i$$

The above is a probit regression, in which  $Acq\%_i$  is the % of shares acquired and  $Foreign_i$  is a dummy variable that equals zero if the acquirer is from Southeast Asia (including South Korea) and equals one if the acquirer is not from Southeast Asia.

Column (2) repeats the estimation of (1), but only with deals from the Asian nations that suffered most severely from the Asian financial crisis (Indonesia, Malaysia, Philippines, Thailand, South Korea). Column (3) analyses all acquisitions from 1991-2000, and adds a crisis period dummy, and an interaction of the crisis dummy with  $Foreign_i$  as follows:

$$Acq\%_i = f(Foreign_i + Crisis_i + Foreign_i * Crisis_i) + e_i$$

In the above,  $Crisis_i$  equals one if the acquisition took place in 1996-2000 and equals zero if it took place in 1991-1995.

Column (4) repeats the estimation of (3), but only with deals from the Asian nations that suffered most severely from the Asian financial crisis (Indonesia, Malaysia, Philippines, Thailand, South Korea). Column (5) adds a country fixed effect to (3) to control for the target's nation. Column (1) is estimated from 4450 observations, column (2) from 3494 observations, columns (3) and (5) from 6317 observations, and column (4) from 4826 observations.

		(1)	(2)	(3)	(4)	(5)
<b>Constant</b>	Coefficient	0.212	0.206	0.08	0.114	
	p-value	<.0001	0.0004	0.115	0.083	
<b>Foreign</b>	Coefficient	-0.147	-0.217	-0.161	-0.261	-0.133
	p-value	0.0003	<.0001	0.04	0.009	0.082
<b>Crisis</b>	Coefficient			0.133	0.093	0.155
	p-value			0.054	0.287	0.005
<b>Foreign * Crisis</b>	Coefficient			0.014	0.045	-0.009
	p-value			0.876	0.675	0.917
<b>Country fixed-effects</b>						x
<b>Crisis nations only</b>			x		x	

**Table 6A: Purchase and subsequent re-sale in terms of the origin of the acquirers**

		2nd Acquirer		
		Domestic	Foreign	Total
<b>1st Acquirer</b>	<b>Domestic</b>	130	27	157
	<b>Foreign</b>	66	27	93
	<b>Total</b>	196	54	250

**Table 6B: Purchase and subsequent re-sale in terms of the origin of the acquirers (%)**

		2nd Acquirer	
		Domestic	Foreign
<b>1st Acquirer</b>	<b>Domestic</b>	82.8%	17.2%
	<b>Foreign</b>	71.0%	29.0%

**Table 7: Determinants of the probability of flipping**

This table analyses the flipping rates of domestic and foreign buyers. The six columns report the estimation results (coefficients and p-values) of six different probit regressions. Column (1) analyses only acquisitions made in 1996-2000. It models the probability of flipping as a function of whether the acquirer is foreign or domestic as follows:

$$Acq\%_i = f(Foreign_i) + e_i$$

The above is a probit regression, in which  $Flip_i$  equals one if the deal is flipped and equals zero if the deal is not flipped.  $Foreign_i$  is a dummy variable that equals zero if the acquirer is from Southeast Asia (including South Korea) and equals one if the acquirer is not from Southeast Asia.

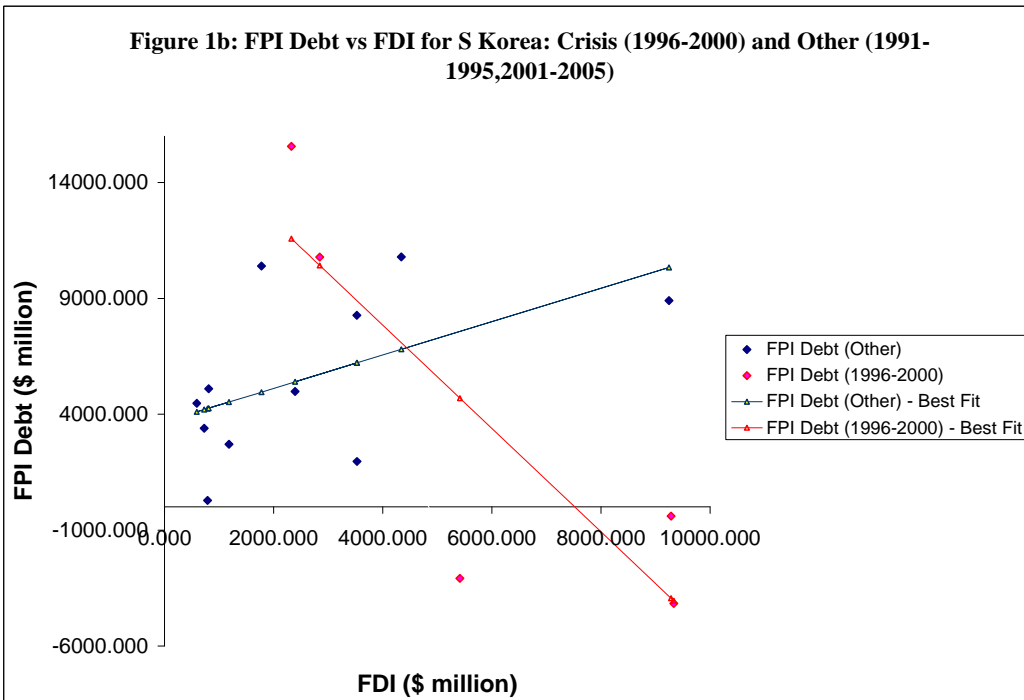
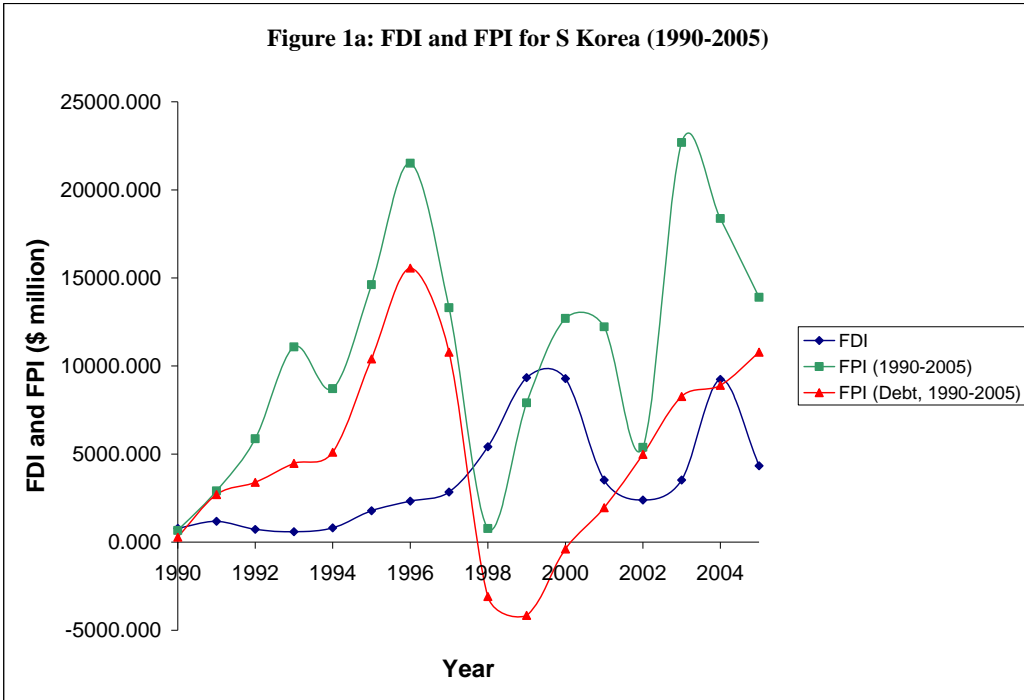
Column (2) repeats the estimation of (1), but only with deals from the Asian nations that suffered most severely from the Asian financial crisis (Indonesia, Malaysia, Philippines, Thailand, South Korea). Column (3) analyses all acquisitions from 1991-2000, and adds a crisis period dummy, and an interaction of the crisis dummy with  $Foreign_i$  as follows:

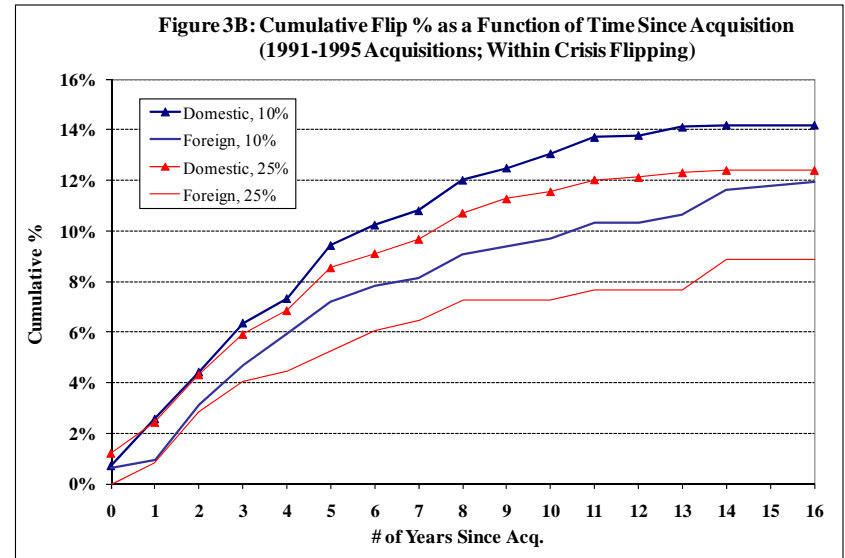
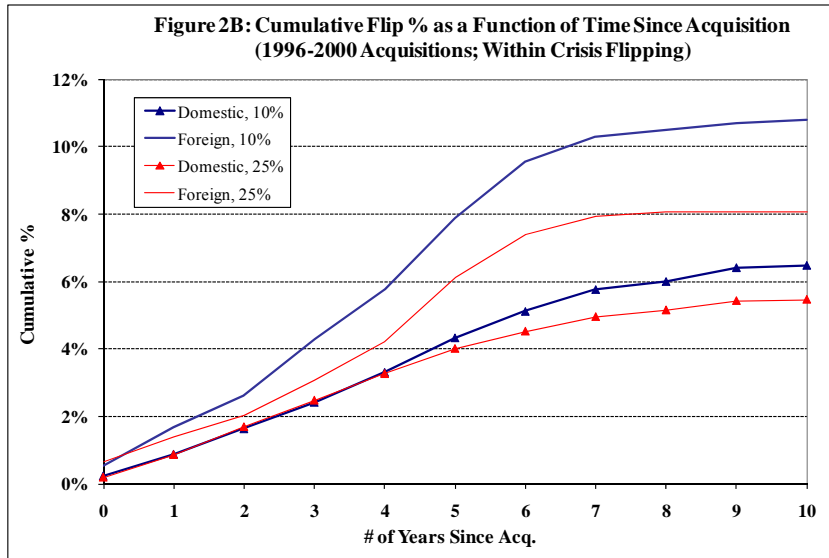
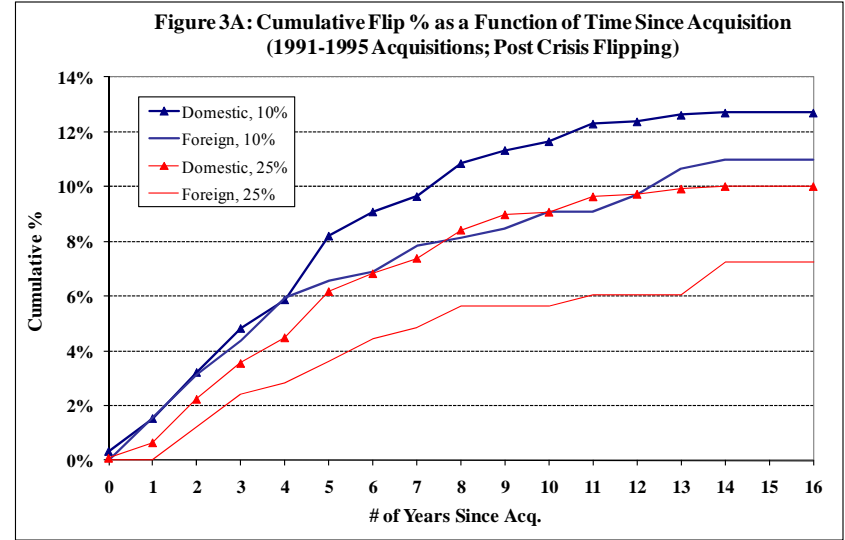
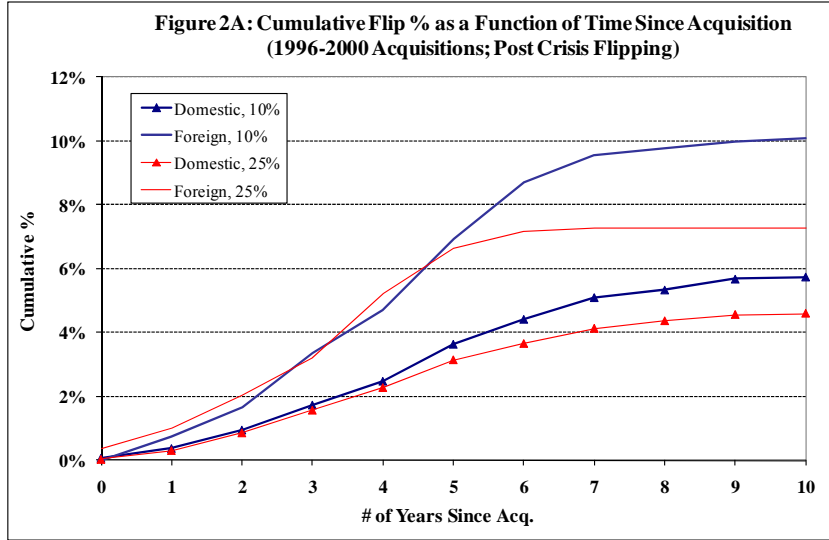
$$Pr (Flip_i=1)=f(Foreign_i + Crisis_i + Foreign_i *Crisis_i) + e_i$$

In the above,  $Crisis_i$  equals one if the acquisition took place in 1996-2000 and equals zero if it took place in 1991-1995.

Column (4) repeats the estimation of (3), but only with deals from the Asian nations that suffered most severely from the Asian financial crisis (Indonesia, Malaysia, Philippines, Thailand, South Korea). Column (5) adds a country fixed effect to (3) to control for the target's nation. Column (6) has both country and time fixed effects. The time fixed effect is added to control for the year of acquisition. Column (1) is estimated from 3981 observations, column (2) from 3094 observations, columns (3), (5), and (6) from 5454 observations, and column (4) from 4233 observations.

		(1)	(2)	(3)	(4)	(5)	(6)
<b>Constant</b>	Coefficient	-1.540	-1.549	-1.110	-1.101		
	p-value	<.0001	<.0001	<.0001	<.0001		
<b>Foreign</b>	Coefficient	0.259	0.303	-0.102	-0.035	-0.107	-0.099
	p-value	<.0001	<.0001	0.428	0.807	0.235	0.277
<b>Crisis</b>	Coefficient			-0.427	-0.446	-0.426	
	p-value			<.0001	<.0001	<.0001	
<b>Foreign * Crisis</b>	Coefficient			0.357	0.335	0.327	0.314
	p-value			0.012	0.033	0.004	0.005
<b>Time fixed-effects (acquisition year)</b>							x
<b>Country fixed-effects</b>						x	x
<b>Crisis nations only</b>			x		x		







$t = 0$	$t = 1$	States
	<ul style="list-style-type: none"> <li>Returns from the risky investments are realized.</li> </ul>	$k \leq \underline{k}$ <ul style="list-style-type: none"> <li>Price is the full price, <math>\bar{p}</math>.</li> <li>All assets are purchased by surviving firms.</li> </ul>
<ul style="list-style-type: none"> <li>Domestic firms invest in risky projects using their own capital.</li> </ul>	<ul style="list-style-type: none"> <li>A proportion <math>k</math> of domestic firms fail.</li> </ul>	$\underline{k} < k \leq \bar{k}$ <ul style="list-style-type: none"> <li>Price is decreasing as a function of <math>k</math> but is still above the threshold value of foreigners, <math>\underline{p}</math>.</li> <li>All assets are purchased by surviving firms.</li> </ul>
	<ul style="list-style-type: none"> <li>Failed firms are auctioned to surviving firms and foreigners.</li> </ul>	$k > \bar{k}$ <ul style="list-style-type: none"> <li>Price is the threshold value of foreigners, <math>\underline{p}</math>.</li> <li>Some assets are purchased by foreigners.</li> </ul>

Figure 4: Timeline of the benchmark model.

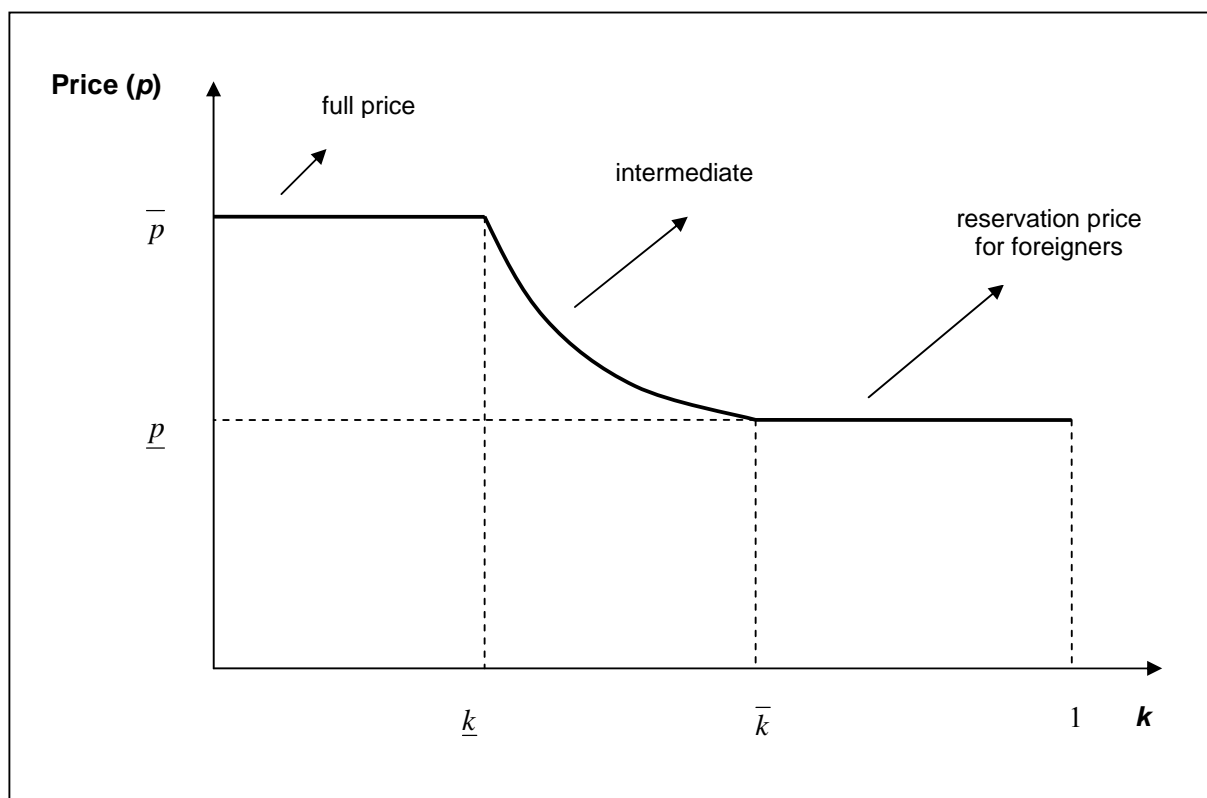


Figure 5: Price in Proposition 2.

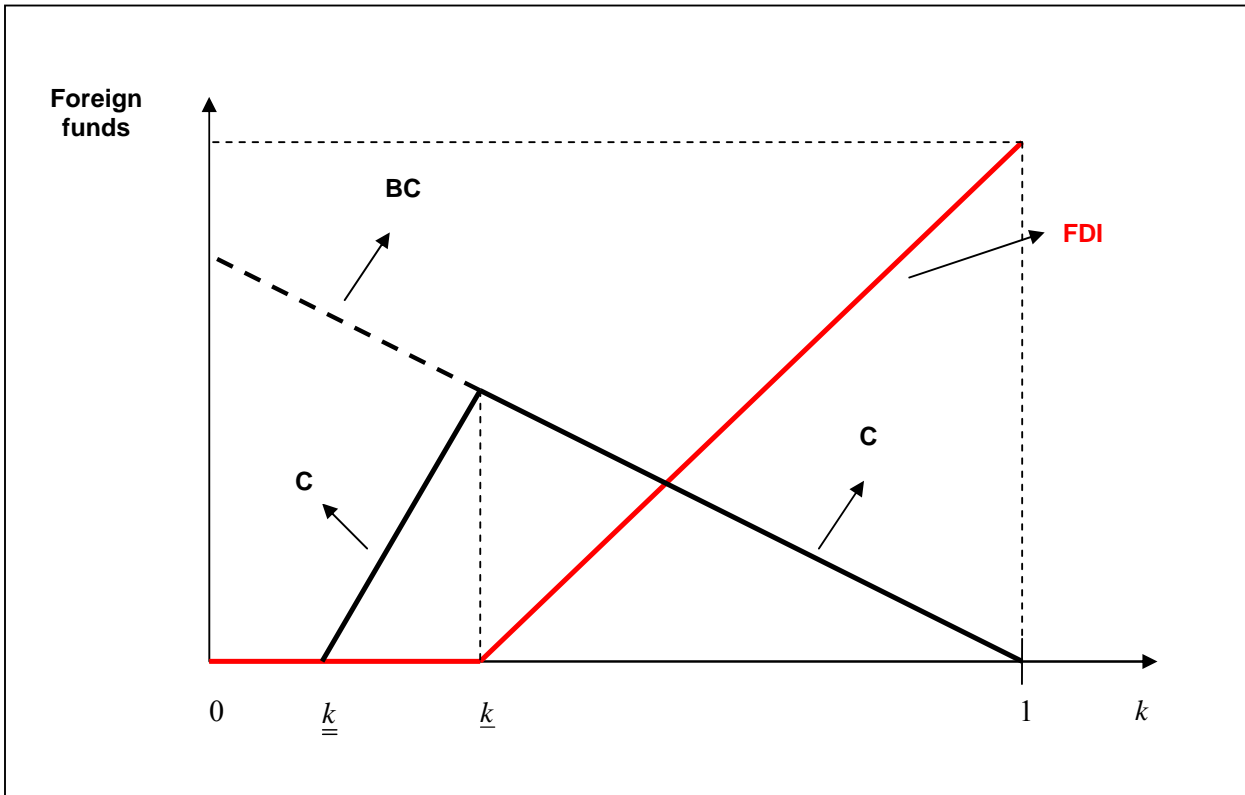


Figure 6: Capital flight and FDI (Proposition 3).

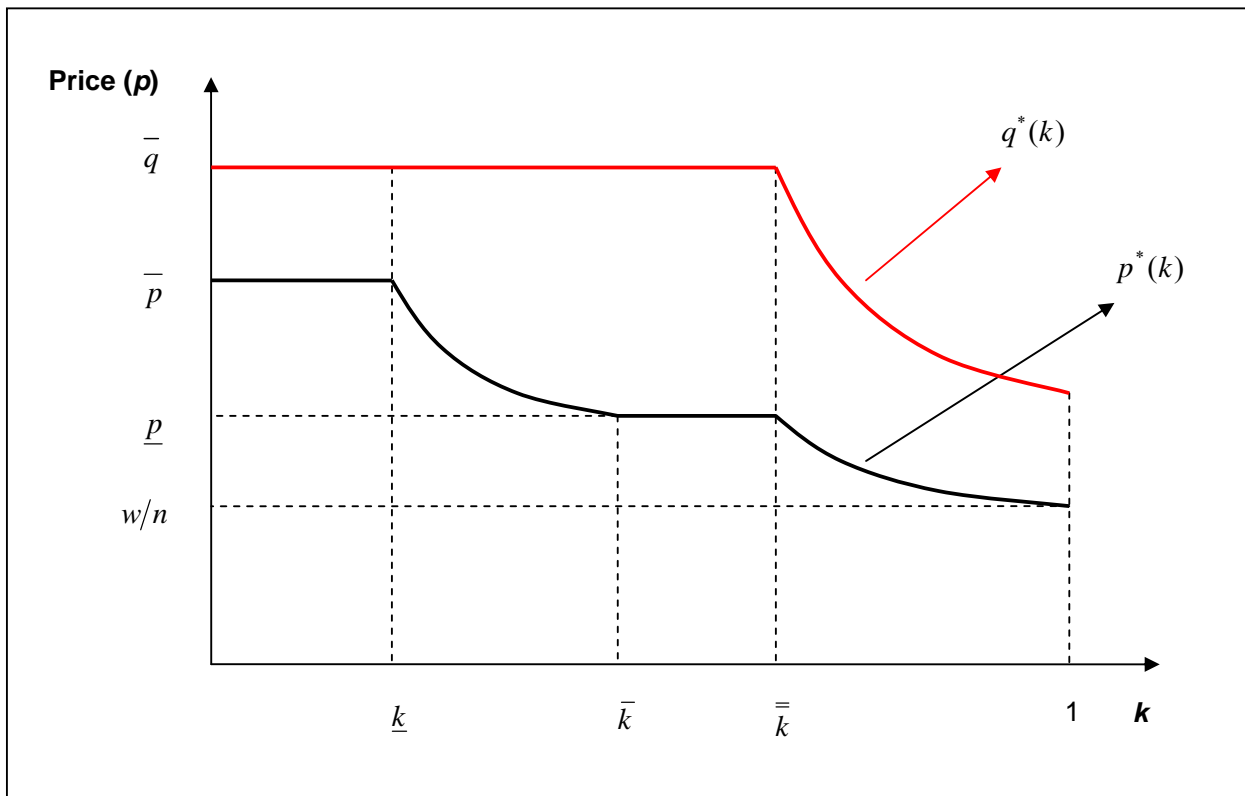


Figure 7: Prices with limited outsider funds (Proposition 4).

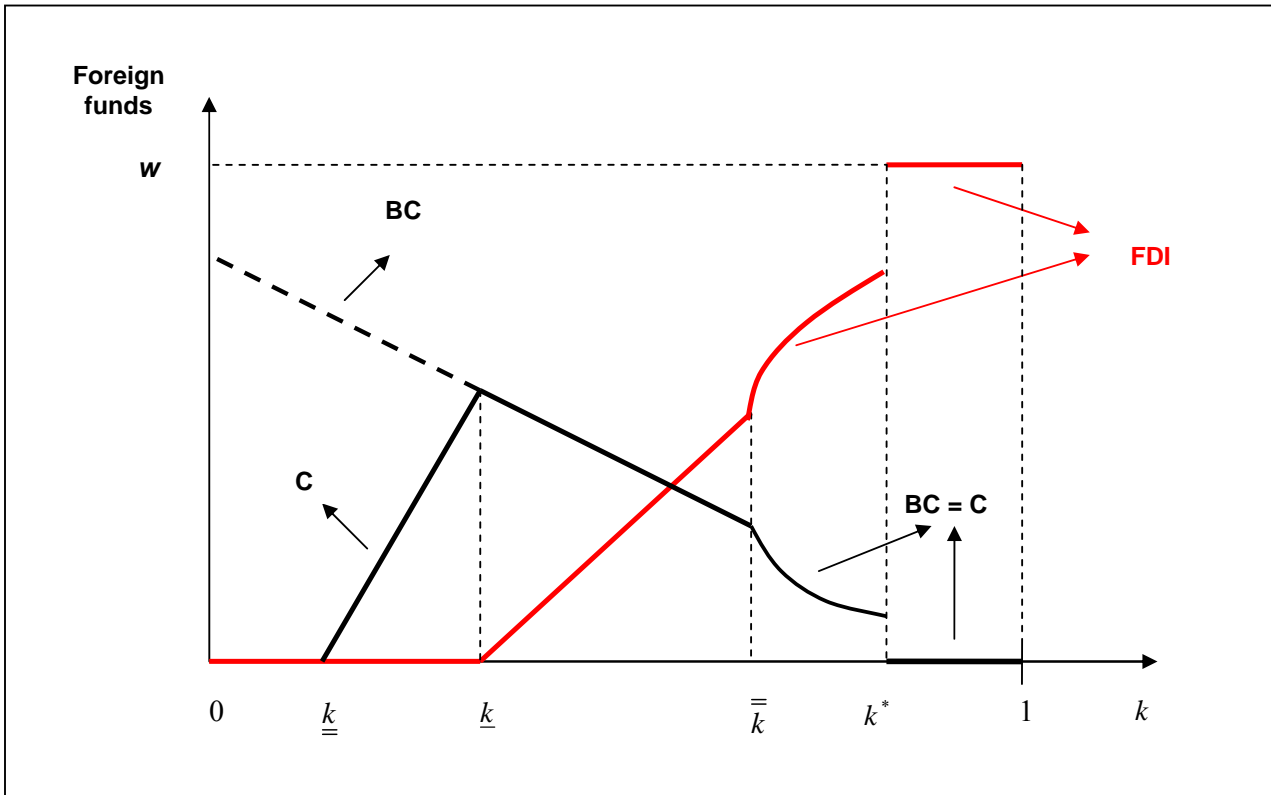


Figure 8: Capital flight and FDI (Proposition 4).

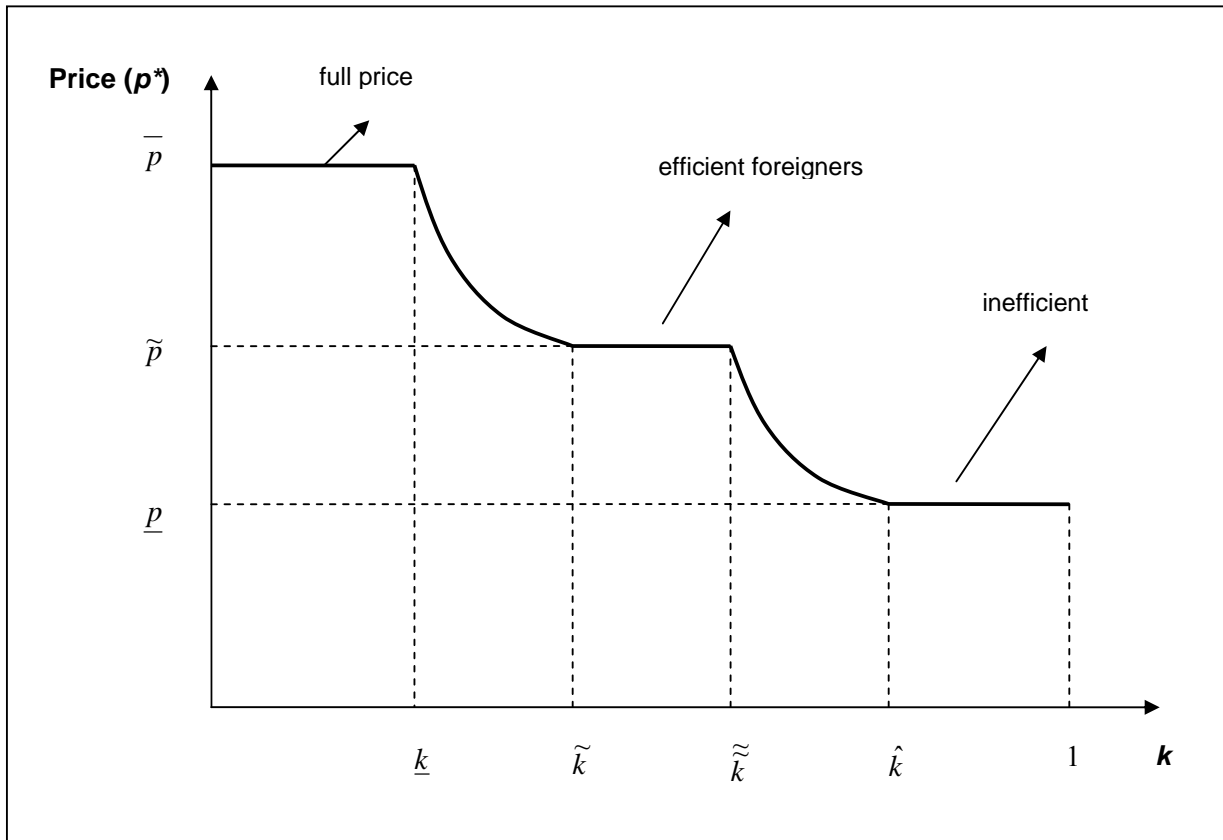
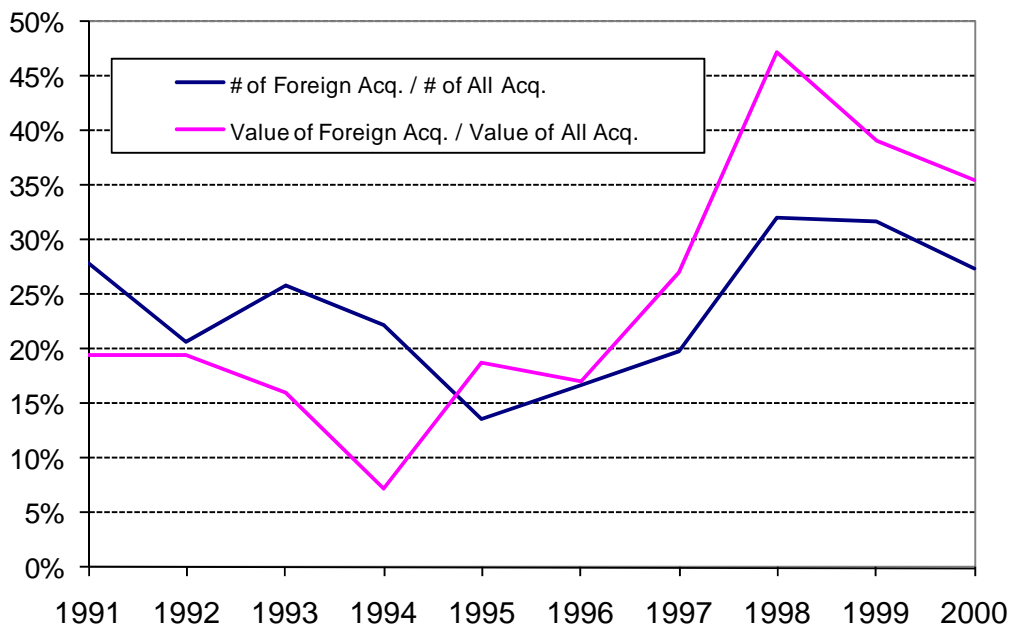


Figure 9: Price with differential efficiency levels of foreigners (Proposition 5).

**Figure 10: Foreign Acquisitions (As % of All Acq.) Over Time**



**Figure 11: Average Shares Acquired (%) Across Time**

