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ABSTRACT

FDI investors control the management of the firms, whereas FPI investors delegate decisions to managers. Therefore, direct investors are more informed than portfolio investors about the prospects 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 liquidation price they can get will be lower when buyers know that they have more information on investment projects. In this paper we examine the choice between Foreign Direct Investment and Foreign Portfolio Investment at the level of the source country. Based on the Goldstein and Razin model, we predict that (1) source countries with higher expectation of future liquidity problems export relatively more FPI than FDI, and (2) this effect strengthens as the source country's capital market transparency worsens. To test these hypotheses, we examine the variation of FPI relative to FDI for source countries from 1985 to 2004. Our key variable is the predicted severity of liquidity shock, as proxied by episodes of economy-wide sales of external assets. Consistent with our theory, we find that the predicted liquidity shock has a strong effect on the composition of foreign equity investment. Furthermore, greater capital market opacity in the source country strengthens the effect of the liquidity shock.

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1 Introduction

The liberalization of international capital markets gave rise to large amounts of international equity flows in recent years. These flows seem to have had a major impact on the cost of capital, on the volatility of capital markets, and even on economic growth.[1] In assessing the costs and benefits of the globalization of international equity markets, it is important to take account of the composition of international equity flows. These flows generally take two forms: Foreign Direct Investments (FDI) – that usually involve a control position by the foreign investor – and Foreign Portfolio Investments (FPI) – that do not involve a control position. It is well known that these two forms of investment generate very different implications for the stability of international capital markets and of host countries. For example, during financial crises, FPI investors usually rush to liquidate their investments, whereas FDI is much more resilient and thus contributes to the stability of the host country (see: Frankel and Rose, 1996; Lipsey, 2001; and Sarno and Taylor, 1999).

Despite the importance of the distinction between FDI and FPI, not much is known about the factors that guide the choice of international investors between them. Traditionally, Multinationals engaged in FDI, while collective investment funds– including private equity funds, mutual funds and hedge funds – engaged in FPI. In such a world, investors seeking international exposure had to choose between investing in multinationals or in investment funds. This choice influenced the composition of equity flows between FDI and FPI. More recently, the choice between FDI and FPI has become even more direct, as collective investment funds became sources of FDI and started competing with traditional multinationals in acquiring foreign companies.[2]

The goal of this paper is to shed empirical light on the factors that affect the choice between FDI and FPI at the level of the source country. Our focus is on the effect of liquidity. The basic idea is that FDI investments are illiquid and more difficult to sell, and thus FPI investments become more desirable in the face of expected liquidity needs.

Our hypotheses are based on an extension of Goldstein and Razin (2006), which we develop

[1] See, for example, Bekaert and Harvey (2000), Errunza and Miller (2000), Henry (2000), Chari and Henry (2004), and Bekaert, Harvey, and Lundblad (2005). Stulz (2005) reviews the development of financial globalization and its limitations.

[2] According to the 2006 World Investment Report, collective investment funds have become growing sources of FDI. These funds raised an 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.

formally in the appendix. In the Goldstein and Razin (2006) model, FDI investors are more informed than FPI investors about the prospects of the firms they invest in. 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.

To provide better link to the data, 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 main prediction of the extended model is that countries with a high probability of liquidity problems will be the source of relatively more FPI and less FDI. Another prediction is that the effect of the expected liquidity shocks on the shares of FDI and FPI is driven by lack of transparency about the fundamentals of the investment. 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. Hence, the second empirical prediction is that the effect of an expected liquidity shock on the ratio between FPI and FDI decreases in the level of transparency in the source country.

We take these predictions to the data. A main advantage of the new specification of the model is that it can be taken directly to macro data. We use negative purchase of external assets as an indicator of aggregate liquidity problems. Our measures of FDI and FPI are based on source countries' stocks of external assets as compiled by Lane and Milesi-Ferretti (2007). Using a sample of 65 countries between 1985 and 2004, we first estimate the determinants of liquidity shortages. Then, based on the estimated results, we examine the effect of the expected liquidity problems on the choice of a source country between FDI and FPI. Overall, using various specifications and

control variables, we find strong support for our model: when more severe liquidity problems are expected, the ratio between FPI and FDI at the source country increases.

We further introduce proxies for capital market opacity to capture the degree of asymmetric information in the source country. We interact these opacity measures with the expected liquidity and confirm that greater capital-market opacity in the source country strengthens the effect of the expected liquidity problems on the ratio between FPI and FDI. This illustrates that a channel for strong institutions to affect capital flows is through the mitigation of the consequence of potential liquidity shocks.[3]

Our results have strong implications for the future of FDI 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, events such as the recent subprime market turbulence and the resulting credit crunch could lead to difficulties for the private equity funds in conducting FDI investments. Our results are also relevant for the going debate on the transparency requirements for collective investment funds.[4] Initiatives to improve these funds' transparency may increase funds' ability to engage in 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 returns than FPI, due to the management efficiency.

Our paper is related to the vast empirical literature on international equity flows. Several papers study the determinants of FDI (including cross-border M&As) emphasizing factors such as wealth and credit constraints, governance, mispricing, and fire sales. They include: Froot and Stein (1991), Klein, Peek, and Rosengren (2002), Rossi and Volpin (2004), Aguiar and Gopinath (2005), Albuquerque, Loayza, and Serven (2005), and Baker, Foley, and Wurgler (2009). Other papers (e.g., Griffin, Nardari, and Stulz, 2004; Gelos and Wei, 2005; Ferreira and Matos, 2008; and Leuz, Lins, and Warnock, 2009) study the determinants of FPI. Albuquerque (2003) studies the ratio of FDI to FPI at the level of the host country, emphasizing expropriation risk. None of these papers examines the effect of potential liquidity crises or considers the determinants of the composition between FDI and FPI at the level of the source country.

The remainder of this paper is organized as follows: Section 2 describes the hypotheses based on

[3] Earlier works have emphasized the importance of host country institution on capital inflow. For instance, Alfaro, Kalemli-Ozcan and Volosovych (2008) document that the low institutional quality, measured by host country's political risk, is the leading explanation of the lack of capital flows from rich to poor countries.

[4] See http://www.bloomberg.com/apps/news?pid=20601100&sid=aMS8oOJlJp0I&refer=germany

the model that is contained in the appendix. In Section 3, we describe the data. The econometric model and its various specifications are presented in Section 4. In Section 5, we present the results of the empirical analysis. Section 6 concludes.

2 Hypotheses

Our hypotheses are based on an extension of the model by Goldstein and Razin (2006). The extension is fully and formally developed in the appendix of this paper. In this section, we provide a short intuitive description.

Our main hypothesis is that a source country's composition of foreign equity investment will have more FPI and less FDI if this country is expected to experience more liquidity problems. The idea is that direct investments are more costly to liquidate. Hence, expecting greater liquidity needs in the future, investors tend to tilt their investments towards the liquid asset, which is a portfolio investment.

This hypothesis does not depend on the source of illiquidity of direct investment. The model of Goldstein and Razin (2006) and its extension in this paper derive the illiquidity endogenously as a result of asymmetric information. In the model, foreign direct investors are able to acquire better information about the fundamentals of the firms that they hold due to their ownership positions. This provides an advantage to FDI relative to FPI when it comes to managing the investment. But, when they need to sell due to a liquidity need, FDI investors face a lemon problem due to their superior information and sell at a discount. In the extension developed in the appendix, if the country gets into an aggregate liquidity problem, individual investors might face liquidity needs, which force them to sell. At this point, holding FDI is disadvantageous, as buyers do not know if the sale is due to a liquidity need or adverse information. Hence, in countries that expect greater liquidity problems, investors will choose to conduct more FPI and less FDI.

Our second hypothesis points more directly to the source of illiquidity in the model: asymmetric information. It says that the link between expected liquidity problems and the ratio of FPI to FDI is stronger in countries with lower transparency. This is because transparency alleviates the asymmetric information problem and reduces the cost of holding FDI in times of liquidity shortage.

3 Data

Our key variable of interest is the ratio between the assets that a country holds as FPI and the assets that it holds as FDI. To measure this ratio, we use the recently available data on a country's external assets and liabilities, as compiled by Lane and Milesi-Ferretti (2007). Lane and Milesi-Ferretti (2007) 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, foreign portfolio (equity) investment, official reserves, and external debt. The convention for distinguishing between direct investment and portfolio investment is to see whether the ownership of shares of companies is above or below 10%. If it is above the threshold, then it is classified as direct investment.[5]

For most countries, Lane and Milesi-Ferretti (2007) 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. For earlier years, they then work backwards 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. In our estimation, we use the data from 1985 till 2004 as the sample period.

Our sample includes both developed and developing countries as source countries for outward FPI and FDI. New sources of FDI are emerging among developing and transition economies, as multinationals from these economies become major regional - or sometimes even global - players. It seems that the new global links these multinationals are forging will have far-reaching repercussions in shaping the world economic landscape of the coming decades (UNCTAD: World Investment Report 2006). Table 1 lists the countries covered in the sample from 1985 till 2004, and their mean ratio of FPI to FDI.[6]

[5] Arguably, there 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 percent 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 he had earlier purchased as FPI.

[6] Sample coverage in the following econometric analyses varies a bit, depending on whether countries have data

Our key explanatory variable measures the extent of liquidity problems in the source country. As we explain in the next section, we estimate this variable using data on annual flows in external assets. This data is collected from the IMF's Balance of Payments dataset.[7] Finally, in the following empirical sections, we will also use a few macroeconomic variables as our explanatory variables. These macroeconomic data, such as GDP, current account balance, exchange rates, and trade openness, are collected from the IMF's World Economic Outlook database, which has historical cross-country coverage. Some other variables, such as political risk and opacity, are collected from various datasets and will be described in more details when introduced.

4 Econometric Model

We first develop a linear model, where liquidation of external assets is a continuous variable, measuring the severity of the financial fragility of the country. We then develop a nonlinear model, where there is a latent financial fragility state, and when it goes above some threshold, there is a liquidity crisis. Using these two specifications, we examine how perceived financial fragility in the future affects the FPI/FDI composition.

4.1 Linear Model

The crux of our theory is that if a country expects greater liquidity problems in the future it will increase the share of FPI relative to FDI. We use the variable $E_t\left[Severity_{it+1}\right]$ to proxy for the severity of expected liquidity shocks, as perceived in period t, and investigate how it affects the FPI/FDI ratio for source countries. The empirical analysis has two stages. First, to estimate the expected severity of liquidity shocks, we run the following regression:

$$Severity_{i,t+1} = \gamma X_{it} + \theta Z_{it} + \xi_{t+1} + \varsigma_i + \eta_{it+1}. \tag{1}$$

Then, we use the expected value of $Severity_{i,t+1}$, estimated from (1), as our main explanatory variable for the ratio of FPI to FDI in period t:

$$\ln\left(FPI/FDI\right)_{it} = \alpha X_{it} + \beta E_t\left[Severity_{it+1}\right] + v_t + u_i + \varepsilon_{it} \tag{2}$$

on various explanatory variables. Table 1 is for the sample when countries have data available for the estimations in Table 3.

[7] This data does not account for changes in valuation, and therefore allows ud to capture the notion of the quantity of investment liquidations in our model.

In (1), $Severity_{i,t+1}$ is measured as the negative net annual purchase of external assets – which include FDI, FPI, other investments and foreign reserves – in country i in period $t+1$. We normalize these flows by the stock of total external assets of country i at time t. X_{it} are variables that affect both the liquidity shock and the ratio of FPI to FDI. Z_{it} are variables excluded from equation (2), ξ_{t+1} are year fixed effects and ς_i stand for country effects. In (2), we take the log of the FPI/FDI ratio to reduce the impact of extreme values. In this equation, v_t stands for time fixed effects, u_i stands for country effects. ε_{it} and η_{it+1} are i.i.d. residuals.

Our selection of control variables X_{it} is motivated by Faria et al. (2007), who examine the determinants of the composition of a country's external liabilities. They consider a set of explanatory variables, including country size, economic development level, trade openness and financial reform. They find that only country size has some explanatory power on the distribution of equity liabilities between direct investment and portfolio equity. As little work has empirically examined the composition of external assets, we use the control variables in Faria et al. (2007) as our starting point. First, we include two variables – the log of the population and the log of GDP per capita in constant US dollars – to capture market size and the level of economic development. We then also include trade openness, as measured by imports plus exports over GDP, to control for the connection between trade and FDI. We further include the lagged real exchange rate to capture the wealth effect on capital flows (see Froot and Stein (1991)). Table 2 provides summary statistics of these variables.

The vector Z_{it} is motivated by the literature on financial crises (e.g., Frankel and Rose, 1996). It includes source country political risk index, current account surplus over GDP, and a country's external debt over total assets. Political risk index, from the International Country Risk Guide, is based mainly on government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, and bureaucracy quality.[8] It has been linked to financial crises in earlier literature, with higher political risk making the economy vulnerable to capital flow reversals (e.g. Gelos and Wei (2005), and Broner, Gelos and Reinhart (2006)). Identifying the system in (1) and (2) requires the exclusion restriction to be satisfied. That is, the variables in Z_{it} should have no effect on FPI/FDI except for the indirect effect via the expected liquidity shock. Indeed, our theory does not suggest the inclusion of political risk, current account surplus, and external debt as direct controls in (2), and we are not aware of other models that suggest such a link. In earlier literature, political risk at the host country has been tied to its level of FDI

[8] See http://www.prsgroup.com/commonhtml/ methods.html# _International_Country_Risk.

due to confiscation considerations (Albuquerque (2003) and Alfaro, Kalemli-Ozcan and Volosovych (2008)). The link between FDI and these confiscation considerations, however, does not apply to the source country. Another potential concern is that the current account balance may indirectly affect the FPI/FDI composition through affecting the exchange rate, which may then generate some wealth effect and influence FDI and FPI asymmetrically as in Froot and Stein (1991).[9] To alleviate this concern, we include a control variable for the real exchange rate in equation (2).[10]

Finally, we consider another specification for (2), where the lagged FPI/FDI can affect the current FPI/FDI. Hence, we estimate:

$$\ln\left(FPI/FDI\right)_{it} = \phi \ln\left(FPI/FDI\right)_{i,t-1} + \alpha X_{it} + \beta E_t\left[Severity_{it+1}\right] + v_t + u_i + \varepsilon_{it}. \qquad (3)$$

There is a complication in estimating equation (3). That is, if ε_{it} is not i.i.d but serially-correlated, then $\ln\left(FPI/FDI\right)_{i,t-1}$ will be correlated with ε_{it} and thus create an endogeneity problem. To correct this problem, we then use the Arellano-Bond dynamic GMM approach to estimate equation (3).

4.2 Threshold Model

We now turn to describe the alternative model – the threshold model. The idea here is that a liquidity shock has a strong impact on the FPI/FDI composition only after it reaches a certain threshold, and becomes a "liquidity crisis". In this model, we start by estimating the following Probit equation:

$$I_{i,t}\left(Liquidity\ Crisis_{i,t+1}\right) = \begin{cases} 1 & \text{if } Severity_{i,t+1} > 0 \\ 0 & \text{if } Severity_{i,t+1} \leq 0 \end{cases}, \qquad (4)$$

where $Severity_{i,t+1}$is a function of independent variables as specified in equation (1). Here, we define a liquidity crisis as an episode of negative purchase of external assets, which has a frequency

[9] The Froot and Stein (1991) model operates via a wealth effect in the host country. Because of frictions in control that exist in FDI but not in FPI, wealth is important only for FDI. Thus a rise in host-country wealth, from the appreciation of its real exchange rate, will increase its FDI inflow, while having no impact on its FPI receipts. One could potentially extend their model to source countries with the prediction that real exchange rate appreciation may increase FDI outflow, relative to FPI outflow.

[10] Baker, Foley, and Wurgler (2009) also argue that higher source country's wealth could significantly boost FDI outflow, due to cheap financial capital. They use the market to book ratio in the US stock market as a proxy of cheap capital for US firms. As the data on exchange rate has more country coverage than the market/book ratio, we will then use the real exchange rate also to proxy for the wealth of source country.

of 13% in our sample. Table 8 lists the countries and years when there is a liquidity crisis, according to this definition. It shows that besides developing countries, some developed economies, such as Denmark, Japan, New Zealand and Spain, also experienced liquidity crises in our sample period.

After estimating the probability of a liquidity crisis, we use it as an explanatory variable in the second-stage equation:

$$\ln\left(FPI/FDI\right)_{it} = \alpha X_{it} + \beta \Pr_{i,t}\left(Liquidity\ crisis_{i,t+1}\right) + v_t + u_i + \varepsilon_{it}. \tag{5}$$

5 Empirical Findings

5.1 Linear Model

5.1.1 Determinants of Liquidity Shocks

Table 3 presents the results of the first stage of the estimation, where we examine the determinants of liquidity shocks. In Columns 1-2, we analyze the determinants of liquidity shocks in the next year. We report the random-effect estimations. Random-effect estimation differs from fixed-effect estimation in the treatment of the country effects ς_i in equation (1). In fixed-effect models, ς_i is treated as a set of fixed parameters, which may either be estimated directly or conditioned out of the estimation process. In random-effect models, ς_i is a random variable with a specified probability distribution (usually i.i.d. normal). The random-effect model would be more efficient (in terms of smaller standard errors for estimated coefficients of the covariates X_{it} and Z_{it}) if X_{it} and Z_{it} are not correlated with ς_i. To test the validity of the assumption of random effects, we apply the Hausman specification test to examine whether the covariates are correlated with ς_i (see Greene (2002)). In Columns 1 and 2, higher current account surplus significantly reduces the severity of liquidity shocks. Moreover, higher stock of foreign debt over GDP and lower political stability increase the severity of liquidity shocks. A Hausman test reports a χ^2 of 29.76, which then produces a p-value of 0.23 with a distribution of $\chi^2(25)$. The test can hence be interpreted as supporting the validity of the random-effect estimation. When we move on to the second stage of the estimation, we will thus use the results from Column 2 (random effect model with more Z variables) to capture the expected severity of a liquidity shock.

In the above analysis we estimate the determinants of liquidity shocks in the following year. We then use the estimated expected liquidity shock in the next section to explain the choice between FDI and FPI. A potential weakness in this specification is that the choice of investment

composition effectively occurs at a lower frequency, and thus when this choice is made it is affected by the expected liquidity problems in the next few years. We address this issue in Columns 3-4. Here, on the left-hand side of the regression, we have the maximum severity of a liquidity shock in the next three years, i.e., $max(Severity_{t+1}, Severity_{t+2}, Severity_{t+3})$. The idea is that investors try to estimate the worst liquidity problem in the next three years and use this to guide their choice between FDI and FPI. The determinants of liquidity shocks in the next three years are overall consistent with those in Columns 1-2, albeit with lower significance. Again, the results of a Hausman test suggest that the random-effect model is more efficient than the fixed-effect model ($\chi^2 = 2.76$, producing a p-value of 1.00 with a $\chi^2(25)$ distribution).

5.1.2 The Choice between FPI and FDI

With the predicted severity of liquidity shocks from Column 2 of Table 3, we can now estimate equations (2) and (3). The second-stage regression results are presented in Table 4, with all standard errors clustered at the country level. Column 1 presents the random-effect estimation with no dynamic feedbacks. As the theory predicts, more severe liquidity shocks in the future increase the share of FPI outflow relative to FDI outflow. The effect also seems to be economically significant. From Table 2, we know that the percentage change of FPI over FDI is 3% on average per year with a standard deviation of 49% (see second row of the table). Meanwhile, the change of the predicted severity of liquidity shock is -0.01 per year on average, with a standard deviation of 0.02. If the predicted severity of liquidity shock increases by one standard deviation, this will be translated into a percentage change of FPI/FDI by 14% (=6.93*0.02), based on the estimations in Table 4. This is about 30% of the standard deviation of the annual percentage change of FPI/FDI (i.e., 30%=14%/49%). Again, we run a Hausman test to examine whether the random effect model estimates the data more efficiently. The Hausman test generates a $\chi^2(23)$ of 23.62 and a p-value of 0.43. That is, the random effect estimation is valid and more efficient.

Column 2 reports the dynamic panel estimation. The dynamic estimation reduces the sample size, but reassuringly, more severe liquidity shocks in the future still increase FPI relative to FDI. We also find that the lagged FPI/FDI ratio is associated with the current FPI/FDI ratio. The coefficient of the lagged FPI/FDI is 0.73, suggesting that there is no panel unit root process for $ln(FPI/FDI)$.

The year-to-year variation in the FPI/FDI ratio could be noisy, we hence look at longer intervals of years as a noise reduction method. We study a three-year interval from 1986 to 2004, by looking

at the change of FPI/FDI ratio across 1986, 1989,..., 2004 (Column 3). The predicted severity of liquidity shock is from Column 4 of Table 3, which forecasts the maximum severity of liquidity shock in the coming three years for a given time t. This reduces the sample size significantly. Again, the effect of liquidity shock on FPI/FDI composition is significant at the 5% level. Moreover, the effect of liquidity shock in the three-year interval (Column 3) is almost twice as large as that in the one-year interval (Column 1). Hence taking longer intervals indeed reduces the noise in the data.

As a robustness check, we consider several variations of equation (2) in Table 5. Following the intuition presented above – that investment decisions are made on a low-frequency basis – we examine the results at a 4-year and 5-year interval in Columns 1 and 2 of the table. The impact of the predicted severity on the ratio of FPI to FDI turns out to be large and significant at those intervals. Sticking with the 5-year interval, we then add more variables to equation (2) to tackle the problem of potential omitted variables. We first add the Chinn and Ito (2008) measure of capital account openness, which is the principal component from a set of binary dummy variables that codify restrictions on cross-border financial transactions as reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. We do not find a significant effect for it on either the liquidity problems or the FPI/FDI composition (Column 3 of Table 5). Then, we add the two-year lag of stock market capitalization over GDP to capture the development level of stock market.[11] On the one hand, a more developed stock market may have 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. But on the other hand, a more developed domestic stock market may provide more opportunities at home and hence reduce the incentive for portfolio investors to go abroad. It is then an empirical question which effect dominates. We do not find it to have any significant impact on equity flow composition. More importantly, it does not alter our earlier result on the effect of expected liquidity problems (Column 4 of Table 5) . We also use an alternative measure of stock market depth, i.e., the number of listed domestic stocks. Again, we do not find significant results for it (Column 5 of Table 5).

Overall, the above results point to an effect of expected future liquidity problems on the composition of foreign equity investments. Consistent with our theory, countries that expect higher liquidity problems are more likely to choose FPI over FDI as a vehicle of investment in foreign coun-

[11] One may argue that stock market capitalization can be affected by stock return and might be endogenous. Hence, we take the two-year lag to reduce potential endogeneity.

tries. While our theory is based on information asymmetries, these results could also be consistent with a simple story of transaction costs or market depth that cause FPI to be easier to liquidate than FDI. For example, to liquidate FDI, it may take longer to find buyers who know the sector and are willing to take over the management. But to liquidate FPI, it will not be difficult to sell stocks to other portfolio investors in a deep stock market. If an investor foresees a liquidity crisis and the need to liquidate assets, he may then choose FPI instead. To provide further support for the story of information asymmetry, we now present evidence on the interaction between liquidity and capital-market transparency and how it influences the FPI/FDI composition.

5.2 Capital Market Opacity in Source Country

A key prediction of the theoretical model is that the more opaque the source country is, the higher is the impact of the predicted liquidity shocks on FPI/FDI. Hence, we estimate the following equation

$$\ln\left(FPI/FDI\right)_{it} = \alpha X_{it} + \beta E_t\left[Severity_{it+1}\right] + \varpi E_t\left[Severity_{it+1}\right] * Opacity_i + v_t + u_i + \varepsilon_{it}. \quad (6)$$

We expect to see a positive value of ϖ. Note that the opacity index itself is excluded as an explanatory variable, as it is time-invariant and therefore imbedded in country effects.

In the theoretical model, opacity can be about the fundamentals of the project or the liquidity situation of investors. We now use proxies that capture the degree of opacity about investors' liquidity, and to some extent, the underlying projects. We will introduce several proxies of capital market opacity to capture the degree of asymmetric information in the country.

We start with the Opacity Factor 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 Factor 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.[12] Table 6 lists the Opacity Factor index (OPA), where a higher value indicates higher level of opacity. The regression results for the overall opacity index (OPA) are presented in Columns 1 and 2 of Table 7. Column 1, for the random effect model,

[12] See: http://www.opacityindex.com/opacity_index.pdf

shows that the more opaque a country's capital market is, the higher the effect of the predicted liquidity shock on the country's FPI/FDI composition. Column 2 reports the dynamic estimation. Reassuringly, the interaction term of opacity and the expected liquidity problems is still significantly positive. Consistent with our expectation, in both cases, higher opacity increases the effect of the predicted liquidity crisis. [13]

We then use another indicator of capital market transparency: the disclosure score from Center for International Financial Analysis and Research (1995), which examines firm-level annual reports for the omission or inclusion of 90 accounting items in 41 countries for the year of 1993. The score is related to firm's incomes, cash flows and balance sheets, which cover firm's liquidity and operations. It ranges from 56 to 85, with higher score associated with better corporate disclosure. It has been applied in prior studies (La Porta et al. (1998), Rajan and Zingales (1998), and Bushman, Piotroski and Smith (2004)). We use 100 minus the original CIFAR transparency index to arrive at the CIFAR opacity index (Table 6). CIFAR score is highly correlated with the earlier Opacity Factor index (correlation=0.63) . The correlations are reasonably high, considering that both the methodologies and the base years are different (year 1993 vs. 2004). Note that the CIFAR score has 10% fewer country coverages compared with the earlier Opacity Factor index. With the CIFAR score, we again find that higher opacity increases the effect of liquidity shock, albeit insignificantly (Columns 3 and 4 of Table 7).

Columns 5 and 6 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" with a score from 1 (strongly disagree) to 7 (strongly agree). We use 8 minus the original value to construct our proxy of opacity (WEF, see Table 6). 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 and 0.65 with OPA and CIFAR, respectively. The regression results in Columns 5 and 6 of Table 7 again suggest that opacity significantly strengthens the impact of the liquidity shock on the FPI/FDI composition.

In Columns 7 to 9, we estimate the impact of opacity and liquidity shock on FPI/FDI for

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

every three years from 1986 to 2004. The predicted severity of liquidity shock is based on Column 4 of Table 3, which forecasts the maximum severity of liquidity shock in the coming three years. The interaction of liquidity shock with opacity is significant across the three indicators of opacity. Moreover, the coefficients are much larger than their counterparts in the one-year-interval estimation.

The findings in Table 7 thus provide strong support of our asymmetric-information-based theoretical model. To be more precise, we cannot rule out the potential existence of the pure-transaction-cost-based liquidity effect as mentioned in the last section. But based on Table 7, we can say that asymmetric information is an important driving force behind the effect of the liquidity pressure on equity outflow composition.

5.3 Threshold Model

We now turn to an alternative model based on a threshold effect. Following the specification in (4), we estimate the probability that a country will get into a liquidity crisis, where a crisis is defined as a negative purchase of external assets in a certain year. We then estimate the effect of the probability of a crisis on the FPI/FDI composition.

Table 8 lists the crisis years for countries in the sample. We can see that crises episodes are widespread across countries and over time. Importantly, even some developed economies like Denmark, Greece, Israel, Japan, New Zealand, and Spain, experienced liquidity crises during our sample period according to our definition.

The results of the first-stage estimation (Equation (4)) are presented in Table 9. The first column estimates the determinants of the probability of a crisis in the next year. Higher political risk, higher foreign debt over GDP, smaller GDP and smaller current account surplus increase the probability of crises. In Column 2, we estimate the probability of a crisis in the coming three years (i.e., the probability that there will be a net sale of assets in one of the next three years). We find that variables that are significant in Column 1 are still significant in Column 2.

With the predicted probability of a crisis for the coming year (from Column 1 of Table 9), we then estimate its role in affecting the FPI/FDI composition. Table 10 presents the results of the estimation with country random effects (Column 1) and with dynamic effects (Column 2). We find that the effect of crisis probability is significantly positive in both specifications. We then estimate the FPI/FDI ratio every three years, every four years and every five years, in Column 3, 4, and 5, respectively. We again find a significant and positive coefficient for the crisis probability.

In Table 11, we use the predicted probability of a crisis in the coming three years (from Column 2 of Table 9), and repeat the analysis of Table 10. We still find a significant and positive coefficient for the effect of the probability of crisis in the coming three years on the FPI/FDI ratio. Interestingly, the results in Table 11 are overall stronger (both statistically and economically).

Overall, the effect of expected liquidity shocks on the choice between FDI and FPI appears to be strong and consistent with our theory under the alternative specification, where there is a threshold effect, such that investors consider the probability of getting into a liquidity crisis when deciding on the type of investment.

6 Conclusion

In this paper, we examine how the fear of liquidity shocks guides international investors in choosing between FPI and FDI. Our hypothesis is based on an extension of Goldstein and Razin (2006). In the original model, 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 prospects 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 expect an aggregate liquidity problem will be the source of more FPI and less FDI. Another prediction is that this effect will be strong only when the transparency in the source country is weak.

To test this hypothesis, we apply a dynamic panel model to examine the variation of FPI relative to FDI for source countries from 1985 to 2004. We use the net sale of external assets as a proxy for liquidity problems. We estimate the determinants of liquidity problems, and then test the effect of expected liquidity problems on the ratio between FPI and FDI generated by the source country. We find strong support for our model: greater expected liquidity problems have a significant positive effect on the ratio between FPI and FDI. Moreover, higher opacity in the source country accelerates this effect. Hence, liquidity shocks seem to have strong effects on the composition of foreign investment, as predicted by our model.

Appendix

We develop a model that generates the empirical predictions tested in the paper. The model is an extension of the model in Goldstein and Razin (2006).

Liquidity shocks and the choice between FDI and FPI

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 as 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 $R(K, \varepsilon)$:

$$R(K, \varepsilon) = (1 + \varepsilon)K - \frac{1}{2}AK^2, \tag{7}$$

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:

$$K^d(\varepsilon) = \frac{1 + \varepsilon}{A}. \tag{8}$$

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

$$\frac{E\left((1 + \varepsilon)^2\right)}{2A}. \tag{9}$$

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:

$$\frac{1}{2A}. \tag{10}$$

Comparing (9) with (10), 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. There are also costs for FDI investment, however. First, an FDI investor has to incur a fixed cost in order to acquire the expertise to manage the project directly. We denote this cost, which is exogenously given in the model, by C. Second, there is an endogenous cost arising 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. Then, as demonstrated below, due to information asymmetries, there will be a discount when selling a project managed as direct investment.

In specifying the probability of a liquidity shock, we deviate from Goldstein and Razin (2006) by assuming that liquidity shocks to individual investors are triggered by some aggregate liquidity shock. Specifically, there is a probability q of an aggregate liquidity shock in period 1. 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. In particular, half of the investors will need to sell with probability λ_H and half with probability λ_L. We follow Goldstein and Razin (2006) and assume that $1 > \lambda_H > \frac{1}{2} > \lambda_L > 0$, and $\lambda_H + \lambda_L = 1$. Investors know ex ante whether they are of a λ_H type or a λ_L type and this is their private information. 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.

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. 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 $\frac{E\left((1+\varepsilon)^2\right)}{2A}$ in case they hold a FDI (see (9)) and $\frac{1}{2A}$ in case they hold a FPI (see (10)). On the other hand, if a liquidity shock does happen, direct investors may sell due to a low realization of ε. Then, using Bayes' Law, the price that buyers are willing to pay for a direct investment that is being sold in period 1 is:

$$P_{1,D} = \frac{(1-\lambda_D)\int_{-1}^{\underline{\varepsilon}_D} \frac{(1+\varepsilon)^2}{2A} g(\varepsilon)d\varepsilon + \lambda_D \int_{-1}^{1} \frac{1+2\varepsilon}{2A} g(\varepsilon)d\varepsilon}{(1-\lambda_D)\,G(\underline{\varepsilon}_D) + \lambda_D}. \tag{11}$$

Here, $\underline{\varepsilon}_D$ is a threshold level of ε, set by the direct investor; below which the direct investor is selling the project without being forced to do so by a liquidity shock; λ_D is the probability, as perceived by the market, that an FDI investor gets a liquidity shock. In (11), 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:

$$P_{1,D} = \frac{(1+\underline{\varepsilon}_D)^2}{2A}. \tag{12}$$

Equations (11) and (12) 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 $P_{1,D}(\lambda_D)$.

Because portfolio investors do not observe ε in period 1, they only sell their investment project at that time if they are forced to do so. The period-1 price of a portfolio investment is then 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:

$$P_{1,P} = \frac{1}{2A}. \tag{13}$$

Comparing the price of FDI, which is determined by (11) and (12), with the price of FPI, which is determined by (13), 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. 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.

Based on this analysis, we can write the ex-ante expected net cash flow from FDI:

$$\begin{aligned} EV_{Direct}\left(\lambda_i, \lambda_D, A, q\right) &= (1-q)\int_{-1}^{1} \frac{(1+\varepsilon)^2}{2A} g(\varepsilon) d\varepsilon \\ &\quad + q \left[\begin{array}{c} (1-\lambda_i) \left[\begin{array}{c} \int_{-1}^{\underline{\varepsilon}_D(\lambda_D)} \frac{(1+\underline{\varepsilon}_D(\lambda_D))^2}{2A} g(\varepsilon) d\varepsilon \\ + \int_{\underline{\varepsilon}_D(\lambda_D)}^{1} \frac{(1+\varepsilon)^2}{2A} g(\varepsilon) d\varepsilon \end{array} \right] \\ + \lambda_i \frac{(1+\underline{\varepsilon}_D(\lambda_D))^2}{2A} \end{array} \right] - C. \end{aligned} \tag{14}$$

The ex-ante expected net cash flow from FPI is simply:

$$EV_{Portfolio}(A) = \frac{1}{2A}. \tag{15}$$

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

$$Diff\left(\lambda_i, \lambda_D, A, q\right) \equiv EV_{Direct}\left(\lambda_i, \lambda_D, A, q\right) - EV_{Portfolio}(A). \tag{16}$$

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

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 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:

$$\lambda_D = \frac{\lambda_H \lambda_{H,FDI} + \lambda_L \lambda_{L,FDI}}{\lambda_{H,FDI} + \lambda_{L,FDI}}, \tag{17}$$

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.

The analysis of equilibrium outcomes is very similar to that in Goldstein and Razin (2006). Their model is essentially identical to our model, only assuming that $q = 1$. It is straightforward

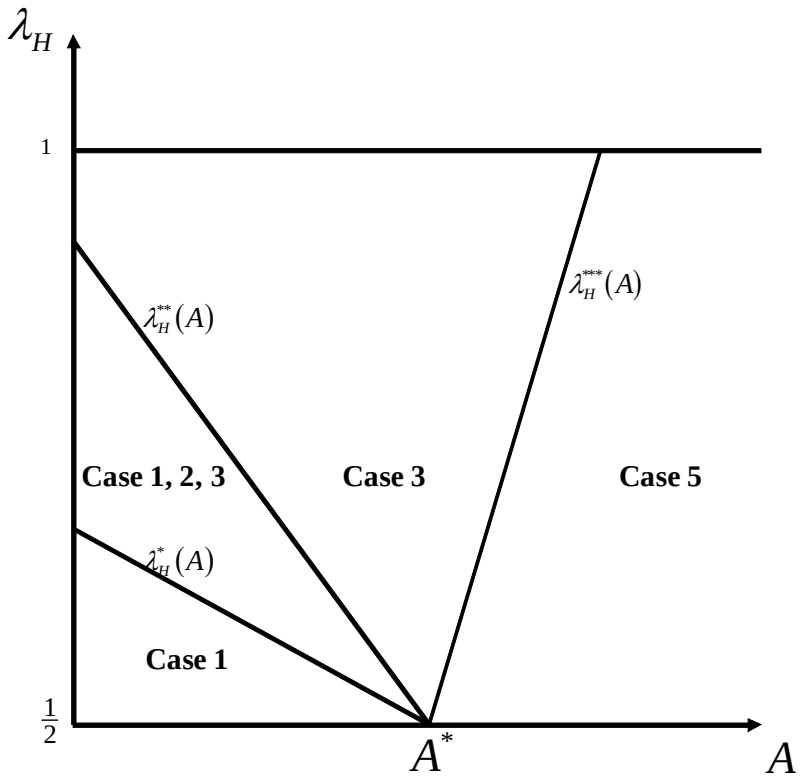

Figure 1: Equilibrium Outcomes

to show that the equilibrium outcomes characterized in Proposition 3 of their paper hold here for any value of q between 0 and 1.[14] These outcomes are summarized in the following figure:

The five cases referred to in the figure are as follows: **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.

Further analysis shows how the four thresholds in the figure – A^*, $\lambda_H^*(A)$, $\lambda_H^{**}(A)$, and $\lambda_H^{***}(A)$ – depend on the probability of an aggregate liquidity shock q, and leads to our empirical prediction. In particular, A^*, $\lambda_H^*(A)$, and $\lambda_H^{**}(A)$ are decreasing in q, while $\lambda_H^{***}(A)$ is increasing in q.[15] This implies that as the probability of an aggregate liquidity shock q increases, there will be more FPI

[14] Details are available from the authors upon request.

[15] This is based on a straightforward analysis of the effect of q on the function $Diff$. Note that q does not have an unambiguous effect on $Diff$. The effect depends on the relation between λ_i and λ_D. The result comes from the fact that $Diff$ 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.

and less FDI in equilibrium. 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 tendency for liquidity problems will be source of a higher ratio of FPI to FDI.

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 or liquidity situation of the firms. If the fundamentals or liquidity situation 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 $\frac{E\left((1+\varepsilon)^2\right)}{2A} - C$. 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.[16]

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, 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 an expected liquidity shock on the ratio of FPI and FDI increases in the level of opacity in the source country.

[16] Note 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.

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Table 1: Ratio of FPI to FDI

Country	Obs	Mean of FPI/FDI	Country	Obs	Mean of FPI/FDI
Algeria	4	0.002	Korea	18	0.10
Argentina	20	2.11	Luxembourg	1	0.66
Armenia	5	0.55	Malaysia	20	0.13
Australia	20	0.48	Malta	10	0.43
Austria	20	0.78	Morocco	2	0.11
Bahrain	19	1.78	Netherlands	20	0.49
Belgium	1	0.47	New Zealand	16	0.54
Brazil	20	0.05	Norway	20	0.43
Bulgaria	8	1.07	Pakistan	2	0.07
Canada	20	0.96	Paraguay	20	0.05
Chile	20	2.64	Peru	20	2.66
China,P.R.: Main	16	0.07	Philippines	20	0.98
Colombia	20	0.50	Poland	6	0.17
Costa Rica	9	0.86	Portugal	20	1.42
Croatia	5	0.05	Romania	7	0.06
Cyprus	1	2.47	Russia	9	0.02
Czech Republic	10	1.63	Saudi Arabia	12	0.42
Denmark	20	0.48	Slovak Republic	7	4.01
Dominican Republ	8	1.61	South Africa	20	0.53
Finland	20	0.14	Spain	20	0.29
France	20	0.24	Sweden	20	0.26
Gabon	6	0.14	Switzerland	20	0.90
Germany	13	0.82	Thailand	18	0.21
Hong Kong S.A.R.	5	0.30	Togo	16	0.41
Hungary	13	0.16	Trinidad and Tob	9	0.29
Iceland	13	1.42	Tunisia	20	9.43
India	19	0.70	Turkey	16	4.33
Indonesia	3	0.01	Uganda	1	0.03
Ireland	20	2.69	Ukraine	5	0.78
Israel	20	1.04	United Kingdom	20	0.90
Italy	20	0.63	United States	20	0.45
Japan	20	0.51	Uruguay	16	0.82
Korea	18	0.10	Venezuela, Rep.	20	0.64

Note: Table 1 presents the average of FPI stock over FDI stock for 65 source countries over the period from 1985 to 2004. Obs is the number of non-missing observations for each source country. Source: Lane and Milesi-Ferretti (2006).

Table 2. Summary statistics of Variables

Variables	Obs	mean	median	st dev	Min	max
ln(FPI/FDI)	909	-0.93	-0.71	1.54	-7.56	2.79
ln(FPI/FDI)-annual change	878	0.03	0.04	0.49	-3.01	4.43
FPI/FDI	909	1.03	0.49	1.84	0.00	16.34
FPI/FDI-annual change	903	-0.04	0.01	1.45	-35.65	8.76
Expected Severity of liquidity shock	909	-0.03	-0.04	0.05	-0.17	0.19
Expected Severity of liquidity shock-- annual change	834	-0.01	-0.01	0.02	-0.12	0.04
Current Account Balance/GDP	909	-0.81	-1.18	4.87	-17.40	20.30
Political stability	909	72.14	74.00	13.72	33.00	97.00
GDP, log	909	16.68	16.67	1.64	12.46	20.98
GDP per capita, log	909	8.76	9.00	1.28	5.31	10.75
Trade openness	909	4.09	4.15	0.58	2.51	5.83
Real exchange rate	909	4.62	4.62	0.20	3.78	5.87
External debt/GDP (%)	909	84.69	55.66	141.19	7.48	995

Table 3: First stage estimation of the severity of liquidity shock

	Severity of Liquid Shock for Next Year		*Severity of Liquid Shock for Coming Three Years*	
	Column 1	*Column 2*	*Column 3*	*Column 4*
Current Account Balance/GDP	-0.00322***	-0.00316***	-0.00191**	-0.00186*
	[0.000849]	[0.000872]	[0.000955]	[0.000967]
Political stability	-0.00129***	-0.000982**	-0.00108	-0.000744
	[0.000452]	[0.000436]	[0.000672]	[0.000629]
GDP, log	0.00737	0.00967	0.000233	0.00419
	[0.00611]	[0.00595]	[0.00773]	[0.00721]
GDP per capita, log	0.0218***	0.0174**	0.00504	-0.000848
	[0.00764]	[0.00747]	[0.00844]	[0.00812]
Trade openness	-0.00909	-0.0174	-0.00849	-0.0202
	[0.0143]	[0.0143]	[0.0198]	[0.0208]
Real exchange rate (lag)	0.0487	0.0455	0.0539	0.0493
	[0.0331]	[0.0328]	[0.0445]	[0.0442]
External debt/GDP		0.000139***		0.000214***
		[2.18e-05]		[3.44e-05]
Observations	909	909	909	909
Within R-squared	0.08	0.08	0.14	0.16
Number of countries	65	65	65	65

Note: The dependent variable in Columns 1 and 2 is the severity of liquidity shock, defined as the annual sale of external assets normalized by the stock of total external assets of that country. The dependent variable in Columns 3 and 8 is the maximum of the severity of liquidity shock in the coming three years. All estimations include year fixed-effects. Standard errors adjust for heteroskedasticity and within cluster correlation clustered at the country level. *, ** and *** indicate statistical significance at less than the 10%, 5% and 1% levels, respectively.

Table 4. The Impact of Liquidity on FPI/FDI

	Column 1 Random Effects	*Column 2* Dynamic	*Column 3* Three Year Interval
Predicted severity of liquidity shock	6.929*	0.493**	11.89**
	[4.11]	[0.23]	[4.942]
GDP, log	-0.322**	-1.632**	-0.223*
	[0.14]	[0.64]	[0.128]
GDP per capita, log	0.114	-0.593*	0.169
	[0.20]	[0.31]	[0.135]
Trade openness	-0.286	-0.0284	-0.173
	[0.46]	[0.17]	[0.443]
Real exchange rate (lag)	-0.962*	-0.264	-1.601**
	[0.51]	[0.21]	[0.662]
Lagged FPI/FDI effect		0.728***	
		[0.046]	
Observations	909	846	270
Within R-squared	0.08		0.08
Number of countries	65	59	59

Note: The dependent variable is the log of FPI stock over FDI stock. The estimation in Columns 1 and 2 is on an annual basis, while in Column 3 it is on a three-year basis. The predicted severity of liquidity shock in Column 1 and Column 2 is based on the estimation from Column 2 of Table 3. The predicted severity of liquidity shock in Column 3 is based on the estimation from Column 4 of Table 3. All estimations include year fixed-effects. Standard errors adjust for heteroskedasticity and within cluster correlation clustered at the country level. *, ** and *** indicate statistical significance at less than the 10%, 5% and 1% levels, respectively.

Table 5. The Impact of Liquidity on FPI/FDI (Longer Intervals)

	Column 1 Four Year Interval	Column 2 Five Year Interval	Column 3 Capital Openness	Column 4 Market capitalization	Column 5 Market capitalization-alt
Predicted severity of liquidity shock	15.28***	14.12***	15.74***	13.37**	11.70*
	[4.230]	[5.439]	[5.413]	[6.246]	[6.779]
GDP, log	-0.243*	-0.285*	-0.275*	-0.392***	-0.25
	[0.142]	[0.164]	[0.164]	[0.152]	[0.179]
GDP per capita, log	0.0486	-0.0856	-0.0437	-0.229	-0.113
	[0.161]	[0.200]	[0.232]	[0.185]	[0.173]
Trade openness	-0.0163	-0.0815	-0.0369	-0.199	-0.146
	[0.421]	[0.480]	[0.488]	[0.502]	[0.506]
Real exchange rate (lag)	-1.393**	-1.179	-1.167	-1.241	-1.729*
	[0.706]	[0.761]	[0.811]	[0.811]	[0.925]
Capital openness			-0.0523		
			[0.106]		
Market Capitalization / GDP				0.0705	
				[0.260]	
Number of listed stocks					-0.103
					[0.161]
Within R-squared	0.11	0.18	0.19	0.17	0.23
Observations	220	170	164	134	129

Note: The dependent variable is the log of FPI stock over FDI stock. The predicted severity of liquidity shock is based on Column 2 of Table 3. Column 1 estimates the sample every four years from 1984 to 2004, and Column 2 estimates the sample every five years. Columns 3 to 5 also estimate the sample every five years, but add additional explanatory variables. All estimations are based on random effect models. All estimations include year fixed-effects. Standard errors adjust for heteroskedasticity and within cluster correlation clustered at the country level. *, ** and *** indicate statistical significance at less than the 10%, 5% and 1% levels, respectively.

Table 6: Opacity Index

Country	CIFAR	Opacity Factor	WEF
Argentina	32	44	2.91
Australia	20	21	1.82
Austria	38	23	2.06
Brazil	44	40	2.91
Bulgaria			3.51
Canada	25	23	1.84
Chile	22	29	1.99
China,P.R.: Mainland		50	4.29
Colombia	42	43	3.15
Costa Rica			3.46
Czech Republic		41	3.71
Denmark	25	19	2
Egypt		48	3.35
Finland	17	13	1.58
France	22	37	2.26
Germany	33	25	2.39
Greece	39	41	2.85
Hungary		36	3.05
Iceland			2.85
India	39	48	3.07
Ireland	19	26	2.62
Israel	26	30	2.58
Italy	34	43	2.83
Japan	29	28	2.75
Jordan			2.84
Kong S.A.R. of China	27	20	2.81
Korea	32	37	3.27
Malaysia	21	35	2.79
Mauritius			2.89
Mexico	29	44	2.66
Netherlands	26	24	2.2
New Zealand	20		1.88
Norway	25		2.04
Peru			2.97
Philippines	36	50	3.17
Poland		41	2.8
Portugal	44	35	2.67
Russia		46	4.41
Saudi Arabia		46	
Singapore	21	24	2.37
Slovak Republic			4.12
South Africa	21	34	2.48
Spain	28	34	2.23
Sweden	17	19	1.69
Switzerland	20	23	2.65
Thailand	34	35	3.35
Turkey	42	43	2.97
Ukraine			2.22
United Kingdom	15	19	1.74
United States	24	21	1.59
Venezuela, Rep. Bol.		51	3.88

Note: CIFAR is from the Center for International Financial Analysis and Research (1995). OPA is from MIT Sloan Management Review (2004); WEF is from the Global Competitiveness Report (1999) by the World Economic Forum.

Table 7. The Effect of Opacity

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
	One-year interval	One-year Interval	One-year interval	One-year Interval	One-year interval	One-year Interval	Three-year interval	Three-year Interval	Three-year interval
Predicted severity of liquidity shock	-5.653	-2.627	5.211	-5.105***	-11.17	-4.390*	-12.52	-12.55	-13.8
	[9.14]	[1.86]	[9.95]	[1.72]	[10.1]	[2.63]	[18.84]	[14.84]	[18.62]
Predicted severity of shock *Opacity (Opacity Factor)	0.367**	0.0839*					0.855**		
	[0.16]	[0.047]					[0.335]		
Predicted severity of shock *Opacity (CIFAR)			0.103	0.0868				1.153*	
			[0.21]	[0.055]				[0.617]	
Predicted severity of shock *Opacity (WEF)					7.013***	1.770**			11.11*
					[2.58]	[0.87]			[5.716]
GDP, log	-0.761***	-0.433	-0.981***	0.0601	-0.632***	-1.019***	-0.462**	-0.601***	-0.523***
	[0.28]	[0.32]	[0.27]	[0.27]	[0.18]	[0.38]	[0.235]	[0.232]	[0.157]
GDP per capita, log	-0.344	-0.490***	-0.739**	-0.0987	-0.444*	-0.514***	-0.254	-0.111	-0.121
	[0.33]	[0.13]	[0.31]	[0.12]	[0.27]	[0.16]	[0.168]	[0.201]	[0.178]
Trade openness	-0.72	-0.175	-0.971	-0.0893	-0.633	-0.287**	-0.221	-0.445	-0.303
	[0.59]	[0.12]	[0.67]	[0.12]	[0.48]	[0.14]	[0.662]	[0.595]	[0.494]
Real exchange rate (lag)	-1.439**	-0.307**	-1.784**	0.0393	-1.507***	-0.480***	-2.660***	-2.035**	-2.057***
	[0.59]	[0.13]	[0.71]	[0.13]	[0.47]	[0.15]	[0.948]	[0.797]	[0.644]
Lagged FPI/FDI		0.844***		0.883***		0.771***			
		[0.0190]		[0.0174]		[0.0204]			
Observations	661	607	608	567	746	682	182	197	222
Within R-squared	0.12		0.19		0.16		0.22	0.17	0.17
Number of countries	40	38	34	32	47	45	32	38	45

Note: The dependent variable is the log of FPI stock over FDI stock. The predicted severity of liquidity shock from Column 1 to 6 is based on Column 2 of Table 3. Columns 1-2 are for opacity measured by opacity factor; Columns 3 and 4 are for opacity measured by CIFAR; Columns 5 and 6 are for opacity measured by WEF. The values of opacity indexes are given in Table 6. The predicted severity of liquidity shock from Columns 7 to 9 is based on Column 4 of Table 3. Standard errors adjust for heteroskedasticity and within cluster correlation clustered at the country level. All estimations include year fixed-effects.*, ** and *** indicate statistical significance at less than the 10%, 5% and 1% levels, respectively.

Table 8: Episodes of Liquidity Crisis from 1985 to 2004

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 9. Probit Estimation of Liquidity Crisis

	Column 1 Next Year	Column 2 Coming Three Years
GDP, log	-0.126*	-0.216**
	[0.074]	[0.099]
GDP per capita, log	-0.152	-0.398***
	[0.10]	[0.14]
Political stability	-0.0225***	-0.0176**
	[0.0079]	[0.0085]
Current Account Balance/GDP	-0.0581***	-0.0536***
	[0.016]	[0.015]
Debt/GDP	0.00103*	0.00239**
	[0.00062]	[0.00099]
Trade openness	-0.401**	-0.502**
	[0.19]	[0.24]
Real exchange rate (lag)	0.597*	0.24
	[0.31]	[0.34]
US interest rate	0.124**	0.0899**
	[0.048]	[0.040]
Observations	911	911
Number of countries	65	65

Note: The dependent variable is the liquidity crisis dummy that equals one when the annual purchase of foreign assets has a negative value. The liquidity crises in our sample are listed in Table 8. Standard errors adjust for heteroskedasticity and within cluster correlation clustered at the country level. *, ** and *** indicate statistical significance at less than the 10%, 5% and 1% levels, respectively.

Table 10. Second Stage - Probit estimation

	Column 1 Random	Column 2 Dynamic	Column 3 Three Year Interval	Column 4 Four Year Interval	Column 5 Five Year Interval
Probability of Crisis next year	1.961**	1.696***	2.582**	2.882***	2.010*
	[0.90]	[0.48]	[1.03]	[1.04]	[1.14]
GDP, log	-0.218	-0.394	-0.144	-0.058	-0.164
	[0.14]	[1.20]	[0.14]	[0.14]	[0.16]
GDP per capita, log	0.291*	-0.678	0.253*	0.374**	0.173
	[0.16]	[0.43]	[0.14]	[0.17]	[0.18]
Trade openness	-0.26	0.195	-0.173	0.00227	-0.201
	[0.46]	[0.26]	[0.46]	[0.43]	[0.51]
Real exchange rate (lag)	-0.898*	-0.388	-1.340**	-1.109	-0.751
	[0.50]	[0.25]	[0.61]	[0.72]	[0.74]
Lagged FPI/FDI		0.712***			
		[0.042]			
Observations	911	811	271	222	171
Number of countries	65	59	59	58	58

Note: The dependent variable is the log of FPI stock over FDI stock. The predicted probably of crisis is estimated from Column 1 of Table 9. All estimations include year fixed-effects. Standard errors adjust for heteroskedasticity and within cluster correlation clustered at the country level. *, ** and *** indicate statistical significance at less than the 10%, 5% and 1% levels, respectively.

Table 11. Second Stage-Probit estimation (three years ahead)

	Column 1 Random	Column 2 Dynamic	Column 3 Three Year Interval	Column 4 Four Year Interval	Column 5 Five Year Interval
Probability of a crisis in three years	2.372***	1.873***	3.123***	3.217***	2.899***
	[0.82]	[0.50]	[0.92]	[0.87]	[0.97]
GDP, log	-0.104	-1.035	-0.0105	0.0638	-0.00641
	[0.14]	[1.09]	[0.14]	[0.13]	[0.15]
GDP per capita, log	0.448***	-0.771*	0.467***	0.578***	0.404**
	[0.17]	[0.44]	[0.16]	[0.18]	[0.20]
Trade openness	-0.0811	0.316	0.0302	0.14	0.064
	[0.46]	[0.26]	[0.46]	[0.41]	[0.47]
Real exchange rate (lag)	-0.825*	-0.353	-1.244**	-0.985	-0.73
	[0.47]	[0.25]	[0.59]	[0.68]	[0.67]
Lagged FPI/FDI (log)		0.718***			
		[0.043]			
Observations	911	811	271	222	171
Number of countries	65	59	59	58	58

Note: The dependent variable is the log of FPI stock over FDI stock. The predicted probably of a crisis in the coming three years is estimated from Column 2 of Table 9. All estimations include year fixed-effects. Standard errors adjust for heteroskedasticity and within cluster correlation clustered at the country level. *, ** and *** indicate statistical significance at less than the 10%, 5% and 1% levels, respectively.