

Liquidity, Institutional Quality and the Composition of International Equity Outflows

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August 31, 2007

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⁴We acknowledge insightful comments by Rui Albuquerque, Samuel Bentolila, Francesco Caselli, Robert Flood, Olivier Jeanne, Enrique Mendoza, Christopher Pissarides, Danny Quah, Rafael Repullo and seminar participants at the IMF, LBS and LSE. This paper represents the views of the authors and should not be thought to represent those of the International Monetary Fund.

Abstract

In this study, we examine investor's choice between Foreign Direct Investment and Foreign Portfolio Investment. Key predictions of the theory developed in this paper are (1) Source countries with higher probability of aggregate liquidity crises export relatively more FPI relative to FDI; (2) As the source country capital market transparency lessens, the differential effect of the probability of an aggregate liquidity crisis on the composition of capital-equity exports becomes more pronounced. To test these hypotheses, we apply a dynamic panel model to examine the variation of FPI relative to FDI for 140 source countries from 1985 to 2004. Our key variable is the probability of an aggregate liquidity crisis, estimated from a Probit model, as proxied by episodes of economy-wide sales of external assets (international reserves, credit and equity). It turns out that the probability of a liquidity crisis has strong effects on the composition of foreign equity investment, as predicted by our model. Furthermore, greater capital market opacity in the source country strengthens the effect of the crisis probability. Our findings help explaining the recent trend of collective investment funds as growing sources of FDI, and shed some light on how this trend may be affected by liquidity crunch and the requirement on investment fund transparency.

1 Introduction

International equity flows are a main feature of the recent trends towards the globalization of capital markets both in emerging and in developed economies. These flows take two major forms: Foreign Direct Investments (FDI) and Foreign Portfolio Investments (FPI). Despite the prominence of these two forms of investment, not much is known about the factors that guide international investors in choosing between them; especially on the determinants of equity flows in a source country. The traditional wisdom is that transnational corporations (TNC) mainly engage in FDI, while collective investment funds— private equity funds, mutual funds and hedge funds – engage in FPI.

However, according to the latest 2006 World Investment Report, collective investment funds have become growing sources of FDI. These funds raised a record amount of \$261 billion in 2005, from institutional investors, such as banks, pension funds and insurance companies. About half of the funds raised were then used towards FDI. Moreover, their main type of FDI, cross-border M&As, reached \$135 billion and accounted for as much as 19% of total cross-border M&As in 2005. That is to say, these funds have been competing with traditional TNCs in acquiring foreign companies. What factors have driven these investment funds into FDI? Or more broadly, what determines investor's choice between FDI and FPI? And would recent subprime market turbulence and credit crunch affect these funds' future engagement in FDI?

In a recent paper, Goldstein and Razin (2006) highlights a key difference between FDI and FPI: FDI investors are in effect the managers of the firms under their control; whereas FPI investors effectively delegate decisions to managers. Consequently, direct investors are more informed than portfolio investors regarding the prospects of their projects. This information enables direct investors to manage their projects more efficiently. This informational advantage, however, comes at a cost. If investors need to sell their investments before maturity because of liquidity shocks, the price they can get will be typically lower when buyers know that they have more information on the fundamentals of the investment project. A key implication of the model is that the choice between FDI and FPI will be linked to the likelihood with which investors expect to get a liquidity shock.

A problem with taking the model to the data, however, is that it assumes that liquidity shocks to individual investors are completely idiosyncratic, i.e., there is no correlation between the realization of a liquidity shock for one investor and that for other investors. Idiosyncratic liquidity shocks, in turn, are not observable to econometricians with macro data, and thus this aspect of the model

cannot be easily tested with such data. In this paper, we extend the Goldstein and Razin (2006) model by making the more realistic assumption that liquidity shocks to individual investors are triggered by some aggregate liquidity shock. We are trying to capture the idea that individual investors are forced to sell their investments early particularly at times when there are aggregate liquidity problems. In those times, some individual investors have deeper pockets than others, and thus are less exposed to the liquidity issues. Thus, once an aggregate liquidity shock occurs, some individual investors will need to sell, but they will get a low price because buyers do not know if they have deep pockets and sell because of adverse information or because they are truly affected by the aggregate liquidity crisis.

The extended model hence predicts that countries with a high probability of an aggregate liquidity crisis will be the source of relatively more FPI and less FDI. The intuition is that as the probability of an aggregate liquidity shock increases, agents know that they are more likely to need to sell the investment early, in which case, if they hold FDI, they will get a low price since buyers do not know whether they sell because of an individual liquidity need or because of adverse information on the productivity of the investment. As a result, the attractiveness of FDI decreases, and the ratio of FPI to FDI increases.

In the extended model, we also show that the effect of the probability of liquidity shocks on the composition of FDI and FPI is driven by lack of transparency about the fundamentals of the investment projects. If the fundamentals were publicly known, then liquidity shocks would not be that costly for direct investors, as the investors would be able to sell the investment at fair price without bearing the consequences of the lemons problem. This leads to our second empirical prediction: the effect of a liquidity shock on the composition of FPI and FDI decreases in the level of transparency in the source country.

We then put these predictions into empirical testing. As mentioned above, a main advantage of this new specification is that it can be taken directly to macro data. We use negative purchase of external asset as an indicator of an aggregate liquidity crisis. As frequently done, we estimate the probability of a liquidity shock by using a Probit specification. Our sample covers 140 countries from 1985 to 2004. And our measures of FDI and FPI are based on source country's stock of external assets as compiled by Lane and Milesi-Ferretti (2006). Then, we use the dynamic panel model approach to examine the effect of the crisis probability. We find strong support for our model: a higher probability of a liquidity crisis in the source country indeed has a significant positive effect on the ratio between FDI and FPI.

We further introduce a set of proxies for capital market opacity to capture the degree of asymmetric information in the source country, including PricewaterhouseCoopers (2001) overall and accounting opacity indexes, CIFAR (1995) accounting disclosure score, and the Global Competitiveness Report (1999) financial disclosure index. We interact the opacity measure with the likelihood of liquidity crisis, to illustrate that a channel for strong intuitional factors to affect capital flow is through the mitigation of the consequence of potential liquidity shocks. We confirm that greater capital-market opacity in the source country strengthens the effect of the crisis probability on FPI and FDI.¹

What is the implication of our findings on future investments by collective investment funds? These funds have expanded significantly in the past few years due to historically low interest rates, high liquidity of investors and the good performance of private equity funds. However, given the tendency of many such funds to use bank loans to finance private equity buyouts, a deterioration in the macroeconomic environment, such as the recent subprime market turbulence and credit crunch, could lead to difficulties for the private equity funds and slow down their direct investment abroad.

Our findings also shed some light on the going debate on the transparency requirement for collective investment funds ²Initiatives to improve these funds' transparency may increase funds' incentives and abilities for FDI, as they will then be less likely to suffer from the lemons problem during liquidity crises. This can be beneficial to investment funds, as FDI engagement, in the long run, is likely to generate higher return than FPI, due to the management efficiency.

Our study is related to several other papers in the literature that analyze the determinants of FDI or FPI. These include Razin, Sadka and Yuen (1998), Albuquerque (2003), Alfaro, Kalemli-Ozcan and Volosovych (2005), and Ju and Wei (2007). But these earlier works have not examined the effect of potential aggregate liquidity crises on the composition of FDI and FPI. Moreover, they focus on determinant factors inside the host country while we focus on factors inside the source country.

The remainder of this paper is organized as follows: Section 2 reviews the model of idiosyncratic liquidity shocks by Goldstein and Razin (2006). In Section 3, we extend the model to introduce aggregate liquidity shocks and capital market transparency. Section 4 describes the data and the econometric model used for the empirical analysis. In Section 5, we present the empirical results.

¹Earlier works have emphasized the importance of host country institution on capital inflow. For instance, Alfaro, Kalemli-Ozcan and Volosovych (2005) document that the low institutional quality, measured by host country's political risk, is the leading explanation of the lack of capital flow from rich to poor countries.

²See <http://www.bloomberg.com/apps/news?pid=20601100&sid=aMS8oOJJp0I&refer=germany>

Section 6 concludes.

2 Model

2.1 Goldstein and Razin (2006): Idiosyncratic Liquidity Shocks

We start by describing the model of Goldstein and Razin (2006), with which they study a trade off between FDI and FPI based on the existence of idiosyncratic liquidity shocks.

2.1.1 Efficiency of FDI

A small economy is faced by a continuum $[0, 1]$ of foreign investors. Each foreign investor has an opportunity to invest in one investment project. Foreign investment can occur in one of two forms: either a direct investment (FDI) or as a portfolio investment (FPI). A direct investor effectively acts like a manager, whereas in case of a portfolio investment, the project is managed by an "outsider". Investors are risk neutral, and thus choose the form of investment that maximizes (ex-ante) expected payoff.

There are three periods of time: 0, 1, and 2. In period 0, each investor decides whether to make a direct investment or a portfolio investment. In period 2, the project matures. The net cash flow from the project is denoted by $R(K, \varepsilon)$:

$$R(K, \varepsilon) = (1 + \varepsilon)K - \frac{1}{2}AK^2, \quad (1)$$

where ε is an idiosyncratic random productivity factor, which is independently realized for each project in period 1, and K is the level of capital input invested in the project in period 1, after the realization of ε . The productivity shock ε is distributed between -1 and 1 with mean 0. The cumulative distribution function is $G(\cdot)$, and the density function is $g(\cdot) = G'(\cdot)$. The parameter A reflects production costs.

In period 1, after the realization of the productivity shock, the manager of the project observes ε . Thus, if the investor owns the project as a direct investment, she observes ε , and chooses K , so as to maximize the net cash flow:

$$K^d(\varepsilon) = \frac{1 + \varepsilon}{A}. \quad (2)$$

Then, the ex-ante expected net cash flow from a direct investment, if held until maturity, is:

$$\frac{E\left((1 + \varepsilon)^2\right)}{2A}. \quad (3)$$

In case of a portfolio investment, the owner is at arms length relationships with the manager, and thus she cannot observe ε . In this case, the manager follows earlier instructions as for the level of K . Following the logic described in Goldstein and Razin (2006), we assume that the ex-ante instruction is chosen by the owner so as to maximize the expected return absent any information on the realization of ε , and is based on the ex-ante 0 mean. Thus, the manager will be instructed to choose $K^p = K^d(0) = \frac{1}{A}$. Then, the ex-ante expected payoff from a portfolio investment, if held until maturity, is:

$$\frac{1}{2A}. \quad (4)$$

Comparing (3) with (4), we see that if the project is held until maturity, it yields a higher payoff as a direct investment than as a portfolio investment. This reflects the efficiency that results from a hands-on management style in the case of a direct investment.

2.1.2 Costs of FDI

As in Goldstein and Razin (2006), there are also costs to direct investments. We specify two types of costs. The first type, reflects the fixed initial cost that an FDI investor has to incur in order to acquire the expertise to manage the project directly. We denote this cost, which is exogenously given in the model, by C . The second type, which is derived endogenously in the model, results from the possibility of liquidity shocks occurring in period 1.

Specifically, in period 1, before the value of ε is observed, the owner of the project might get a liquidity shock. With the realization of a liquidity shock, the investor is forced to sell the project immediately. We assume that the number of foreign investors is fixed. We denote by λ the probability of liquidity shocks, and assume that there are two types of foreign investors: half of the investors face a liquidity need with probability λ_H , whereas the other half face a liquidity need with probability λ_L , where $1 > \lambda_H > \frac{1}{2} > \lambda_L > 0$, and $\lambda_H + \lambda_L = 1$. Investors know their type ex ante, but this is their own private information.

In addition to liquidity-based sales, there is a possibility that an investor will liquidate a project in period 1 if she observes a low realization of ε . Because portfolio investors do not observe ε in period 1, only direct investors sell their investment project at that time when a liquidity shock is

absent. Then, using Bayes' Law, the price that buyers are willing to pay for a direct investment that is being sold in period 1 is:

$$P_{1,D} = \frac{(1 - \lambda_D) \int_{-1}^{\underline{\varepsilon}_D} \frac{(1+\varepsilon)^2}{2A} g(\varepsilon) d\varepsilon + \lambda_D \int_{-1}^1 \frac{1+2\varepsilon}{2A} g(\varepsilon) d\varepsilon}{(1 - \lambda_D) G(\underline{\varepsilon}_D) + \lambda_D}. \quad (5)$$

Here, $\underline{\varepsilon}_D$ is a threshold level of ε , set by the direct investor; below which the direct investor is selling the project in absence of a liquidity shock; λ_D is the probability, as perceived by the market, that an FDI investor gets a liquidity shock. In (5), it is assumed that if the project is sold due to a liquidity shock, that is, before the initial owner observes ε , the value of ε is not recorded in the firms before the sale. Therefore, the buyer does not know the value of ε . However, if the project is sold for low-profitability reasons, the owner will know the value of ε after the sale.

Of course, the threshold $\underline{\varepsilon}_D$ is determined in equilibrium. The initial owner sets the threshold level $\underline{\varepsilon}_D$, such that given $P_{1,D}$, when observing $\underline{\varepsilon}_D$, she is indifferent between selling and not selling the project in absence of a liquidity shock. Thus:

$$P_{1,D} = \frac{(1 + \underline{\varepsilon}_D)^2}{2A}. \quad (6)$$

Equations (5) and (6) together determine $P_{1,D}$ and $\underline{\varepsilon}_D$ as functions of the market-perceived probability λ_D . We denote these functions as: $\underline{\varepsilon}_D(\lambda_D)$ and $P_{1,D}(\lambda_D)$.

The period-1 price of a portfolio investment is easier to determine. Essentially, when a portfolio investor sells the projects in period 1, everybody knows she does it because of a liquidity shock. Thus, the price she gets for the project is given by:

$$P_{1,P} = \frac{1}{2A}. \quad (7)$$

Comparing the price of FDI, which is determined by (5) and (6), with the price of FPI, which is determined by (7), we see that the resale price of a direct investment in period 1 is always lower than the resale price of a portfolio investment in that period (see Goldstein and Razin (2006)). The intuition is that if a direct investor prematurely sells the investment project, the market price must reflect the possibility that the sale originates from inside information on low prospects of this investment project. This constitutes the second cost of FDI.

2.1.3 The Decision between FDI and FPI

With probability λ_i ($i = H, L$), the direct investor gets a liquidity shock, and sells the project in period 1 for a price $P_{1,D}(\lambda_D) = \frac{(1 + \underline{\varepsilon}_D(\lambda_D))^2}{2A}$. With probability $1 - \lambda_i$, the direct investor does not

get a liquidity shock. She sells the project if the realization of ε is below $\underline{\varepsilon}_D(\lambda_D)$, but she does not sell it if the realization of ε is above $\underline{\varepsilon}_D(\lambda_D)$. In addition, the direct investor has to incur a fixed cost of C . The (ex-ante) expected net cash flow for an FDI investor is thus:

$$EV_{Direct}(\lambda_i, \lambda_D, A) = (1 - \lambda_i) \left[\int_{-1}^{\underline{\varepsilon}_D(\lambda_D)} \frac{(1 + \underline{\varepsilon}_D(\lambda_D))^2}{2A} g(\varepsilon) d\varepsilon + \int_{\underline{\varepsilon}_D(\lambda_D)}^1 \frac{(1 + \varepsilon)^2}{2A} g(\varepsilon) d\varepsilon \right] + \lambda_i \frac{(1 + \underline{\varepsilon}_D(\lambda_D))^2}{2A} - C. \quad (8)$$

Similarly, when the investor holds the investment as a portfolio investment, the (ex-ante) expected net cash flow is simply given by:

$$EV_{Portfolio}(A) = \frac{1}{2A}. \quad (9)$$

This is because, regardless whether the investor gets a liquidity shock or not, her payoff is $\frac{1}{2A}$.

We denote the difference between the expected value of FDI and the expected value of FPI by:

$$Diff(\lambda_i, \lambda_D, A) \equiv EV_{Direct}(\lambda_i, \lambda_D, A) - EV_{Portfolio}(A). \quad (10)$$

Then, investor i will choose FDI when $Diff(\lambda_i, \lambda_D, A) > 0$; will choose FPI when $Diff(\lambda_i, \lambda_D, A) < 0$; and will be indifferent between the two (that is, may choose either FDI or FPI) when $Diff(\lambda_i, \lambda_D, A) = 0$.

As is shown in Proposition 2 of Goldstein and Razin (2006), investor i is more likely to choose FDI when the FDI cost (C) is lower; the production cost (A) is lower; the probability of getting a liquidity shock (λ_i) is lower; and the market-perceived probability λ_D of a liquidity shock for FDI investors is higher.

2.1.4 FDI and FPI in Equilibrium

To complete the description of equilibrium, it remains to specify how λ_D , the market perceived probability that an FDI investor will get a liquidity shock, is determined. Assuming that rational expectations hold in the equilibrium, λ_D has to be consistent with the equilibrium choice of the two types of investors between FDI and FPI. The equilibrium condition is:

$$\lambda_D = \frac{\lambda_H \lambda_{H,FDI} + \lambda_L \lambda_{L,FDI}}{\lambda_{H,FDI} + \lambda_{L,FDI}}, \quad (11)$$

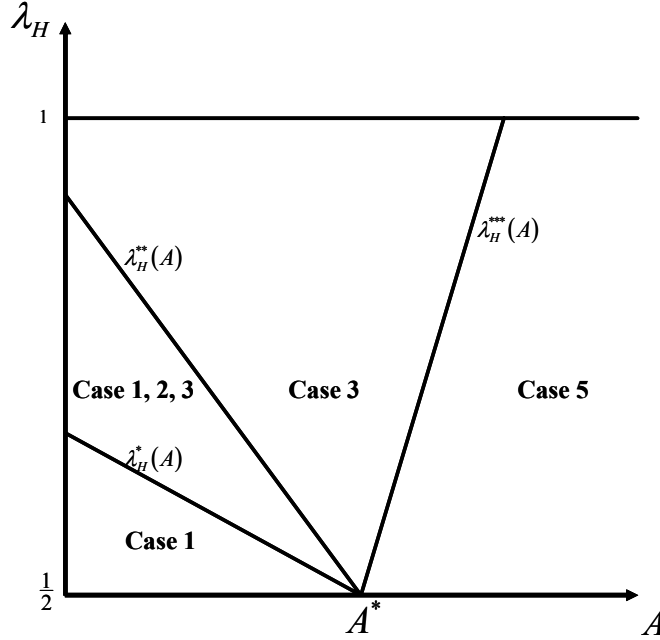


Figure 1: Equilibrium Outcomes

where $\lambda_{H,FDI}$ is the proportion of λ_H investors who choose FDI in equilibrium and $\lambda_{L,FDI}$ is the proportion of λ_L investors who choose FDI in equilibrium.

Goldstein and Razin (2006) show that five cases can potentially be observed in equilibrium:

Case 1: All investors choose FDI.

Case 2: λ_L investors choose FDI; λ_H investors split between FDI and FPI.

Case 3: λ_L investors choose FDI; λ_H investors choose FPI.

Case 4: λ_L investors split between FDI and FPI; λ_H investors choose FPI.

Case 5: All investors choose FPI.

Equilibrium outcomes then depend on λ_H and A in a way that is depicted by Figure 1. (See Proposition 3 in Goldstein and Razin (2006).)

As we can see in the figure, the equilibrium patterns of investment are determined by the parameters A and λ_H . Since $\lambda_H + \lambda_L = 1$, the value of λ_H also determines λ_L , and thus can be interpreted as a measure for the difference in liquidity needs between the two types of investors. In the figure we can see that there are four thresholds – A^* , $\lambda_H^*(A)$, $\lambda_H^{**}(A)$, and $\lambda_H^{***}(A)$ – that are important for the characterization of the equilibrium outcomes. These thresholds are defined in Goldstein and Razin (2006). Overall, we can see that as the production cost A increases, we are more likely to observe FPI and less likely to observe FDI in equilibrium. As the difference in

liquidity needs between the two types of investors increase, we are more likely to see a separating equilibrium, where different types of investors choose different forms of investment.

2.2 Aggregate Liquidity Shock

So far we followed the model in Goldstein and Razin (2006), which assumes that liquidity shocks to individual investors are completely idiosyncratic, i.e., there is no correlation between the realization of a liquidity shock for one investor and that for other investors. A more realistic assumption is that liquidity shocks to individual investors are triggered by some aggregate liquidity shock.

Suppose now that an aggregate liquidity shock occurs in period 1 with probability q . Once the shock occurs, it becomes common knowledge. Conditional on the realization of the aggregate liquidity shock, individual investors may be subject to a need to sell their investment at period 1 with probabilities as in the previous section. That is, if a liquidity shock occurs (with probability q) then half of the investors need to sell in period 1 with probability λ_H and half with probability λ_L . Conditional on the realization of an aggregate liquidity shock, the realizations of individual liquidity needs are independent of each other. With probability $(1 - q)$, an aggregate liquidity shock does not occur. In this case individual investors never have a liquidity need that forces them to sell at period 1.

This specification of the model is admittedly simple. The idea that we are trying to capture with this specification is that individual investors are forced to sell their investments early at times when there are aggregate liquidity problems. In those times, some individual investors have deeper pockets than others, and thus are less exposed to the liquidity issues. Thus, once an aggregate liquidity shock occurs, λ_L investors, who have deeper pockets, are less likely to need to sell than λ_H investors.

The analysis of the model under the extension to aggregate shocks is simple given the analysis of the model in the previous subsection. If an aggregate liquidity shock does not occur, then it is known that no investor needs to sell in period 1 due to liquidity needs. This implies that the only reason to sell at that time is adverse information on the profitability of the project. As a result, the market breaks down due to the well-known lemons problem (see Akerlof (1970)). Thus, when an aggregate liquidity shock does not occur, no investor sells her investment at period 1. Investors wait till the maturity of the investment, and get $\frac{E((1+\epsilon)^2)}{2A}$ in case they hold a FDI (see (3)) and $\frac{1}{2A}$ in case they hold a FPI (see (4)). On the other hand, if a liquidity shock does happen, the expected payoffs from FDI and FPI are exactly the same as in the previous section; see (8) for FDI

and (9) for FPI. Essentially, the model in the previous section corresponds to the case of $q = 1$.

Using these arguments, we can write the ex-ante expected net cash flow from FDI in the new model as (we use the superscript *Ext* to denote expected values in the extended model:

$$EV_{Direct}^{Ext}(\lambda_i, \lambda_D, A, q) = (1 - q) \int_{-1}^1 \frac{(1 + \varepsilon)^2}{2A} g(\varepsilon) d\varepsilon + q \left[(1 - \lambda_i) \left[\int_{-1}^{\varepsilon_D(\lambda_D)} \frac{(1 + \varepsilon)^2}{2A} g(\varepsilon) d\varepsilon + \int_{\varepsilon_D(\lambda_D)}^1 \frac{(1 + \varepsilon)^2}{2A} g(\varepsilon) d\varepsilon + \lambda_i \frac{(1 + \varepsilon_D(\lambda_D))^2}{2A} \right] \right] - C. \quad (12)$$

The ex-ante expected net cash flow from FPI in the new model is as before:

$$EV_{Portfolio}^{Ext}(A) = \frac{1}{2A}. \quad (13)$$

Then, the difference between the expected value of FDI and the expected value of FPI is:

$$Diff^{Ext}(\lambda_i, \lambda_D, A, q) \equiv EV_{Direct}^{Ext}(\lambda_i, \lambda_D, A, q) - EV_{Portfolio}^{Ext}(A). \quad (14)$$

As before, investor i will choose FDI when $Diff^{Ext}(\lambda_i, \lambda_D, A, q) > 0$; will choose FPI when $Diff^{Ext}(\lambda_i, \lambda_D, A, q) < 0$; and will be indifferent between the two (that is, may choose either FDI or FPI) when $Diff^{Ext}(\lambda_i, \lambda_D, A, q) = 0$.

Our main goal in introducing the aggregate liquidity shock is to be able to generate a testable empirical prediction on the relation between liquidity variables and the choice of investors between FDI and FPI. In the original model by Goldstein and Razin (2006), the probabilities of idiosyncratic liquidity shocks, λ_H and λ_L , affected the equilibrium allocation between FDI and FPI. The problem, however, is that idiosyncratic liquidity shocks are not observable to econometricians. The big advantage of the current model is that λ_H and λ_L are now linked to q – the probability of an aggregate liquidity shock, which is observable. Thus, our main interest is to derive a prediction on the effect that q has on the ratio of FPI to FDI and then to test it.

Repeating the analysis in Proposition 3 of Goldstein and Razin (2006) for the extended model, one can see that the equilibrium outcomes depend on the thresholds A^* , $\lambda_H^*(A)$, $\lambda_H^{**}(A)$, and $\lambda_H^{***}(A)$, just as before. The difference is that these thresholds now depend on q . In particular, A^* , $\lambda_H^*(A)$, and $\lambda_H^{**}(A)$ are decreasing in q , while $\lambda_H^{***}(A)$ is increasing in q . This implies that as the probability of an aggregate liquidity shock q increases, there will be more FPI and less FDI in

equilibrium.³ Thus, the ratio of FPI to FDI will increase. The intuition is that as the probability of an aggregate liquidity shock increases, agents know that they are more likely to need to sell the investment early, in which case they will get a low price since buyers do not know whether they sell because of an individual liquidity need or because of adverse information on the productivity of the investment. As a result, the attractiveness of FDI decreases. The empirical prediction is that countries with a higher probability of liquidity shocks will be source of a higher ratio of FPI to FDI.

2.3 The Role of Opacity

The effect of liquidity shocks on the composition of foreign investment between FDI and FPI is driven by lack of transparency about the fundamentals of the direct investment. If the fundamentals of each direct investment were publicly known, then liquidity shocks would not be that costly for direct investors, as the investors would be able to sell the investment at fair price without bearing the consequences of the lemons problem.

More precisely, suppose that the source country imposes disclosure rules on its investors that ensure the truthful revelation of investment fundamentals to the public. In such a case, FDI investors will have to reveal the realization of ε once it becomes known to them. Then, since potential buyers know the true value of the investment, direct investors will be able to sell their investment at $\frac{(1+\varepsilon)^2}{2A}$. Thus, whether or not a direct investor sells the investment, he is able to extract the value $\frac{(1+\varepsilon)^2}{2A}$, and so the expected value from investing in FDI is $\frac{E((1+\varepsilon)^2)}{2A} - C$. The expected value from investing in FPI is $\frac{1}{2A}$ as before. This is because the kind of disclosure requirements we describe here do not affect the value of portfolio investments. These are requirements that are imposed by the source country, and thus apply only for investments that are being controlled by source-country investors.⁴

Analyzing the trade off between FDI and FPI under this perfect source-country transparency, we can see two things. First, with transparency, FDI becomes more attractive than before. Second,

³Note that there is a delicate point about this result, which comes from the fact that q does not have an unambiguous effect on the function $Diff^{Ext}$. The effect depends on the relation between λ_i and λ_D . The result comes from the fact that $Diff^{Ext}$ is decreasing in q when $\lambda_i \geq \lambda_D$ and the thresholds A^* , $\lambda_H^*(A)$, $\lambda_H^{**}(A)$, and $\lambda_H^{***}(A)$ are all derived for situations where $\lambda_i \geq \lambda_D$. More details are available from the authors upon request.

⁴Note that this type of transparency is different from the one studied in Goldstein and Razin (2006). In that paper the transparency was based on host-country rules, and thus affected the information investors could learn on their portfolio investments.

with transparency, the decision between FDI and FPI ceases to be a function of the probability of a liquidity shock. This leads to our second empirical prediction: the effect of the probability of a liquidity shock on the ratio of FPI and FDI increases in the level of opacity in the source country.

3 Data and Empirical Model

3.1 Data on FPI and FDI

In the empirical application, we use the recently available data on a country's external assets and liabilities, as compiled by Lane and Milesi-Ferretti (2006). Lane and Milesi-Ferretti (2006) assemble a comprehensive dataset on the external assets and liabilities of 140 developed and developing countries for the period 1970–2004. They distinguish four types of international assets: foreign direct investment, portfolio equity investment, official reserves, and external debt. The convention for distinguishing between portfolio and direct investment is to see whether the ownership of shares of companies is above or below a ten percent threshold. If it is above the threshold, then it is classified as direct investment.⁵

For most countries, Lane and Milesi-Ferretti (2006) use as a benchmark the official International Investment Position (IIP) estimates. However, only very few countries have consistently reported their IIP over the period 1970–2004, with the majority of countries starting to report in the early 1990s, following the methodology described in the IMF Balance of Payments Manual, fifth edition, 1993. For earlier years, they then work backward with data on capital flows, together with calculations for capital gains and losses, to generate estimates for stock positions. In their estimation, due to cross-country variation in the reliability of the data, they also employ a range of valuation techniques to obtain the most appropriate series for each country. Particularly, they use similar valuation adjustment for FPI and FDI (see the Appendix for more details). In our following estimation, we use the data from 1985 to 2004 as the sample period.

Table 1 lists the countries covered in the sample from 1985 to 2004, as a source for FPI and FDI. From this table, we can see that developed countries have more observations on average

⁵There is the problem of "borderline" cases where it is difficult to classify an investment as FDI or FPI. In countries where FPI is liberalized, a portfolio investor might buy more than 10 per cent of the shares of companies without having a "lasting interest" to control the companies. And yet that investor's investment can be classified as FDI. Using the control interest as a dividing line, there are circumstances where FDI can turn into FPI through the dilution of ownership and loss of control. Conversely, FPI can be transformed into FDI, if the investor decides to have a management interest in the companies whose assets it had earlier purchased as FPI.

than developing economies do, due to the fact that developed countries engage in more foreign investment than their developing counterparts. Table 1 also shows that developed countries tend to have higher ratio of FPI/FDI, which may reflect factors other than liquidity. In the following estimation sections we will focus on the effects of the probability of liquidity crises, and the degree of country specific transparency, on the composition of the source country external assets. We will control for standard determinants of FPI/FDI, as well as for unobservable country fixed effects.⁶

3.2 Econometric Model

We investigate the effect of a country-level liquidity shock on the FPI/FDI ratio for source countries. The latter variable is the dependent variable in the following reduced form equation:

$$\ln(FPI/FDI)_{it} = \alpha X_{it} + \beta Pr_{i,t}(Liquidity\ Shock_{i,t+1}) + \gamma Year_t + u_i + \varepsilon_{it} \quad (15)$$

for source country i at time t . u_i stands for country fixed effect, while ε_{it} follows an i.i.d normal distribution.

We take the log of the FPI/FDI ratio as our dependent variable, to reduce the impact of extreme values. The vector X_{it} includes explanatory variables as follows. First, we put two variables – the log of the population and the log of GDP per capita (measured in constant US dollars) – to capture market size and the level of economic development. Another variable is the log of stock market capitalization over GDP. This captures how liquid is the country’s stock market is.⁷ A more developed stock market has more established professional asset management (mutual funds and hedge funds, for instance), which could help domestic investors to enter international stock markets and therefore increase FPI outflow. We also include a variable indicating trade openness to control for the connection between trade and FDI. Trade openness is measured as source country’s imports plus exports over its GDP. Finally, according to Froot and Stein (1991), and Baker et al. (2004), higher source country’s wealth could significantly boost FDI outflow, as it provides cheaper

⁶In principle, there could be a two-stage decision process as follows. In stage 1, a potential investor has to decide whether to engage in foreign investment. In stage 2, in what form to do it (FDI or FPI). Some missing observations may indicate situations where these countries did not cross the threshold for foreign investment, hence a Heckman selection model could be desirable.

⁷One may suspect that stock market capitalization over GDP can be affected by stock return and might thus be endogenous. Hence, in the robustness checks, we use an alternative measure of the depth of stock market, i.e, the total value of shares traded over GDP, retrieved from the World Development Indicators. We find similar results there.

financing.⁸ Froot and Stein (1991) use the appreciation of exchange rate to proxy for cheaper financing, while Baker et al. (2004) use the stock market's market to book ratio. As the data on exchange rate has more country coverage than the market/book ratio, we will then use the real exchange rate to proxy for the wealth of source country.

Also, the lagged FPI/FDI may affect the current FPI/FDI.⁹ Hence we estimate, alternatively, the following dynamic panel regression.

$$\ln(FPI/FDI)_{it} = \phi \ln(FPI/FDI)_{i,t-1} + \alpha X_{it} + \beta \text{Pr}_{i,t}(Liquidity\ Shock_{i,t+1}) + \gamma Year_t + u_i + \varepsilon_{it} \quad (16)$$

There is a complication in estimating equation (16). That is, if ε_{it} is not i.i.d, but instead serially-correlated, then the explanatory variable $\ln(FPI/FDI)_{i,t-1}$ will be correlated with ε_{it} , and thus create an endogeneity problem. Hence, we use the Arellano-Bond dynamic GMM approach to estimate equation (16), which corrects the endogeneity problem.

3.3 Probability of Liquidity Crisis

The crux of our theory is that a higher probability of an aggregate liquidity shock (the variable q) increases the share of FPI, relative to FDI. Therefore we include in equation (15) a variable, $\text{Pr}_{i,t}(Liquidity\ Shock_{i,t+1})$, to proxy this probability in period $t+1$, as perceived in period t .¹⁰We

⁸Froot and Stein (2004) model operates via a wealth effect in the source country. Appreciation of the real exchange rate increases the wealth of the source country. Because of frictions in control that exist in FDI but not in FPI, wealth is important only for FDI, and thus an increase in wealth increases FDI/FPI ratio.

⁹Arguably, in our model, investors can rebalance their portfolio of assets every period. Thus, the stocks of external assets rather than the flows are consistent with the model. But the choice of the stock at time t may need to use the information set conveyed in the stock at time $t - 1$. Therefore, empirically, we may need to allow for the lagged dependent variable in the equation to control for the dynamics of the information set.

¹⁰In recent literature, financial and liquidity crises are triggered not only by fundamental shocks, but also by the degree to which market expectations about these fundamentals are coordinated (Morris and Shin, 2000). In the absence of common knowledge, an individual market participant receives not only an independent and noisy signal about the fundamentals but also must have some uncertainty about the other market participants' expectations. Morris and Shin (2000) show how the market participants' knowledge about the statistical distributions of signals and market fundamentals helps to coordinate the behaviour of market participants. The coordination of expectations induces a unique equilibrium in such a set up, in which there exists a threshold level of the fundamental. As a consequence, the equilibrium macroeconomic performance can be specified as a one-to-one function of a fundamental ex-ante probability of the financial crisis, derived from the probability distribution of the fundamentals correlated with the macroeconomic performance. This gives a theoretical underpinning for the econometric model applied here. The inclusion of the liquidity shock probability is inspired by Razin and Rubinstein (2006), where they stress the

emphasize that we look at the probability of such a shock to occur irrespective of whether such a shock actually occurs.¹¹

In our baseline estimation, we define the liquidity crisis as episodes of negative purchase of external assets. The intuition is that economy wide liquidity crises in source countries will generate a sale of many types of external assets, such as foreign reserves, loans and equities. Hence negative purchase of external assets can be a reasonable proxy of liquidity crises. The flow data on external assets is from the International Financial Statistics's Balance of Payments dataset, where assets include foreign direct investment, foreign portfolio investment, other investments and foreign reserves. We thus define the liquidity crisis episodes as sales of external assets, which has a frequency of 13% in our sample of 140 countries from 1985 to 2004. The Balance of Payments data do not control for valuation effect. Therefore, they could capture the notion of the quantity of investment liquidations in our model. Table 2 lists the country and year when there is a negative purchase of external assets. It shows that besides developing countries, some developed economies, such as Denmark, Japan, New Zealand and Spain, also experienced liquidity crises in the sample period.

To estimate the probability of liquidity crises, we apply the following Probit model:

$$I_{i,t}(\text{Liquidity Crisis}_{i,t+1}) = \begin{cases} 1 & \text{if } y_{i,t+1}^* > 0 \\ 0 & \text{if } y_{i,t+1}^* \leq 0 \end{cases},$$

where $y_{i,t+1}^*$, a latent variable, is a function of the following independent variables:

$$y_{i,t+1}^* = Z_{it}'\lambda + \eta_{i,t+1}, \tag{17}$$

where $\eta_{i,t+1}$ have a standard normal distribution.

The vector Z_{it}' includes the log of population, the log of GDP per capita, US real interest rate, trade openness, current account surplus over GDP, budget balance as a percentage of GDP, and the risk indexes from the International Country Risk Guide (ICRG). ICRG provides measures of political and financial risks. The political risk rating is based on government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, importance of including the probability of currency crisis in estimating the relationship between exchange rate regime and economic growth.

¹¹An econometrically equivalent way is to use the dummy of realized crises at time $t + 1$, instrumented by $\text{Pr}_{i,t}(\text{Liquidity Shock}_{i,t+1})$. But economically, at time t , investors can not observe whether there will be a crisis or not at time $t + 1$. That is, the actual occurrence of the crisis at $t + 1$ is not an information investors can use at t . What investors can use at t is only the estimated probability of crisis.

religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality. The financial risk rating is based on foreign debt as a percentage of GDP, foreign debt service as a percentage of exports, current account as a percentage of exports, net international liquidity as months of imports, and the exchange rate stability.¹²

These ICRG risk variables have been linked to financial crises in earlier empirical literature. For example, according to Mei (1999), Leblang (2002) and Mehrez and Kaufmann (2004), the political risk is highly correlated with the currency and banking crisis. An intuition is that political and financial risks make the economy vulnerable to capital flow reversals. Moreover, according to Haque et al. (1997), rating agencies, such as Institutional Investor, Euromoney, and Economist Intelligence Unit, consider political and economic risks as important factors in determining the creditworthiness of a country. When the credit rating of a country declines, this country will face difficulty in borrowing and consequently face a liquidity crunch. Consequently, we use the ICRG risk indexes as explanatory variables in the Probit estimation of liquidity crises.¹³

As a robustness check, we substitute the ICRG risk indexes with Standard and Poor's sovereign rating. We use the numeric representation of the rating, with smaller number corresponding to higher risk, i.e. worse rating. When the sovereign rating is poor, government, banks and non-financial firms find it expensive to borrow abroad and therefore compete for domestic resources, creating an upward pressure on interest rates. The correlation between the risk indexes and the sovereign rating is as high as 0.67 over the sample period from 1985 to 2004. But the inclusion of sovereign rating reduces the sample size, due to smaller country coverage.

¹²Additional details on the indexes are available at http://www.prsgroup.com/commonhtml/methods.html#_International_Country_Risk.

¹³In earlier literatures, Gelos and Wei (2005) find that as the ICRG risk rises, mutual funds reduce their investment in the country, which may then lead to liquidity crises. The results are confirmed in Broner et al. (2006). Similarly, Alfaro et al. (2007) find that higher the composite ICRG risks, smaller the capital inflow. Furthermore, lower political risk reduces the cost of capital (e.g. Harvey (2004)) and the credit spread (e.g. Dailami and Hauswald (2003), and Eichengreen, Kletzer and Mody (2003)).

4 Empirical Findings

4.1 Probit

We use pooled specification to predict the liquidity crisis, in that fixed-effect Probit regressions are not consistent estimators due to the incidental parameters problem (Greene 2002).¹⁴ Table 3 presents the Probit estimation for all countries from 1985 to 2004, subject to data availability. As expected, larger economic size, higher development level, higher current account surplus, and trade openness all contribute to the reduction of the occurrence of liquidity crises (Column 1). Higher U.S. interest rate and higher political risk increase the probability of crises as well. We do not include stock market capitalization in the Probit because that it is not significant and its inclusion cuts the sample by half. Similarly, we do not include the lag of the real exchange rate, as it is not significant either.¹⁵

In Column 2, we replace political risk with Standard and Poor's sovereign rating. Higher sovereign rating significantly increases the likelihood of liquidity crisis. The R-squared is also higher now, reaching 0.17.

In the following analyses, we will use the predicted probability based on Column 1, as it provides a larger sample. The predicted probability of crises lies between 0 and 0.32, with an average of 0.07. Using the predicted probability based on Column 2 generates similar results.

4.2 Ratio of FPI to FDI

With the predicted probability of liquidity crises, we can now estimate equations (15) and (16). The results are reported in Table 4.

Columns 1 and 2 report the estimations with pure country fixed effects (i.e., no dynamic feedback). We start with the predicted probability as the only explanatory variable. As our theory predicts, a higher probability of liquidity shocks significantly increases the share of FPI outflow, relative to FDI. Moreover, higher stock market capitalization/GDP increases FPI, while trade open-

¹⁴The estimator relies on T_i increasing for the constant terms (fixed effects) to be consistent. But in this model, T_i is both small and fixed. Hence, the estimators of the constant terms are not consistent. That is, they do not converge at all. The estimator of β is a function of the estimators of the fixed effects, which means that the estimation of β is not consistent either.

¹⁵The R-square of the Probit estimation is 0.08. Arguably, it is not large. We use Probit to test the hypothesis that the probability of crises matters, but we are not too concerned about the degree of fitness of the Probit, as long as it is an unbiased estimate of the probability.

ness complements FDI. Finally, the appreciation of the real exchange rate increases the FDI more than the FPI, consistent with Froot and Stein (1991).¹⁶

Columns 3 and 4 report dynamic panel estimations. Dynamic estimation reduces the sample size, but reassuringly, higher probability of liquidity shocks still increases FPI relative to FDI. Statistically, 1% rise of the probability will increase the ratio of FPI over FDI by 3%.¹⁷ We also find that trade openness and the lagged real exchange rate maintain their signs and significance levels. We further find that the lagged FPI/FDI ratio is associated with the current FPI/FDI ratio. The coefficient of the lagged FPI/FDI is 0.7, which suggests that there is no panel unit root process for FPI/FDI. Additional Arellano-Bond tests fail to reject the hypothesis of no second-order autocorrelation. Hence, the estimations in Columns 3 and 4 are valid and provide strong empirical support for our theory.¹⁸

One question is whether there are alternative explanations. A potential alternative one is that when the probability of crisis is high, there is flight of capital out of the country, but because it is easier to invest in FPI rather FDI, we will get a correlation between FPI/FDI and the crisis probability. This alternative explanation implies that both FPI and FDI rises when a crisis is coming, and the effect is stronger for FPI. To distinguish our hypothesis from this alternative one, we run separate regressions for FPI and FDI. The results are presented in Table 5. Separate regressions shows a decrease in FDI when the crisis probability increases, which is inconsistent with the alternative interpretation, but consistent with our prediction.

Another question is whether to include current account balance over GDP and political risk of source countries in the second stage estimation as well. Our theory does not suggest their inclusion. And we are not aware of other models where trade surplus and political risk directly influence the composition of capital outflows, without affecting the probability of crisis. In earlier literatures, institutional factors, such as political risks, have been included in Albuquerque (2003) and Alfaro

¹⁶The median of the dependent variable (i.e, the log of FDI/FPI) is -0.64, with the 25% quartile cutoff at -1.63 and the 75% quartile cutoff at -0.06. Hence, if the probability of the crisis rises by 20%, then the dependent variable will move from the median into the 25% quartile, *ceteris paribus*.

¹⁷The median of the dependent variable (i.e, the log of FDI/FPI) is -0.64, with the 25% quartile cutoff at -1.63 and the 75% quartile cutoff at -0.06. Hence, if the probability of the crisis rises by 20%, then the dependent variable will move from the median into the 25% quartile, *ceteris paribus*.

¹⁸We do not look at how FDI and FPI respond respectively to the probability of liquidity crisis, as doing so will generate omitted variable bias. Also, to examine whether the effect of the predicted probability is nonlinear, we add the square of the predicted probability as an additional explanatory variable. The square term is not significant in either the pure fixed effect estimation or the dynamic panel estimation. Hence, there is no evidence of nonlinearity.

et. al (2007), which applies to the host country FDI confiscation considerations. But their models focus on the host country and do not cover source country. As a robustness check, we also include political risk in the FPI/FDI equation directly. It does not turn out to be significant in either the country fixed effect estimation or the dynamic estimation. More importantly, the impact of the probability of crisis is not altered.

Note also that alternative explanations based on capital flights, due to potential exchange rate depreciation, do not assign a role to capital market transparency. If the currency is about to depreciate, then owing to higher foreign return, both FPI and FDI will increase, regardless of the transparency of firms in source country. However, our model, based on asymmetric information, assigns a role to capital market transparency. We will test this implication in the following subsection.

4.3 Capital Market Opacity in Source Country

A key prediction of our model is that the higher is the opacity in the source country, the higher is the impact of the probability of liquidity shocks on FPI/FDI. Hence, we estimate the following equation

$$\ln(FPI/FDI)_{it} = \phi \ln(FPI/FDI)_{i,t-1} + \alpha X_{it} + \beta_0 \text{Pr}_{i,t}(Liquidity\ Shock_{i,t+1}) + \beta_1 Opacity_i * \text{Pr}_{i,t}(Liquidity\ Shock_{i,t+1}) + \gamma Year_t + u_i + \varepsilon_{it} \quad (18)$$

We expect to see a positive value of β_1 .¹⁹

We will introduce several proxies of capital market opacity to capture the degree of asymmetric information in the country. We start with the opacity index constructed by the Kurtzman Group and published in MIT Sloan Management Review (2004), which follows the methodology in the original opacity index by Pricewaterhouse-Cooper (2001) but expands the country coverage from 35 to 48. The original 2001 opacity index has been applied in Gelos and Wei (2005), where they look at the connection between transparency and international investor behavior. The opacity index measures opacity based on some standards-related dimensions. It includes five dimensions—corruption, efficacy of the legal system, deleterious economic policy, inadequate accounting and governance practices, and detrimental regulatory structures.²⁰ Its accounting subcomponent is based

¹⁹We do not include the Opacity index itself as an explanatory variable, as it is not time-varying and is therefore imbedded in country fixed effects.

²⁰http://www.opacityindex.com/opacity_index.pdf

on the following survey questions: Have exchanges established disclosure requirements? Are large shareholders required to disclose ownership? Are annual reports available to the public on demand? Are public corporations' financial statements required to be reviewed by an external auditor? Are the country's accounting standards on disclosure in accordance with International Accounting Standards? And must firms account for financial assets at fair market value? Appendix Table 1 lists both the overall and the accounting opacity index, with the higher the value, the higher the opacity.

The regression results for the overall opacity index (OPA) are presented in Columns 1 and 2 of Table 6. Column 1 is for the pure fixed effect model, while Column 2 for the dynamic panel model. Consistent with our expectation, in both cases, higher opacity increases the effect of the predicted liquidity crisis. In Columns 3 and 4, we report the estimation results with the accounting opacity subcomponent (ACC). They confirm the findings with the overall opacity index. Note that as the accounting opacity index ranges from 17 to 63, the net effect of the predicted liquidity crisis is positive for source countries.²¹

In Columns 5 and 6, we use another indicator of capital market opacity: the disclosure score from CIFAR (Center for International Financial Analysis and Research). The CIFAR score is created by examining annual reports for the omission or inclusion of 90 annual report items in the year 1993. The score ranges from 56 to 85, with higher score associated with better corporate disclosure. It has been used in prior studies (La Porta et al. (1998), Hope (2002), Rajan and Zingales (1998), and Bushman et al. (2003)). We use 100 minus the original CIFAR transparency index as the CIFAR opacity index (Appendix Table 2). CIFAR opacity index is highly correlated with our earlier overall opacity index (correlation=0.63) and accounting opacity index (correlation=0.30). The correlations are reasonably high, considering that both the methodologies and the base years are different (year 1993 vs. 2004).²² With the CIFAR score, we again find that higher opacity enlarges the effect of the probability of liquidity shock, particularly in the pure fixed effect estimation.

Columns 7 and 8 apply another proxy of opacity from the Global Competitiveness Report (1999) by the World Economic Forum. The Report includes results from surveys about the level of financial disclosure about companies, which measure the perceptions of over 3,000 executives about the country in which they operate and covers 53 countries. The respondents were asked to assess the validity of the statement "The level of financial disclosure required is extensive and detailed"

²¹Our sample size in Table 5 is around 70% of that in Table 4, as some source countries are not covered by the Opacity Index.

²²The CIFAR score has 10% fewer country coverages compared with the earlier opacity index.

with a score from 1 (strongly disagree) to 7 (strongly agree). We use 8 minus the original value to construct our proxy of opacity (GCR, Appendix Table 3). This proxy for corporate opacity has previously been applied in Gelos and Wei (2005). It is highly correlated with our other proxies. The correlation is 0.78, 0.24, and 0.65 with OPA, ACC and CIFAR respectively (Appendix Table 4). The regression results in Columns 7 and 8 again suggest that opacity strengthens the impact of the predicted liquidity crisis, although not significantly.

So far, the estimated probability of crisis is based on the Probit estimation in Column 1 of Table 3. Now, we use an alternative measure of probability based on Column 2 of Table 3, where Standard and Poor's sovereign rating replaces ICRG risks. The regression results with the new crisis probability are reported in Table 7. The sample size there is 15% less than that in Table 5. But again, we find significant impacts of opacity, similar to those in Table 5. Moreover, the proxy of opacity from the Global Competitiveness Report (GCR) has strong impacts now, statistically different from zero at the 1% level.

Throughout this subsection, we have excluded opacity itself as an explanatory variable, in that time-invariant opacity indicators are already imbedded in source country fixed effects. As a sensitivity check, we drop country fixed effects and add the overall opacity index (OPA) as a control variable. We find that opacity itself is significantly associated with higher FPI/FDI ratio, which is consistent with our theory.²³ The results are similar with other proxies of opacity.

4.4 More Sensitivity Checks

We substitute the predicted probability of crisis with the actual occurrence of liquidity crisis at $t + 1$. Evidently, this may create some endogeneity issues in estimation. But it can still serve as useful checks, particularly if there is some concern about the forecasting power of Probit models. The dynamic panel estimation results are presented in Table 8, with four proxies of opacity (OPA, ACC, CIFAR, and GCR). Again, there we find that the occurrence of liquidity crises at $t + 1$ increases the ratio of FPI to FDI. Moreover, the impact becomes larger for source countries with opaque capital markets.

We further use the one-year lags of FPI stock (log) and FDI stock (log) as explanatory variables, rather than the lag of the FPI/FDI ratio. We find that the lagged FPI is positively associated with the FPI/FDI ratio, while the lagged FDI is negatively associated with the FPI/FDI ratio. More importantly, the probability of crises still has significant impacts as those in Table 4.

²³The estimated coefficient is 0.019, different from zero at the 1% level.

5 Conclusion

In this paper, we examine how the liquidity shock guides international investors in choosing between FPI and FDI. According to Goldstein and Razin (2006), FDI investors control the management of the firms; whereas FPI investors delegate decisions to managers. Consequently, direct investors are more informed than portfolio investors about the prospect of projects. This information enables them to manage their projects more efficiently. However, if investors need to sell their investments before maturity because of liquidity shocks, the price they can get will be lower when buyers know that they have more information on investment projects. We extend the Goldstein and Razin (2006) model by making the assumption that liquidity shocks to individual investors are triggered by some aggregate liquidity shock. A key prediction then is that countries that have a high probability of an aggregate liquidity crisis will be the source of more FPI and less FDI.

To test this hypothesis, we therefore apply a dynamic panel model to examine the variation of FPI relative to FDI for 140 source countries from 1990 to 2004. We use episodes of negative purchase of external assets as a proxy for liquidity crises. Using a Probit specification, we estimate the probability of liquidity crises for each country and in every year of our sample. Then, we test the effect of this probability on the ratio between FPI and FDI generated by the source country. We find strong support for our model: a higher probability of a liquidity crisis, measured by the probability of episodes of negative purchase of external assets, has a significant positive effect on the ratio between FDI and FPI. Moreover, higher opacity in the source country accelerates the effect of the probability of liquidity shock on FPI/FDI. Hence, liquidity shocks do have strong effects on the composition of foreign investment, as predicted by our model.

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6 Appendix: The Valuation Adjustment for the Stock of FDI and FPI Assets

For FPI assets, Lane and Milesi-Ferretti (2006) use the following method to calculate the market value of the stock at the end of year t (i.e, $EQAS_t$):

$$EQAS_t = EQAS_{t-1} \frac{p_t^{MS}}{p_{t-1}^{MS}} + EQAF_t \frac{p_t^{MS}}{\bar{p}_t^{MS}}$$

where $EQAS_{t-1}$ is the market value of the stock at the end of $t-1$; $EQAF_t$ is the flow during the year t ; p_t^{MS} is the Morgan Stanley Composite Index of world stock markets at the end of t ; and \bar{p}_t^{MS} is the average Morgan Stanley composite index during year t .

For FDI assets, they use a different method to account for the valuation effect. The IMF's dataset of International Investment Position (IIP) provide book-value estimates of FDI stock for the majority of countries, and market-value estimates for a relatively small number of countries. Lane and Milesi-Ferretti (2006) complement the IIP dataset with valuation changes designed to capture shifts in relative prices across countries. Here is how they do it:

- For market-value series of FDI stock in IIP, they adjust stock positions for shifts in stock market price indices (i.e, p_t^{MS}), same as their adjustment method for FPI. However, only France, New Zealand, Norway, Sweden and the U.S. provide market value series.

- For book-value series of FDI stock in IIP, they mainly use this method: cumulative flows adjusting outstanding holdings for fluctuations in real exchange rates (as in Lane and Milesi-Ferretti, 2001a, JIE). They first assume that the investment pattern of a country reflects its trade pattern. Their adjustment then is to account for the impact of changes in the exchange rates of the countries where the investment takes place vis-a-vis the US dollar. Hence, their formula is

$$FDIAS_t = FDIAS_{t-1} \frac{rerpc_t}{rerpc_{t-1}} + FDI AF_t$$

where $FDIAS_{t-1}$ is the Lane and Milesi-Ferretti (2006)'s adjusted market value of FDI stock at the end of year $t-1$; $FDIAF_t$ is FDI outflow during year t ; and

$$rerpc_t = \frac{cpi^{pc} e_{\$}^{pc}}{cpi^{us}}$$

where pc stands for partner countries, us for the U.S., cpi^x is the consumer price index of country x and $e_{\pc is the dollar / partner countries' nominal exchange rate. Let us look at Italy's FDI asset

as an example. Suppose that Italy only has FDI in Germany and France, then pc stands for the combination of France and Germany, weighted by these two countries' trade with Italy. One can verify that $rerpc$ actually is the ratio between the CPI-based real exchange rate of the country (Italy) vis-a-vis the US and the CPI-based real effective exchange rate (Italy vis-a-vis trading partners).

Hence, in Lane and Milesi-Ferretti (2006), the adjustment for FDI in book value is different from the adjustment for FPI. Will this significantly affect our estimation model in the main text? It is unlikely, because:

First, we are looking at source country rather than host country. For FPI assets, the adjustment factor, p_t^{MS} , is the global stock return, which does not vary across source countries. Hence, as long as we include year effects, we will fully capture the effect of p_t^{MS} .

Secondly, $rerpc_t$, essentially reflects the price relationship (CPI and exchange rate) between Italy's trading partners and the US. It is unlikely to be affected much by the liquidity crisis in the source country. That is, a crisis in Italy is unlikely to change much the relative price between the combination of Italy's trading partners (France, Germany, China, Canada, U.S., etc.) and the U.S. Note that if the U.S. itself is a large trading partner of Italy, then $rerpc_t$ will change very little. In the extreme case where the U.S. is the only trading partner, $rerpc_t$ will be equal to 1. And in the case where there is a world-wide contagion, again it will be captured by our year dummies.

Table 1: Ratio of FPI to FDI: Summary Statistics

Country Name	Obs	Mean	Country Name	Obs	Mean
United States	15	-0.56	Cambodia	8	-0.09
United Kingdom	15	-0.14	Taiwan Province of China	15	-1.14
Austria	15	-0.32	Hong Kong S.A.R. of China	15	-1.37
Belgium	15	-0.37	India	15	-0.67
Denmark	15	-0.69	Indonesia	4	-4.51
France	15	-1.57	Korea	15	-2.18
Germany	15	-0.28	Malaysia	15	-2.27
Italy	15	-0.40	Pakistan	3	-2.51
Luxembourg	5	-0.22	Philippines	15	-0.17
Netherlands	15	-0.58	Singapore	15	0.05
Norway	15	-0.88	Thailand	14	-3.66
Sweden	15	-1.11	Algeria	14	-7.45
Switzerland	15	-0.10	Botswana	11	-0.16
Canada	15	0.05	Congo, Republic of	10	0.30
Japan	15	-0.52	Benin	9	-3.63
Finland	15	-2.27	Gabon	7	-2.98
Greece	15	-0.62	Côte d'Ivoire	14	-1.07
Iceland	14	-0.24	Kenya	15	-3.48
Ireland	15	1.02	Libya	15	3.04
Malta	11	-1.39	Mali	8	-3.66
Portugal	15	-0.50	Mauritius	6	-1.38
Spain	15	-1.26	Niger	8	-5.38
Turkey	14	0.43	Rwanda	6	-0.33
Australia	15	-0.64	Senegal	15	-1.27
New Zealand	15	-0.72	Namibia	14	0.65
South Africa	15	-0.66	Swaziland	13	-3.94
Argentina	15	0.16	Togo	13	-1.95
Brazil	15	-2.91	Tunisia	15	2.08
Chile	15	-0.22	Burkina Faso	5	-2.04
Colombia	15	-0.91	Armenia	8	-1.58
Costa Rica	10	-1.04	Belarus	8	-1.13
Dominican Republic	9	-0.54	Kazakhstan	6	-0.28
El Salvador	4	0.58	Bulgaria	8	-0.52
Mexico	15	-0.40	Moldova	11	-3.99
Paraguay	15	-3.11	Russia	13	-4.70
Peru	15	0.73	China,P.R.: Mainland	15	-2.94
Uruguay	15	-0.22	Ukraine	9	-0.37
Venezuela, Rep. Bol.	15	-1.12	Czech Republic	12	0.33
Trinidad and Tobago	10	-2.32	Slovak Republic	12	1.22
Bahrain	15	0.60	Estonia	11	-2.00
Cyprus	6	0.04	Latvia	11	-1.20
Israel	15	-0.27	Hungary	14	-1.88
Jordan	8	1.79	Lithuania	12	-1.47
Lebanon	4	-0.06	Croatia	8	-3.11
Saudi Arabia	13	-0.89	Slovenia	11	-2.79
United Arab Emirates	15	5.66	Macedonia	7	2.01
Egypt	8	-0.16	Poland	7	-1.97
Bangladesh	5	-3.17	Romania	7	-2.86

Note: Table 1 presents the average of the log of FPI stock over FDI stock for 140 source countries for the period from 1990 to 2004. *Obs* is the number of non-missing observations for each source country. Countries with no observations at all during this period are not reported. Source: Lane and Milesi-Ferretti (2006).

Table 2: Episodes of Sales of External Assets

Algeria	1987,1986,
Argentina	2001,1989,1987,1986,
Bahrain	2002,2001,1995,1993,1991,1990,1987,
Belarus	2003,1998,1997,
Brazil	1999,1997,1986,
Bulgaria	1996,
Chile	1993,1987,1986,
Colombia	2002,1998,1995,
Costa Rica	2002,1998,
Croatia	1998,
Denmark	1994,
Dominican Republic	2000,1996,
Egypt	1999,1998,
Greece	2001,2000,1997,1995,1992,1989,
Hong Kong S.A.R. of China	2001,1998,
Hungary	1994,
Iceland	1994,
India	1995,1990,1989,1988,1987,1986,
Indonesia	2001,
Israel	1988,1987,
Japan	1999,
Kazakhstan	1998,
Kenya	1997,1996,1995,1994,1990,1987,
Latvia	1995,
Lebanon	2004,2003,2002,
Libya	1993,1991,1988,1987,
Lithuania	1999,
Macedonia	2002,
Malaysia	1996,1995,1994,
Malta	2001,1994,
Mauritius	1998,
Mexico	2002,2000,1994,1992,1988,
Moldova	1998,
New Zealand	1997,1992,1991,1988,
Niger	2002,1998,1997,1996,
Pakistan	2004,
Paraguay	2002,2001,1997,1992,1988,1987,1986,
Peru	2000,1999,1998,1990,1987,1986,
Philippines	2001,2000,1997,1990,1987,
Poland	1996,
Romania	1999,1998,1995,
Rwanda	2003,
Saudi Arabia	1998,1996,1995,1994,1993,1992,
Senegal	1993,1990,1987,1986,
Slovak Republic	1999,1998,
Spain	1994,
Swaziland	2003,
Thailand	1997,
Togo	2001,1998,1993,1992,1987,1986,
Turkey	2001,1994,
Ukraine	1998,
Uruguay	2002,
Venezuela, Rep. Bol.	1995,1992,1988,1987,1986,

Table 3: Probit Estimation of Liquidity Crises

	Case 1	Case 2
GDP, log	-0.10*** (0.03)	-0.051 (0.07)
GDP per capita, log	-0.17*** (0.04)	-0.082 (0.1)
US real interest rate	0.11*** (0.03)	0.10** (0.05)
Financial risk	0.00095 (0.008)	0.029 (0.02)
Political risk	-0.012** (0.005)	
Current Account Balance/GDP	-0.012* (0.006)	-0.072*** (0.02)
Government Balance/GDP	-0.010 (0.010)	-0.015 (0.02)
Trade openness	-0.18* (0.09)	-0.072 (0.2)
S&P country rating		-0.24*** (0.08)
Constant	2.70*** (0.9)	-0.34 (2.2)
Observations	1658	736
R-squared	0.095	0.16

Note: Table 3 estimates the probability of liquidity crises for 140 countries over the period 1985-2004. The dependent variable is the liquidation of source country's foreign asset. Political and financial risk indexes are from ICRG, country rating is from Standard and Poor's, while all other variables are from the WDI. A pooled Probit regression is estimated. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Determinants of FPI over FDI

	Fixed Effect Case 1	Fixed Effect Case 2	Dynamic Panel Case 3	Dynamic Panel Case 4
Prob of Liquidity Crisis at t+1	2.47*** (0.9)	4.49*** (1.4)	3.36*** (1.0)	3.08*** (1.1)
GDP, log		-3.29*** (0.8)		-1.71 (1.1)
GDP per capita, log		-0.44 (0.3)		0.16 (0.3)
Stock market capitalization over GDP		0.19*** (0.05)		0.063 (0.04)
Trade openness		-0.86*** (0.3)		-0.39* (0.2)
Real exchange rate (lag)		-1.57*** (0.3)		-0.61*** (0.2)
Ln(FPI/FDI), lag			0.74*** (0.04)	0.70*** (0.03)
Observations	1072	738	905	656
Number of countries	84	60	79	57
R-squared	0.08	0.18	.	.

Note: The dependent variable is the log of FPI stock over FDI stock, for source countries over the period from 1985 to 2004. The estimated probability of liquidity crisis is based on the estimates from Table 3. All other explanatory variables are from the WDI. Case 1 and 2 are estimations with country and year fixed effects. Case 3 and 4 add a one-year-lagged dependent variable as an explanatory variable, and hence estimates a dynamic panel model. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 5: Determinants of FPI over FDI-Dynamic Model

	FDI-Level Fixed Effect	FDI-Level Dynamic Panel	FPI-Level Fixed Effect	FPI-Level Dynamic Panel
Prob of Liquidity Crisis at t+1	-0.25 (0.9)	-1.82*** (0.6)	2.07* (1.1)	1.08 (0.7)
GDP, log	1.46*** (0.5)	-0.48 (0.4)	-2.27*** (0.6)	-0.52 (0.4)
GDP per capita, log	1.96*** (0.3)	0.49*** (0.2)	1.34*** (0.3)	0.12 (0.2)
Stock market capitalization over GDP, log	0.054 (0.03)	0.079*** (0.02)	0.30*** (0.04)	0.066** (0.03)
Trade openness	0.99*** (0.2)	0.022 (0.1)	0.088 (0.2)	0.0042 (0.1)
Real exchange rate (lag)	0.74*** (0.2)	0.038 (0.1)	-0.29 (0.2)	-0.23* (0.1)
Log of FDI, (lag)		0.67*** (0.03)		
Log of FPI, (lag)				0.71*** (0.03)
Observations	868	791	740	660
Number of countries	66	65	60	57
R-squared	0.71		0.78	

Note: The dependent variable is the log of FPI stock or the log of FDI stock, for source countries over the period from 1985 to 2004. Columns 1 and 2 examine the level of FDI (log), while Columns 3 and 4 examine the level of FPI (log). The estimated probability of liquidity crisis is based on the estimates from Table 3. All other explanatory variables are from the WDI. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 6: Determinants of FPI over FDI-Opacity

	OPA	OPA	ACC	ACC	CIFAR	CIFAR	GCR	GCR
	Fixed	Dynamic	Fixed	Dynamic	Fixed	Dynamic	Fixed	Dynamic
	Effect	Panel	Effect	Panel	Effect	Panel	Effect	Panel
Prob of Liquidity Crisis	-3.55 (5.1)	-5.25 (3.2)	0.45 (3.3)	-0.81 (2.2)	-16.7*** (4.8)	1.86 (2.6)	-2.10 (4.7)	-0.94 (3.3)
Prob(liquidity crisis)*Opacity(OPA)	0.20* (0.1)	0.17*** (0.06)						
Prob(liquidity crisis)*Opacity(ACC)			0.15* (0.09)	0.10* (0.06)				
Prob(liquidity crisis)*Opacity(CIFAR)					0.50*** (0.1)	0.012 (0.06)		
Prob(liquidity crisis)*Opacity(GCR)							1.61 (1.4)	1.07 (0.9)
GDP, log	-3.91*** (0.7)	-0.79 (0.7)	-4.25*** (0.8)	-1.34* (0.7)	-5.36*** (0.8)	-0.56 (0.7)	-3.67*** (0.8)	-1.93** (0.9)
GDP per capita, log	-0.23 (0.3)	-0.066 (0.2)	-0.11 (0.3)	-0.0014 (0.2)	-2.00*** (0.4)	-0.55* (0.3)	-0.46 (0.4)	-0.011 (0.3)
Stock capitalization/GDP	0.14** (0.06)	0.018 (0.04)	0.14** (0.06)	0.0085 (0.04)	0.031 (0.07)	0.012 (0.04)	0.20*** (0.05)	0.028 (0.04)
Trade openness	-0.44 (0.3)	-0.092 (0.2)	-0.44 (0.3)	-0.075 (0.2)	-1.06*** (0.3)	-0.15 (0.2)	-0.92*** (0.3)	-0.44** (0.2)
Real exchange rate (lag)	-1.53*** (0.3)	-0.31* (0.2)	-1.50*** (0.3)	-0.31* (0.2)	-2.50*** (0.3)	-0.42** (0.2)	-1.57*** (0.3)	-0.60*** (0.2)
Ln(FPI/FDI), lag		0.84*** (0.03)		0.84*** (0.03)		0.85*** (0.02)		0.75*** (0.03)
Observations	559	511	559	511	515	475	650	591
Number of countries	39	39	39	39	34	34	47	47
R-squared	0.21	.	0.21	.	0.31	.	0.20	.

Note: The dependent variable is the log of FPI stock over FDI stock for source countries over the period from 1985 to 2004. The estimated probability of liquidity crisis is based on the estimates from Table 3 (case 1). The Overall Opacity Index (OPA) and the Accounting (ACC) Opacity Index are constructed in 2004 by Kurtzman Group, following the methodology in Pricewaterhouse-Cooper (2001). The opacity index (CIFAR, 1993) is from the Center for International Financial Analysis and Research. The opacity index (GCR, 1999) is from the annual Global Competitiveness Report produced by the World Economic Forum. All other explanatory variables are from the WDI. *** p<0.01, ** p<0.05, * p<0.1

**Table 7: Determinants of FPI over FDI-Opacity
(Alternative Measure of Crisis Probability)**

	OPA	OPA	ACC	ACC	CIFAR	CIFAR	GCR	GCR
	Fixed	Dynamic	Fixed	Dynamic	Fixed	Dynamic	Fixed	Dynamic
	Effect	Panel	Effect	Panel	Effect	Panel	Effect	Panel
Prob of Liquidity Crisis	-15.3*** (4.1)	-6.93** (2.8)	-11.9*** (3.0)	-4.45** (1.8)	-8.34** (3.9)	2.00 (2.1)	-17.8*** (3.6)	-8.94*** (2.6)
Prob(liquidity crisis) *Opacity(OPA)	0.36*** (0.09)	0.15** (0.06)						
Prob(liquidity crisis) *Opacity(ACC)			0.36*** (0.09)	0.12** (0.05)				
Prob(liquidity crisis) *Opacity(CIFAR)					0.23** (0.1)	-0.087 (0.06)		
Prob(liquidity crisis) *Opacity(GCR)							5.28*** (1.0)	2.65*** (0.7)
GDP, log	-3.77*** (0.7)	-1.38** (0.7)	-4.39*** (0.7)	-1.75*** (0.7)	-4.49*** (0.8)	-1.29** (0.6)	-3.66*** (0.7)	-3.35*** (0.8)
GDP per capita, log	0.23 (0.3)	-0.073 (0.2)	0.48 (0.3)	-0.018 (0.2)	-0.65 (0.5)	-0.60** (0.3)	0.31 (0.3)	0.31 (0.3)
Stock capitalization/ GDP	0.28*** (0.06)	0.017 (0.04)	0.26*** (0.06)	0.0067 (0.04)	0.25*** (0.07)	0.029 (0.04)	0.27*** (0.06)	0.088** (0.04)
Trade openness	-0.12 (0.3)	-0.29 (0.2)	-0.027 (0.3)	-0.26 (0.2)	-0.82** (0.3)	-0.45** (0.2)	-0.50* (0.3)	-0.50** (0.2)
Real exchange rate (lag)	-0.63** (0.3)	-0.054 (0.2)	-0.60** (0.3)	-0.069 (0.2)	-1.94*** (0.4)	-0.46** (0.2)	-0.85*** (0.3)	-0.23 (0.2)
ln(FPI/FDI), lag		0.81*** (0.03)		0.81*** (0.03)		0.84*** (0.03)		0.58*** (0.03)
Observations	483	440	483	440	446	409	554	501
Number of countries	39	39	39	39	34	34	47	47
R-squared	0.27	.	0.27	.	0.31	.	0.28	.

Note: The dependent variable is the log of FPI stock over FDI stock for source countries over the period from 1985 to 2004. The estimated probability of liquidity crisis is based on the estimates from Table 3 (case 2). The Overall Opacity Index (OPA) and the Accounting (ACC) Opacity Index are constructed in 2004 by Kurtzman Group, following the methodology in Pricewaterhouse-Cooper (2001). The opacity index (CIFAR, 1993) is from the Center for International Financial Analysis and Research. The opacity index (GCR, 1999) is from the annual Global Competitiveness Report produced by the World Economic Forum. All other explanatory variables are from the WDI. *** p<0.01, ** p<0.05, * p<0.1

**Table 8: Determinants of FPI over FDI-Transparency
(Actual Occurrence of Liquidity Crisis)**

	OPA	ACC	CIFAR	GCR
Liquidity Crisis (t+1)	-0.59** (0.3)	0.12 (0.3)	-0.41** (0.2)	-0.51 (0.3)
Liquidity Crisis (t+1)*Opacity(OPA)	0.014** (0.006)			
Liquidity Crisis (t+1)*Opacity(ACC)		-0.0038 (0.008)		
Liquidity Crisis (t+1)*Opacity(CIFAR)			0.014** (0.006)	
Liquidity Crisis (t+1)*Opacity(GCR)				0.19* (0.1)
GDP, log	-0.38 (0.4)	-0.41 (0.4)	-0.92** (0.4)	-1.32** (0.5)
GDP per capita, log	-0.54*** (0.2)	-0.53*** (0.2)	-0.62*** (0.2)	-0.52** (0.2)
Stock market capitalization/GDP	-0.0060 (0.03)	-0.0040 (0.03)	-0.0080 (0.03)	-0.000070 (0.03)
Trade openness	-0.25* (0.1)	-0.25* (0.1)	-0.14 (0.1)	-0.35** (0.2)
Real exchange rate (lag)	-0.32** (0.1)	-0.33** (0.1)	-0.34** (0.1)	-0.38** (0.2)
ln(FPI/FDI), lag	0.85*** (0.02)	0.84*** (0.02)	0.84*** (0.02)	0.76*** (0.02)
Observations	493	493	453	560
Number of countries	38	38	32	45

Note: The dependent variable is the log of FPI stock over FDI stock for source countries over the period from 1985 to 2004. The Overall Opacity Index (OPA) and the Accounting (ACC) Opacity Index are constructed in 2004 by Kurtzman Group, following the methodology in Pricewaterhouse-Cooper (2001). The opacity index (CIFAR, 1993) is from the Center for International Financial Analysis and Research. The opacity index (GCR, 1999) is from the annual Global Competitiveness Report produced by the World Economic Forum. All other explanatory variables are from the WDI. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 1: Opacity Index- Pricewaterhouse-Cooper

Country	Acc	Opa	Country	Acc	Opa	Country	Acc	Opa
Finland	17	13	Argentina	30	44	Taiwan	40	34
Belgium	17	23	India	30	48	Brazil	40	40
Germany	17	25	Venezuela	30	51	Poland	40	41
USA	20	21	UK	33	19	Russia	40	46
Canada	20	23	Denmark	33	19	Egypt	40	48
Chile	20	29	Hong Kong	33	20	Czech Rep	44	41
Israel	20	30	Australia	33	21	Turkey	44	43
Thailand	20	35	Austria	33	23	Lebanon	44	59
Japan	22	28	S. Africa	33	34	Singapore	50	24
Indonesia	22	59	France	33	37	Spain	50	34
Sweden	25	19	Mexico	33	44	Portugal	50	35
Switzerland	25	23	Pakistan	33	45	Hungary	50	36
Ecuador	25	42	Saudi Arabia	33	46	Greece	50	41
Colombia	29	43	Philippines	33	50	China	56	50
Malaysia	30	35	Netherlands	38	24	Italy	63	43
Korea	30	37	Ireland	38	26			

Note: The overall Opacity Index was constructed in 2004 by Kurtzman Group, following the methodology in Pricewaterhouse-Cooper (2001). It covers corruption (COR), efficacy of the legal system (LEG), deleterious economic policy (ENF), inadequate accounting and governance practices (ACC), and detrimental regulatory structures (REG). ACC is based on the following survey questions: Have exchanges established disclosure requirements? Are large shareholders required to disclose ownership? Are annual reports available to the public on demand? Are public corporations' financial statements required to be reviewed by an external auditor? Are the country's accounting standards on disclosure in accordance with International Accounting Standards? And must firms account for financial assets at fair market value? The higher is the number, the higher is the opacity.

Appendix Table 2: Transparency Index- CIFAR

Argentina	68
Australia	80
Austria	62
Belgium	68
Brazil	56
Canada	75
Switzerland	80
Chile	78
Colombia	58
Germany	67
Denmark	75
Spain	72
Finland	83
France	78
United Kingdom	85
Greece	61
Hong Kong	73
India	61
Ireland	81
Israel	74
Italy	66
Japan	71
Korea	68
Sri Lanka	74
Mexico	71
Malaysia	79
Nigeria	70
Netherlands	74
Norway	75
New Zealand	80
Pakistan	73
Philippines	64
Portugal	56
Singapore	79
Sweden	83
Thailand	66
Turkey	58
Taiwan	58
United States	76
South Africa	79
Zimbabwe	72

Note: (CIFAR, 1993) is from the Center for International Financial Analysis and Research. We use 100 minus the original CIFAR transparency index as the CIFAR opacity index

Appendix Table 3: Transparency Index-GCR

Argentina	5.09	Japan	5.25
Australia	6.18	Jordan	5.16
Austria	5.94	Korea	4.73
Belgium	5.76	Luxembourg	5.56
Bolivia	3.62	Malaysia	5.21
Brazil	5.09	Mauritius	5.11
Bulgaria	4.49	Mexico	5.34
Canada	6.16	Netherlands	5.8
Chile	6.01	New Zealand	6.12
China,P.R.: Mainland	3.71	Norway	5.96
China,P.R.:Hong Kong	5.19	Peru	5.03
Colombia	4.85	Philippines	4.83
Costa Rica	4.54	Poland	5.2
Czech Republic	4.29	Portugal	5.33
Denmark	6	Russia	3.59
Ecuador	3.53	Singapore	5.63
Egypt	4.65	Slovak Republic	3.88
El Salvador	4.02	South Africa	5.52
Finland	6.42	Spain	5.77
France	5.74	Sweden	6.31
Germany	5.61	Switzerland	5.35
Greece	5.15	Thailand	4.65
Hungary	4.95	Turkey	5.03
Iceland	5.15	Ukraine	5.78
India	4.93	United Kingdom	6.26
Indonesia	3.87	United States	6.41
Ireland	5.38	Venezuela, Rep. Bol.	4.12
Israel	5.42	Vietnam	3.9
Italy	5.17	Zimbabwe	5.22

Note: The opacity index (GCR, 1999) is from the annual Global Competitiveness Report produced by the World Economic Forum. We use 8 minus the original index as our proxy of opacity.

Appendix Table 4: Correlation Among Proxies of Opacity

	OPA	ACC	CIFAR	GCR
OPA	1			
ACC	0.37	1		
CIFAR	0.68	0.33	1	
GCR	0.78	0.24	0.65	1