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ABSTRACT

Firms often cite financing constraints as one of their primary obstacles to investment. Global capital flows, by bringing in scarce capital, may ease host-country firms' financing constraints. However, if incoming foreign investors borrow heavily from domestic basnks, direct foreign investment (DFI) may exacerbate financing constraints by crowding host country firms out of domestic capital markets. Combining a unique cross-country firm-level panel with time-series data on restrictions on international transactions and capital flows, we find that different measures of global flows are associated with a reduction in firm-level financing constraints. First, we show that one type of capital inflow--DFI--is associated with a reduction in financing constraints. Second, we test whether restrictions on international transactions affect firms' financing constraints. Our results suggest that only one type of restriction--those on capital account transactions--negatively affect firms' financing constraints. We also show that multinational firms are not financially constrained and do not appear to be sensitive to the level of DFI. This implies that DFI eases financing constraints for non-multinational firms. Finally, we show that DFI only eases financing constraints in the non-G7 countries.

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"Not all direct foreign investment around the world represents net capital flows. Often such investments are financed in local markets."

Martin Feldstein (2000)

"There is now broad agreement about the value of direct foreign investment, which brings not just capital but also technology and training."

Joseph Stiglitz (1998)

1. Introduction

Firms in developing countries typically cite financing constraints as one of their primary obstacles to investment. Some argue that countries should eliminate restrictions on international transactions and encourage incoming capital flows, especially direct foreign investment (DFI). DFI may ease these firms' financing constraints by bringing in scarce capital. This is one reason why policy makers in developing countries have eased restrictions on inward DFI and in many instances provide special incentives for DFI. Yet if foreign firms borrow heavily from local banks, they may exacerbate domestic firms' financing constraints by crowding them out of domestic capital markets. Foreign investors may borrow on domestic capital markets for a variety of reasons, including as a hedging device against exchange rate fluctuations or in response to artificially low domestic interest rates. [1] Yet most observers assume that DFI is accompanied by significant capital inflows.[2] There

[1] Sometimes they borrow domestically as a hedging device against foreign currency debt; other times, they borrow domestically if local interest rates are low. In many developing countries, interest rates have historically been set at artificially low levels, leading to credit rationing in cases where the interest rate is set below the market clearing level.

has been almost no previous research examining the impact of DFI on host-country firms' financing constraints.

One reason for the limited empirical evidence is the difficulty in obtaining detailed firm-level data across countries. In this paper, we combine a firm-level panel data from Worldscope with cross-country time-series data on restrictions on international transactions and capital flows to test whether different measures of global flows are associated with a reduction in firm-level financing constraints. First, we show that one type of capital inflow—DFI--is associated with a reduction in financing constraints. Second, we test whether restrictions on capital movement affect firms' financing constraints. Our results suggest that one type of capital control—restrictions on capital account transactions—negatively affects firms' financing constraints. The results are robust to the inclusion of other factors that could affect the firm's financing constraints--such as availability of domestic credit, business cycle effects, the country's level of GNP per capita, and the level of financial development. Our results suggest that one type of capital inflow—DFI--plays a beneficial role and improves on capital allocation by diminishing the firm's financing constraints.[3]

Our work is related to the large body of literature on capital market imperfections and firm investment; an excellent survey of this literature is in Hubbard (1998). A number of papers have used

[2] For example, Stiglitz in an address to the Chicago Council on Foreign Relations (1998) argues that there is broad agreement about the fact that direct foreign investment brings additional capital. Feldstein (2000) argues that this is not necessarily the case. Helleiner (1989) in a survey for the Handbook of Development Economics suggests that it is unlikely that much new equity capital will result from expanded DFI flows.

[3] Our results are in contrast to Harrison and McMillan (2001) who find that financing constraints of firms in Cote d'Ivoire were exacerbated by the entrance of foreign firms, which borrowed heavily on domestic credit market and crowded out the local firms. However, this paper only includes two low-income countries, India and Pakistan, and it does not include any countries from Sub-Saharan Africa. This may be important because we would expect the domestic firms in the very

the Euler equation methodology to estimate the effect of financing constraints on investment, with most studies concentrating on firms in developed countries.[4] Surveys suggest that financing constraints are an even more important deterrent to investment in developing countries. [5] Theoretically, capital market imperfections are likely to be more severe in these countries, which will result in stronger financing constraints due to unavailability of external financing.[6]

Most empirical evidence of financing constraints in developing countries comes from studies on individual countries, which are difficult to generalize.[7] Research that links the level of financial development to financing constraints across countries includes; Demirguc-Kunt and Maksimovic (1998), Rajan and Zingales (1998), and Love (2001). Dimirguc-Kunt (1998) finds that firms grow faster than they could have using only internally generated funds in more financially developed countries. Rajan and Zingales (1998) demonstrate that industries that require more external finance grow faster in more developed capital markets; and Love (2001) shows that firm's investment is less sensitive to the availability of internal funds in more financially developed countries. Recent evidence also links financial market liberalization to investment and financing constraints across countries. For example, Laeven (2002), finds that financial liberalization reduces firms financing constraints, especially for small firms. Galindo, Schiantarelli and Weiss (2001) find that financial reform has led

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poorest countries to be the most credit-constrained and at the same time it is likely that governments in the poorest countries implement policies to help ease these constraints such as interest rate controls.

[4] See for example, Whited (1992), Hubbard and Kashyap (1992), Hubbard, Kashyap and Whited (1995), and Calomiris and Hubbard (1995) for work on US firms, Bond and Meghir (1994) for the UK firms, and Bond et al. (1996) for comparison of four developed countries: Belgium, France, Germany and the UK.

[5] For example, in a recent survey of executives in 20 African countries, financing constraints were cited as a major obstacle to business expansion, see Africa Competitiveness Report (1998). However, these surveys could overestimate the degree of constraints because they are typically administered by institutions in a position to make loans, such as the World Bank.

[6] See for example, Aghion et al. (1999) and Banerjee and Newman (1994).

to an increase in the efficiency with which investment funds are allocated. Bekaert and Harvey (2001) and Henry (2000) find that the cost of equity capital decreases significantly after financial liberalizations. In addition, Bekaert, Harvey and Lundblad (2001) find that equity market liberalizations increase real economic growth by approximately 1% per year. Yet none of these studies examines the impact of restrictions on international transactions or capital flows on firm-level financing constraints. Since domestic financing is highly constrained in many developing countries, this is an extremely important and overlooked issue. This paper seeks to fill this gap.

To test whether capital inflows affect firm-level financing constraints we use augmented investment Euler equations. We modify the investment model by introducing a constraint on external financing, which generates a shadow cost of external funds. This provides a theoretical justification for our measure of financing constraints. In the absence of financing constraints, investment should respond only to investment growth opportunities, which we control for with a measure of the marginal product of capital. Therefore, the availability of internal funds should not affect current investment. We interpret the sensitivity of investment to the availability of internal funds (measured by the stock of liquid assets) as a proxy for the degree of financing constraints. We find that firms in countries with greater DFI inflows have less investment-cash sensitivity, after controlling for other factors.[8]

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[7] See for example Jaramilo et al. (1996) for Ecuador; Harris, Schiantarelli, and Siregar (1994) for Indonesia; Gelos and Werner (1999) for Mexico; Patillo (2000) for Ghana; Harrison and McMillan (2001) for Cote d'Ivoire; and Bigsten et al (2000) for several African countries.

[8] Since we are not able to identify the firms that are getting the DFI, our results suggest that the *average* constraints are decreasing in the country-year with high DFI. We partially address this problem in section 5 with the sample splits on domestic vs. multinational firms.

We also test for the impact of restrictions on international transactions on firm-level financing constraints. Lewis (1997) explores the relationship between income and consumption growth, using aggregate data in a cross-country framework. Using an Euler equation for consumption, she argues that the relationship between domestic income and consumption should be weak if individuals are not credit constrained. In particular, she shows that individuals are more credit constrained in countries with restrictions on international transactions. Our framework tests for the impact of restrictions on international transactions on firms (as opposed to individuals). Our results for firms support her results for individuals. Firms are more financially constrained in countries that impose controls on capital account transactions. Unlike Lewis (1997), however, we find that other types of controls--such as import surcharges or surrender requirements for exporters--have no impact on individual firm's financing constraints.

We also focus on which types of firms are most likely to benefit from capital inflows. Although we are unable to directly identify which firms receive DFI, we address this question by splitting the sample into firms with foreign assets abroad (multinationals) and domestic enterprises with no foreign assets. We find that multinational firms, which are more likely to have access to international capital markets, are not financially constrained and are not affected by the level of DFI. We also examine whether our results vary across different countries. We show that DFI only eases firm-level financing constraints in non-G7 countries. This is not surprising. We would expect DFI to have the largest effects in countries where credit market imperfections are most important, which are likely to be countries outside the G7.

The remainder of this paper is organized as follows. Section 2 outlines the general approach used for testing for financing constraints and the impact of DFI. Section 3 describes the data. Section 4 presents results of the estimation of the basic model, focusing on DFI inflows, and does robustness checks. Section 5 examines the impact of restrictions on international transactions on credit constraints and Section 6 presents extensions and Section 7 concludes.

2. Testing for Financing constraints and the Impact of Global Flows: The Framework

Numerous studies have used the Q-theory of investment to study financing constraints (see, for example, Hubbard, Fazzari and Peterson (1998)). Although the Q-theory and Euler model of investment come from the same optimization problem (the two models are just different ways to rearrange the first order conditions), the assumptions required to estimate the Q-model are stronger then those required to estimate the Euler equation model. The main difficulty with implementing the Q-theory is finding a proxy for the unobservable marginal q. Average q is equal to marginal q under perfect competition and linear homogeneity in technology (see Hayashi (1982)). However, even if these conditions are met, imperfections in capital markets will cause the divergence between stock market valuations and the true manager's valuation of the marginal return on capital. The assumption of perfect capital markets is the most problematic in our cross-country study as our countries are significantly different in their levels of financial development (and therefore the degree of market imperfections). In addition, numerous recent papers highlight additional problems with the Q-methodology such as severe measurement error and identification problems (see Kaplan and Zingales (2000), Erikson and Whited(2000), Bond and Cummins (2001) and Gomes (2001)). Therefore we choose to use the Euler equation methodology.

2.1 The Optimization Problem

A dynamic model of firm value optimization is reproduced in this section. This model is similar to models estimated in previous studies (see references in footnote 4) and follows closely the specification in Gilchrist and Himmelberg (1998).[9] In this model shareholders (or managers) maximize the present value of the firm, which is equal to the expected discounted value of dividends subject to the capital accumulation and external financing constraints. The firm value is given by:

$$V_t(K_t, \xi_t) = \max_{\{I_{t+s}\}_{s=0}^{\infty}} D_t + E_t\left[\sum_{s=1}^{\infty} \beta_{t+s-1} D_{t+s}\right] \qquad (1.a)$$

where :

$$D_t = \Pi(K_t, \xi_t) - C(I_t, K_t) - I_t \qquad (1.b)$$

$$K_{t+1} = (1-\delta)K_t + I_t \qquad (1.c)$$

$$D_t \geq 0 \qquad (1.d)$$

Here D_t is the dividend paid to shareholders and is given by the "sources equal uses" constraint (1.b); $ß_{t+s-1}$ is a discount factor from the period t+s to period t. In the capital accumulation constraint (1.c), K_t is the beginning of the period capital stock; I_t is the investment expenditure and δ is the

[9] The resulting Euler equation for investment (given in (2) below) is identical to the Euler equation for investment in Gilchrist and Himmelberg (1998). However, we estimate this Euler equation directly instead of implementing the VAR methodology of Gilchrist and Himmelberg. Our model does not include the possibility of debt financing. Formally including debt into the problem results in a separate Euler equation for debt. However, the Euler equation for investment, which is the focus of our paper, is not affected by adding debt into the model, and so we ignore debt financing for the sake of simplicity.

depreciation rate.[10] The restricted profit function (i.e. it is already maximized with respect to variable costs) is denoted by $\Pi(K_t, \xi_t)$, where ξ_t is a productivity shock. The adjustment cost of investment is given by the function $C(I_t, K_t)$, and is assumed to result in a loss of a portion of investment. The financial frictions are introduced via a non-negativity constraint on dividends (1.d), and the multiplier on this constraint is denoted λ_t in the discussion below. This multiplier is interpreted as a shadow cost associated with raising new equity, which implies that external (equity) financing is costly and this extra cost is due to information or contracting costs.[11] This shadow cost is used in defining financing constraints, which are discussed below.

2.2 The Euler Equation

The first-order conditions to the above maximization problem are rearranged to obtain the following Euler equation:

$$1+\left(\frac{\partial C}{\partial I}\right)_t = \beta_t E_t\left[\Theta_t\left\{\left(\frac{\partial \Pi}{\partial K}\right)_{t+1} + (1-\delta)\left(1+\left(\frac{\partial C}{\partial I}\right)_{t+1}\right)\right\}\right] \qquad (2)$$

$$where\ \Theta_t = \frac{1+\lambda_{t+1}}{1+\lambda_t}$$

Here, $(\partial C/\partial I)$ is the marginal adjustment cost of investment, $(\partial \Pi/\partial K)$ is the marginal profit of capital, i.e. the contribution of an extra unit of capital to the firm's profits, further referred as MPK. Ignoring Θ_t, the intuition behind this Euler equation is that the marginal cost of investing today on the left hand

[10] We ignore the price of investment, which is replaced by fixed and time effects in the estimation. We also ignore tax considerations due to data constraints.

[11] Several influential papers addressed the sources of information- or contracting-related frictions in detail (for example, Jensen and Meckling (1976), Myers and Majluf (1984), Hart (1995) and others). Here, these frictions are exogenous to the firm and are represented by the shadow value of external finance. Another possible way to introduce financial frictions is

side (given by the adjustment cost and the price of investment goods, normalized to one) is equal to the discounted marginal cost of postponing investment until tomorrow, on the right hand side. The latter is equal to the sum of the foregone marginal benefit of an extra unit in capital, given by MPK, plus the adjustment cost and price of investment tomorrow (again normalized to one).

To arrive at the empirical model, one must identify empirical measures for financing constraints and MPK, specify a functional form for adjustment costs, linearize the Euler equation and eliminate the expectation operator. These issues are addressed in the subsections below.

2.3 Financing Constraints

At the heart of the financing constraints theory is the factor $\Theta_{t,}$ which is the relative shadow cost of external finance in periods t and t+1. If the shadow cost of external funds is higher in period t than it is expected to be in period t+1 (i.e. $\lambda_t > \lambda_{t+1}$), then $\Theta_t < 1$ and it acts as an additional discount factor which makes current period funds more expensive to use than the next period funds and therefore induces the firm to postpone or reduce its investment. In this case we say that the firm is "financially constrained," and Θ_t is the (degree of) financing constraints.[12] With perfect capital markets $\lambda_t = \lambda_{t+1} = 0$ for all t and hence $\Theta_t = 1$ and the firm is never constrained. With capital-market imperfections, λ_t depends on a vector of state variables, including the productivity shock ξ_t. Therefore, λ_t is time-varying and could be identified with some observable firm characteristics.

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by exogenously limiting the amount of debt that the firm can raise at any point in time, as in Whited (1992). This will create a shadow value of debt, which has the same effect in the investment equation as the shadow value of equity.

Several observable characteristics of the firm's financial health have been used as proxies for financing constraints. The most commonly used variable is cash flow. The problem with cash flow is that it is closely related to operating profits and therefore also to MPK and will measure investment opportunities rather than, or in addition to, measuring the availability of internal funds.[13]

As an alternative measure of internal funds, we use the stock of liquid assets, specifically the stock of cash and marketable securities scaled by total assets (hereafter referred to as cash stock).[14] The cash stock has an intuitive interpretation as "cash on hand" that firms can use for investment if the opportunity presents itself. One theoretical justification for the cash stock measure appears in the Myers and Majluf (1984) model, where the amount of cash holdings, which the authors call "financial slack," has a direct effect on investment in the presence of asymmetric information. This slack allows firms to undertake positive NPV projects, which they would pass up if they did not have any internal funds. This implies that if external financing is costly, there will be a positive relationship between investment and cash stock. This is the relationship explored in this paper.

Unlike the cash flow measure, the cash stock proxies for future growth opportunities only in the presence of financing constraints. Since holding cash is costly to firms (because it diverts resources from productive use and offers zero return), firms will accumulate cash stock only if they

[12] If, on the other side, $\Theta_t > 1$, the firm expects to be more constrained tomorrow (time t+1) than it is today and at time t its investment will be unconstrained. In this case the firm is more likely to invest at time t, since the discount factor β is increased by the amount Θ_t (i.e. the interest rate is lowered).

[13] See for example Gilchrist and Himmelberg (1998) and Hubbard (1998) for a discussion.

[14] Similar measures of financing constraints have been used before: Calomiris, Himmelberg and Wachtel (1995) used financial working capital and Gilchrist and Himmelberg (1998) used cash equivalents. Alternatively, Whited (1992) used debt to assets and interest coverage as proxies for financing constraints.

expect to be financially constrained in the future. Evidence consistent with this hypothesis is presented in Opler et al. (1999), among others.[15]

We measure financing constraints by the sensitivity of investment to cash stock. We argue that the larger this sensitivity, the more constrained the firm is because it has to rely on its internal funds to finance its investment. The primary goal of this paper is to determine whether capital inflows (in particular, DFI) or restrictions on international transactions have an impact on firm-level financing constraints. This will be reflected in the effect of capital inflows or controls on the investment-cash sensitivity. For example, to test the hypothesis that financial constraints are affected by DFI, we allow the investment-cash sensitivity to depend on the country-year inflows of DFI, and hence our proxy for financing constraints is given by:

$$\Theta_{it} = a_{0i} + (a_1 + a_2 DFI_{ct}) Cash_{it-1} = a_{0i} + a_1 Cash_{it-1} + a_2 DFI_{ct} Cash_{it-1} \quad (3)$$

Here a_{0i} is a firm-specific level of financing constraints (which enters into the fixed effects) and $Cash_{it-1}$ is the cash stock scaled by the total assets.[16] The focus of our paper is on the interaction of DFI and Cash, i.e. coefficient a_2. A negative sign suggests that direct foreign investment reduces the sensitivity of investment to the availability of internal funds (i.e. financing constraints) and a positive sign would be an indication of "crowding out".

[15] Kim et al. (1998) and Calomiris, Himmelberg and Wachtel (1995) also find that firms with lower costs of external finance maintain lower levels of financial working capital. Despite the growing empirical evidence on the "precautionary savings" by financially constrained firms, this hypothesis still remains controversial, see for example Kaplan and Zingales (1997); their view is disputed in Fazzari, Hubbard and Petersen (2000).

[16] We assume that the firm makes its decision for period t investment at the beginning of that year (or, equivalently, the end of previous year). Therefore the appropriate timing of the cash stock is t-1, because the investment decision depends on how much cash a firm has before starting the investment.

2.4 Measuring MPK, Adjustment cost and Linearization

To formulate the empirical model we define the proxies for the MPK and adjustment costs. We use a measure of MPK that is derived from profit maximization under the assumption of the Cobb-Douglas production function, given by

$$MPK = \frac{\alpha_k}{\mu}\frac{S}{K} \qquad (4)$$

where (S/K) is a sales to capital ratio, α_k is the capital share in the production function and μ is a markup. We prefer to use the sales-based measure because it is less correlated with cash flow than the alternative operating profits measure.[17]

We assume a quadratic adjustment cost function, which results in a linear marginal adjustment cost of investment:

$$\frac{\partial C}{\partial I}_{it} = \alpha\left(\frac{I}{K}_{it} - g\frac{I}{K}_{it-1} - \nu_i\right) \qquad (5)$$

This adjustment cost function is slightly more general than the one used in the traditional models because it includes the lagged investment to capital ratio with an additional parameter g which is added to capture strong persistence in investment to capital ratios present in the data.[18]

[17] See Gilchrist and Himmelberg (1998) for derivation of the sales-based MPK measure and the arguments against using the operating profits measure of MPK. Unfortunately we do not have direct measures for α_k and μ on the firm level, however we rely on the fixed effects to capture these important firm-dependent characteristics.

[18] This extended functional form allows for the more common form with g=0, which could be tested empirically. The intuition for this added term is that it may be easier for the firm to continue investment at some fraction g of the previous period ratio, since, for example, it has hired workers or made some other arrangements which would be costly to cancel. Parameter ν_i could be interpreted as some firm-specific level of investment at which adjustment costs are minimized.

To simplify the estimation and interpretation of the coefficients, we linearize the product of β_t, Θ_t and the marginal benefit of investment (expression in curly brackets in (2), here denoted as $\{.\}_t$) using a first-order Taylor approximation around the means given by (ignoring constant terms):

$$\beta_t \Theta_t \{.\}_t = b\gamma\Theta_t + b\{.\}_t + \gamma\beta_t \qquad (6)$$

where γ is the unconditional mean of the expression in curly brackets, and b is the average discount factor. [19]

Finally, we assume rational expectations, which allows us to replace expectations with realized values plus an expectation error e_{it}, which is orthogonal to any information available at the time when the investment decision is made.

2.5 Empirical Model and Estimation

We substitute (3), (4) and (5) into Euler equation (2) use linearization in (6) and replace the expectation with the realization plus an error term to obtain the empirical model:

$$\frac{I}{K}_{it} = \beta_1 \frac{I}{K}_{it+1} + \beta_2 \frac{I}{K}_{it-1} + \beta_3 \frac{S}{K}_{it} + \beta_4 Cash_{it-1} + \beta_5 Cash_{it-1} DFI_{ct} + \beta_6 DFI_{ct} + f_i + e_{it} \qquad (7)$$

Here, f_i denotes fixed effects, which capture firm-specific parameters for adjustment cost ν_i , MPK, and for financing constraints a_{0i}.[20] We focus on the coefficient β_5, the interaction of the level of cash

[19] Since Θ_t could be above or below one we assume that its mean is equal to one.
[20] In addition, fixed effects capture the omitted terms that contain prices of investment goods and the conditional covariance of financing constraints and marginal benefit of investment are replaced by the combination of time and fixed effects. Third, the fixed effects capture a sample selection bias if the firms included in the sample have different

stock (a firm-level variable) with the level of DFI inflows, other inflows or restrictions on international transactions (all are country-level variables). If DFI reduces firms' financing constraints, this coefficient should be negative, which implies that the total sensitivity of investment to cash stock (given by the sum of $\beta_4 + \beta_5 DFI$) is reduced with DFI inflows. The coefficient β_4 measures the sensitivity of investment to cash stock in an average country-year. With zero DFI inflows, it is expected to be positive.

We use the same framework to test for the effect of restrictions on international transactions by replacing the DFI measure in (7) with measures of restrictions on international transactions. We also add additional interactions of the cash stock with the control variables of interest (such as financial development, GDP growth, GNP per capita, and M2) to the model in (7) to test if the DFI effect (on the cash coefficient) is robust to controlling for other potential effects on financing constraints.

The first issue in estimating this model concerns the presence of fixed effects. The fixed effects are correlated with the regressors because the model contains lags and leads of the dependent variable, therefore they need to be removed before the estimation. Because the regressors are not strictly exogenous (as discussed above), the commonly used mean-differencing procedure will result in biased estimates. To remove fixed effects we use a forward mean-differencing transformation, which removes only the forward mean, i.e. the mean of all the future observations available for each firm-year. This transformation is otherwise known as orthogonal deviations or the Helmert transformation and is described in Arellano and Bover (1995) and Bond and Meghir (1994). Unlike

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investment policy than the rest. In some robustness checks we also experimented with including country-time dummies (and dropping FDI in levels) and obtained similar results.

the first-differencing, the forward mean-differencing preserves the error structure and therefore does not require any correction for the serial correlation in the error terms. We use heteroskedasticity robust estimates of the standard errors, which are "clustered" by the firm (i.e. do not require an assumption of the independence of errors within the firm).

As discussed above, the expectation error e_{it} is orthogonal to the information available at the time when the investment decision is made. We assume that the investment decision for year t is made at the beginning of that year (which is equivalent to end of year t-1). Therefore, the information available at the time of decision is dated t-1 since year t information does not arrive until the end of year t. Then, the orthogonality conditions for this model are given by $E[e_{it}|x_{it-s}]=0$ for $s\geq 1$, which is equivalent to the assumption that the regressors are predetermined, rather then strictly exogenous.[21]

After the forward mean-differencing, the transformed errors are still orthogonal to the untransformed original variables dated t-s, where $s\geq 1$. Therefore, we use the GMM procedure, implemented as IV (instrumental variables), with t-1 and t-2 lags of instruments.[22] The instruments are all the variables in the regression, plus cash flow, cost of goods sold, and the interactions of cash, sales and investment with DFI and other variables of interest (see Table A2 for variable definitions). Our instruments include lagged DFI, and we also allow for the endogeneity of current DFI. This is important if current flows and current investment are simultaneously determined.

3. Data

[21] This means that the future values of the regressors are allowed to be correlated with the current realization of the error term, (for example sales to capital is clearly related to the current realization of investment error term), while the past realization are strictly orthogonal to the current error term.

All firm level data come from the Worldscope database, which contains data on large publicly traded firms in which there is an investor interest. The firm data are available for 40 countries and cover over 7000 firms for the years 1988-1998 (however, the years before 1991 and the year 1998 have fewer observations). Details are given in Appendix 1. The coverage within countries varies widely from as little as 1% of all listed domestic firms included (for India) to as many as 82% (for Sweden), as calculated by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997). Table A.1 gives the list of countries in the sample with the number of firms and observations per country.

The number of firms in each country varies widely across the countries, and the less developed countries are under-represented. This creates a problem with pooled cross-country estimation as over-represented countries may influence the coefficients in a non-systematic way. To correct for this problem we rerun all main results including only the150 largest firms in each country.[23] In addition we also employ a weighting procedure with each observation assigned a weight inversely proportional to the number of observations available for that country. This weighting is used as an alternative way to balance the sample and it produces similar results.

[22] Using GMM with efficient weighting matrix instead of identity weighting matrix (which is equivalent to an IV procedure) produces similar results. However, the advantage of IV procedure is in allowing the "cluster" option for calculation of the standard errors, which controls for the free-form heteroskedasticity on the firm level.

[23] We rank companies by their relative size of PPENT (fixed capital) in each year for each country (using total assets in US dollars produces similar results). This procedure creates firm ranks that are different for each year. We use these ranks and in addition we use the ranks that are averaged across all years for each firm, which creates an average firm rank that does not change from year to year. Both ranks produce similar results. We also experimented with different cutoff points, such as 50, 100, 200 or 300 firms and all the sub-samples produced results equivalent to the ones reported.

The main firm-level variables are investment and sales, scaled by the beginning of the period capital,[24] and cash stock, which is the stock of cash plus marketable securities scaled by total assets. Variable definitions are given in Table A2. We supplement the firm-level data with country-level data on capital inflows, including portfolio investment, private capital flows, and direct foreign investment. The capital flow data are taken from the IFS publication Balance of Payments Statistics. Our main capital flow variable is inflows of DFI, which we scale by aggregate gross domestic investment (GDI) and alternatively by GDP. In addition we look at net DFI, defined as inflows minus outflows; portfolio investment (both inflows and net flows); and "other" flows. Other flows consist mainly of commercial bank loans but also include any other private flows which are neither portfolio investment or DFI. Our data on restrictions on international transactions are described in section 5. For robustness checks we add the growth rate in real GDP, real GNP per capita, the stock of liquid liabilities scaled by GDP (M2) and credit to private sector by deposit money banks and non-financial institutions; all supplementary data come from IFS. As an additional robustness check we add a country-level measure of financial development, constructed using indicators developed by Demirguc-Kunt and Levine (1996). This measure combines five indicators of financial development: market capitalization over GDP (i.e. the size of the stock market), total value traded over GDP, total value traded over market capitalization, the ratio of liquid liabilities to GDP and the credit going to the private sector over GDP. Each indicator is standardized to have mean zero and variance one, after which the indicators are averaged to produce a standardized index with mean zero and variance one.

[24] The model requires one to use the beginning of the period capital stock as a scaling factor for calculating adjustment costs and MPK. One alternative is to use lagged capital stock (i.e. period t-1 used as the beginning of the period t capital stock). However, this would not be appropriate if there are mergers, acquisitions, divestitures or other capital-changing events, which are hard to identify. We use the approximate value given by the ending period capital, minus investment and depreciation in that year, which is more robust to the capital-changing events, as discussed in Love (1999).

Table A.3 reports means of the key variables over the sample period 1988-1998. The first three columns are capital flow variables scaled by gross domestic investment. All three variables are taken from the International Monetary Fund's publication International Financial Statistics. Direct foreign investment occurs when foreign ownership exceeds ten percent of the total equity of the firm. Investments of less than ten percent are considered portfolio investment. Inflows other than DFI and portfolio include primarily bank loans (public and private). GNP per capita is in U. S. dollars in 1994 from the World Development Report, 1996. The remaining three variables are also from the IFS and are defined as follows:M2 is the stock of liquid liabilities of the financial system scaled by GDP, domestic credit is the ratio of credit allocated to the private sector by depository institutions scaled by GDP and GDP growth is the annual real growth rate of GDP.

The means in Table A.3 indicate that the countries with the highest amount of DFI in our sample are Singapore, New Zealand, Chile, and Belgium. Countries with the lowest amount of DFI are Japan and South Korea. These countries have traditionally been closed to direct investment. More recent data would show an increase in direct investment in South Korea, but these data end in 1998. As a share of gross domestic investment, countries with the highest shares of portfolio investment are Belgium, the United Kingdom, and Venezuela. Table A.3 also reports other summary measures for the sample, including GNP per capita and the Financial Development (FD) indicator developed by Levine. According to this measure, Japan, Germany, the US and the UK have the highest level of financial development; Pakistan and Indonesia have the lowest.

Table A.4 reports means of the components of the capital control index and the mean of the index itself. The measures of restrictions on international transactions are taken from the International

Monetary Fund's annual report, Trade and Exchange Restrictions. The IMF assigns a value of 1 if the country has a control, and zero otherwise. Historically, the IMF has collected information on five types of controls: (1) restrictions on capital account transactions (2) restrictions on current account transactions (3) surcharges on imports (4) requirements for advanced import deposits and (5) export taxes, in the form of repatriation and/or surrender requirements for export revenues. The first control includes any kind of restriction on the capital account, while the second restriction includes restrictions on trade in goods and services. Interestingly, use of restrictions on international transactions is not confined to the poorest countries. Conversely, all of the countries that did not implement restrictions on international transactions (Canada, Hong Kong, the U.K., the U.S., Singapore, the Netherlands and New Zealand) are high-income countries. This suggests that the correlation between income and use of restrictions on international transactions is positive but not perfect. In aggregate, 31 out of 38 countries used some type of capital control during our sample period. The most common types of restrictions on international transactions are restrictions on capital transactions and repatriation and surrender requirements for exports.

Summing across all types of restrictions on international transactions, the evidence in Table A.4 suggests that the most open countries are Canada, Hong Kong, the Netherlands, New Zealand, Singapore, the US, and the UK. The most closed economies are Pakistan and South Africa, followed by Columbia and India. These rankings correspond with anecdotal evidence concerning the openness of the current and capital account across our sample countries.

Table A.5 reports correlation coefficients, p-values and number of observations for the relationship between DFI and restrictions on international transactions and the relationship between

DFI and our macroeconomic indicators. As expected, the correlation between DFI and restrictions on international transactions is strongly negative and significant (-0.32). The two controls most correlated with DFI are restrictions on capital transactions and repatriation and surrender requirements for exports. The latter is not surprising as much of DFI goes to the export sector. The former directly affects DFI and so we would expect this measure to be negatively correlated with DFI, since a restriction on capital transactions could be a direct restriction on incoming or outgoing DFI. One must be cautious in assigning causality. Although restrictions on international transactions do affect DFI inflows, it is equally plausible that restrictions on international transactions are (negatively) correlated with income level and that income levels determine (among other things) DFI flows. However, in the lower panel of Table A.5, we see that DFI and our macroeconomic variables are not very strongly correlated. Although DFI is not correlated with GNP per capita or M2, it is strongly correlated with GDP growth. In addition, DFI is not significantly correlated with either a country's level of financial development (proxied by FD) or the magnitude of private credit.

4. Investment Equation Estimates

Table 1 reports the GMM results for equation 7. The basic specification is reported in column (1). Direct foreign investment (DFI) is scaled by gross domestic investment (GDI). This specification imposes no cut-offs on DFI and includes all firms with non-missing observations. The results indicate that on average, firms in the sample are credit-constrained. The coefficient on lagged cash stock is positive and statistically significant. As expected, the coefficients on lagged and future investment and the sales to capital ratio are also positive and significant. The coefficient on DFI alone is positive and significant, indicating a positive correlation between country-level DFI and firm-level investment.

The focus of this section is the coefficient on DFI*Cash. The coefficient is negative and statistically significant. This indicates that high levels of foreign investment are associated with a reduction in the financing constraints faced by firms. The coefficient on cash stock is equal to 0.13, which we interpret as investment-cash sensitivity in an average country in a year with zero DFI inflow. The distribution of DFI across country-years has mean of 0.09 and standard deviation of 0.08, therefore a one standard deviation increase in DFI inflows implies a 0.08 decrease in the cash sensitivity, that is a change from 0.13 to 0.05, almost a 60% decline in cash sensitivity. These numbers imply that DFI inflows have a large and economically significant influence on the investment-cash sensitivity, which we interpret as a reduction in the firm's financing constraints.

The remainder of this section is devoted to showing that this result is robust to a variety of alternative specifications. In column (2), we restrict the sample to the largest 150 firms in each country. Since most of the firms in the sample are from the largest countries, such as the United States, this restriction is introduced to see if data for the United States is driving the results. Restricting the sample to the largest 150 firms in each country has very little impact on the results. The interaction between DFI and cash stock remains large and statistically significant. The only difference is that DFI no longer has an independent, statistically significant impact on investment.

Column (3) restricts the sample to all observations where country-level inward DFI is greater than zero and less than fifty percent of gross domestic investment (GDI). This allows us to exclude extreme country observations where DFI may account for the major share of domestic investment. This only removes 12 enterprises from the sample. Excluding the extreme observations on DFI leads

to even larger effects of DFI on financing constraints. Further restricting the sample to the largest 150 firms in each country has no significant impact (column (4)) on the results.

In columns (5) and (6), we scale DFI by gross domestic product (GDP) instead of gross domestic investment. Although the point estimates change due to the different scaling factor, the results are unaffected: firms in countries with high levels of DFI are less credit constrained. Column (7) further restricts the sample to observations where DFI values are not extreme, and also weights the observations. The weighted regression approach assigns a country-specific weight, which is equal to the inverse of the number of observations in each country. Countries with a lot of observations get a smaller weight and countries with fewer observations get a larger weight, so that the number of observations is equalized across all countries. We also experimented with country-year specific weights (ie each year in each country is assigned a weight proportional to the number of o bservations in that year and country) and obtained similar results. Introducing weights does not affect the results.

Table 2 redoes the specification reported in Table 1, but includes a number of robustness checks. Direct foreign investment is likely to be correlated with a number of country-level measures of economic well-being, including GDP growth and the general level of financial development. Another possibility is that foreign investment responds to domestic policies which expand the availability of domestic credit. In this case, the results could simply arise from omitted variable bias, where DFI proxies for the expansion of domestic credit.

The results in Table 2 indicate that this is not the case. If we add a variety of additional controls, the coefficient on DFI*cash stock is unaffected. The first two columns add the interaction

of cash stock and financial development (FD). The FD index is equal to the sum of the (standardized) indices of the stock market development, STKMKT, and financial intermediaries development, FININT, which come from Demirguc-Kunt and Levine (1996) (they refer to these indices as Index1 and Findex1 respectively). The STKMKT is the sum of three standardized measures: market capitalization over GDP (i.e. the size of the stock market), total value traded over GDP, and total value traded over market capitalization (two measures of liquidity of the market). The FININT is the sum of two standardized measures: the ratio of liquid liabilities (M3) to GDP (i.e. the overall size of the credit market) and the credit going to the private sector over GDP (the amount of credit th at is relevant to the firm's financing)[25]. Thus, the measure is a country-level measure, with no time variation. We add FD*cash to check whether DFI is essentially a proxy for financial development. However, the inclusion of FD, which varies across countries but not over time, does not affect the coefficient on DFI*cash. As expected, in countries with more financially developed markets, firms appear to be less credit constrained.

In columns (3) through (6), we add the interaction of cash stock and GDP growth. Since foreign investment is attracted to fast-growing countries, DFI may simply be capturing the fact that fast-growing countries experience a reduction in financing constraints. The results in Table 2 indicate that GDP growth has no impact on financing constraints. Inclusion of GDP growth interacted with cash stock has no impact on the DFI*cash coefficient. However, one puzzling result is that GDP growth by itself is negatively associated with investment. In column (6), we show that the negative coefficient on GDP growth is driven by the presence of I(t+1). If we remove forward investment, then the coefficient on GDP growth becomes positive.

[25] The original indicators were standardized to have mean of zero and standard deviation of one. Since my sample does not have all the countries included in the Demirguc-Kunt and Levine's sample, the

In columns (7) through (10) we test whether DFI proxies for changes in the availability of domestic credit. Domestic credit is defined alternatively as M2 relative to GDP and the ratio of private credit to GDP. Although we find that an expansion in M2 eases the financing constraints of firms, as expected, inclusion of this variable does not affect the magnitude or significance of the coefficient on DFI*cash. The results in Table 2 suggest that the impact of foreign investment on domestic financing constraints is remarkably robust.

5. Testing for the Impact of Restrictions on International Transactions

If direct foreign investment inflows affect firm financing constraints in host countries, then restrictions on international transactions (including capital controls which inhibit inflows of DFI) are likely to exacerbate financing constraints. Table 3 presents the results of testing for the impact of restrictions on international transactions on firm-level financing constraints. The measures of restrictions are taken from the International Monetary Fund's annual report, Trade and Exchange Restrictions. The IMF assigns a value of 1 if the country has a control, and zero otherwise. Historically, the IMF has collected information on five types of controls: (1) restrictions on capital account transactions (2) restrictions on current account transactions (3) surcharges on imports (4) requirements for advanced import deposits and (5) export taxes, in the form of repatriation and/or surrender requirements for export revenues. The first control includes any kind of restriction on the capital account, while the second restriction includes restrictions on trade in goods and services. Restrictions on incoming DFI are most likely to be associated with the first type of control, which covers direct restrictions on inflows or outflows of foreign investment. Other controls, however,

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means are slightly different from zero (equal to -0.06 for FININT and 0.09 for STKMKT)

could also have an indirect effect, by reducing the overall profitability of investment and thus discouraging foreign investment inflows.

Table 3 reports the impact of each type of control on financing constraints separately. We focus on the coefficient on the interaction of each different type of restriction and cash stock, Restriction*Cash. As indicated in the table, the only type of restriction which has a significant impact on financing constraints is the restriction on payments for capital transactions. The coefficient is highly significant and positive, indicating that countries with restrictions on payments for capital transactions have more credit-constrained firms.

The second through sixth columns of Table 3 test for the impact of other types of foreign exchange or trade restrictions on financing constraints. None of the other types of restrictions affect firm financing constraints. However, there is a negative and statistically significant relationship between import surcharges and firm-level investment. Countries with higher import surcharges have lower investment, after controlling for other determinants of investment. This result confirms the findings of Levine and Renelt (1992), who argue that trade restrictions operate through their impact on investment, rather than directly on technological change and growth. It is interesting to note that the only type of restriction which directly and negatively affects investment is import surcharges. This suggests that openness to trade could be a critical factor in encouraging domestic investment.

Table 4 reports robustness tests for the impact of capital account restrictions on financing constraints. Including either M2 or GDP growth has no impact on the result that countries with capital account restrictions have more credit-constrained firms. The results in Table 4 suggest that

our results on capital account restrictions are not driven by a negative correlation between capital account restrictions and M2 or GDP growth.

6. Extensions

6.1 Impact of DFI on financing constraints by country type

We would expect that the impact of foreign investment on host country financing constraints would vary with the level of development. In particular, we would expect that the impact of foreign investment would be smaller in countries where credit markets are well-developed and constraints on credit are less pervasive. Table 5 splits the sample into the G7 countries and other countries in the sample. The G7 countries include the United States, Britain, France, Italy, Germany, Japan, and Canada.

The results show that the impact of foreign investment on firm financing constraints is driven by the non-G7 countries. DFI has a significant impact on financing constraints only in the non-G7 countries. Only in those countries is greater DFI associated with an easing of financing constraints. This is not surprising, since half the specifications for the G7 countries indicate that firms on average are not significantly credit constrained.

6.2 Which Firms benefit Most from the DFI inflows?

We would also like to be able to identify the mechanism through which foreign inflows affect domestic financing constraints. For example, are financing constraints eased because firms that were previously denied credit are able to substitute domestic credit with foreign equity inflows? Or do

foreign inflows provide a signal to foreign banks operating in the country, triggering them to lend more to domestic enterprises? Although this is the subject of future research, we can answer a simpler question. In particular, we can separately estimate the impact of DFI inflows on firms with or without foreign assets. The Worldscope database allows us to identify which firms are multinationals, as defined as firms with at least 5 percent total assets owned abroad.

In Table 6, we redo the basic specification, but we separate firms with foreign assets from other firms. In columns (1) and (2) we separate firms with foreign assets by defining multinationals as firms with at least 5 percent of total assets as foreign. In columns (3) and (4), we change the definition of a multinational to 10 percent foreign assets. The results are two-fold. First, the results indicate that firms with foreign assets are less likely to be credit-constrained. The point estimate on cash stock is small in magnitude and statistically insignificant for firms with foreign assets, but large in magnitude and significant for other firms. Only firms without foreign assets appear to be credit constrained in our sample.

Second, the results clearly show that the beneficial effects of DFI inflows are concentrated in non-multinational firms. The coefficient on DFI*cash is only significantly negative and significant for firms without foreign assets. The evidence suggests that the level of DFI in a particular economy does not affect firms with foreign assets, which are more likely to have access to international capital markets.

These results do not shed light on whether firms with FDI are more or less likely to receive the bulk of the benefits—in terms of relaxing financing constraints—from incoming FDI. This is because we cannot identify which firms have FDI: we can only identify which firms are multinationals (ie own foreign assets). Harrison and McMillan (2001) show that in the Ivory Coast,

joint ventures receive all the benefits as far as relaxation of credit is concerned, and domestic firms which are not partially foreign owned are actually crowded out of domestic credit markets. However, the Ivory Coast is an unusual case. The results in Table 6 appear to indicate that domestic firms overall (whether joint ventures or otherwise) benefit from incoming FDI through a relaxation of financing constraints.

6.3 Responding to Kaplan and Zingales.(1997)

Kaplan and Zingales (1997) argue that using investment-cash flow correlations to identify financing constraints is fundamentally flawed. One major part of their argument is based on an analysis of 49 low-dividend firms, identified by Fazzari, Hubbard, and Petersen (1988) as financially constrained. Kaplan and Zingales (1997) argue that these supposedly constrained firms, which exhibit high investment-cash flow correlations, are in fact not constrained at all. To measure constraints, they rely on a detailed analysis of individual firm balance sheets and a number of indicators of financial health, including cash flow, interest coverage, debt ratios and sales growth. They argue that based on these accounting measures of financial health, the subset of firms identified by FHP as exhibiting high cash-flow investment correlations is not financially constrained.

In response to the Kaplan-Zingales critique, we calculate the same financial ratios that they use in their paper and regress these measures of (current period) financial health on lagged DFI, lagged growth in GDP per capita, lagged M2, lagged private credit, and a set of year dummies. The measures of financial health include two measures of investment, two measures of cash flow, debt, two measures of interest coverage, and sales growth. All variables were transformed into deviations from their firm-level means. The results in Table 7 are consistent with the earlier results using the

Euler equation specification: firm-level measures of financial health improve with an influx in foreign investment. These results are unaffected by the inclusion of other variables that could be correlated with DFI, including GDP growth and measures of liquidity. In every case, the within regressions show that an increase in DFI results in improved financial health for the firm. The coefficient on lagged DFI is the correct sign and statistically significant. Using an entirely different approach, and relying on financial ratios as an indicator of financial health, the results in Table 7 provide support for the Euler equation approach.

7. Conclusion

This paper measures whether different measures of globalization affect host country financing constraints. Direct foreign investment, by bringing in scarce capital, may ease firm financing constraints. Alternatively, if foreign firms borrow heavily from domestic banks, they may exacerbate domestic firms' financing constraints by crowding them out of domestic capital markets. Combining a unique cross-country firm panel with country-level data on DFI flows, we test whether foreign investment affects firm-level financing constraints. The results suggest that DFI inflows are associated with a reduction in firm-level financing constraints. Our results are robust to a number of controls, including measures of GDP growth, other measures of credit changes, and a proxy for financial development.

We also test whether restrictions on international transactions affect domestic firm financing constraints. Our results suggest that only one type of restriction—those on capital account transactions—negatively affect firm financing constraints. The results on capital account restrictions are consistent with the results on DFI: easing restrictions on equity inflows eases financing

constraints on firms. These results are robust to the inclusion of other variables which may be correlated with restrictions on international transactions. However, other types of exchange controls—such as repatriation requirements for exporters or import surcharges—have no impact on firm financing constraints.

We also explore whether the impact of DFI varies across the level of economic development. Our results show that direct foreign investment only eases domestic financing constraints in the non-G7 countries. In other words, incoming foreign investment only eases financing constraints in the less wealthy countries in our sample. Finally, we show that DFI eases financing constraints only for firms without foreign assets, i.e. for domestic firms which cannot be classified as multinationals.

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Table 1. Main Results on DFI flows

	1	2	3	4	5	6	7
			scaled by GDP				scaled by GDI
	no limits		limits 0<DFIN<0.5		no limits		limits 0<DFIN<0.5
	all firms	rank 150	all firms	rank 150	all firms	rank 150	weighted
I/K_{t+1}	0.410	0.419	0.392	0.451	0.587	0.482	0.396
	(0.151)***	(0.202)**	(0.154)***	(0.226)**	(0.131)***	(0.184)***	(0.222)*
I/K_{t-1}	0.215	0.219	0.214	0.219	0.209	0.224	0.209
	(0.012)***	(0.015)***	(0.013)***	(0.016)***	(0.012)***	(0.015)***	(0.018)***
S/K_t	0.037	0.033	0.039	0.033	0.032	0.030	0.035
	(0.007)***	(0.009)***	(0.007)***	(0.010)***	(0.007)***	(0.009)***	(0.009)***
$Cash_{t-1}$	0.128	0.131	0.156	0.165	0.096	0.107	0.176
	(0.036)***	(0.054)**	(0.035)***	(0.055)***	(0.034)***	(0.049)**	(0.076)**
DFI_tCash_{t-1}	-0.968	-0.859	-1.388	-1.429	-4.622	-3.932	-1.753
	(0.271)***	(0.298)***	(0.343)***	(0.378)***	(1.269)***	(1.369)***	(0.543)***
DFI_t	0.170	0.086	0.230	0.099	0.740	0.323	-0.038
	(0.060)***	(0.065)***	(0.074)***	(0.087)	(0.318)**	(0.375)	(0.103)
Constant	0.008	0.004	0.009	0.004	0.007	0.004	-0.001
	(0.001)***	(0.001)***	(0.002)***	(0.002)*	(0.001)***	(0.001)***	(0.003)
N obs	22274	12862	21770	12401	23511	13554	21,770
N firms	5191	2996	5179	2987	5259	3037	5,179
R sq	0.220	0.200	0.224	0.180	0.148	0.190	0.182
Root MSE	0.120	0.123	0.124	0.124	0.133	0.125	0.141

Note:*** denotes significance at 1% level, ** at 5% level and * at 10% level. Robust standard errors are in parentheses

Table 2. Robustness checks on DFI flows

	1	2	3	4	5	6	7	8	9	10
control:	FD		growth GDP				M2		private credit to GDP	
	all firms	rank 150	all firms	150 firms	150 firms with limit on DFI	all firms without forward lag	all firms	150 firms	all firms	150 firms
I/K_{t+1}	0.430	0.355	0.736	0.768	0.778		0.370	0.261	0.564	0.386
	(0.150) ***	(0.175) **	(0.162) ***	(0.166) ***	(0.209) ***		(0.136) ***	(0.176)	(0.142) ***	(0.165) **
I/K_{t-1}	0.215	0.221	0.197	0.209	0.207	0.237	0.219	0.225	0.208	0.221
	(0.012) ***	(0.015) ***	(0.014) ***	(0.015) ***	(0.017) ***	(0.010) ***	(0.012) ***	(0.015) ***	(0.012) ***	(0.014) ***
S/K_t	0.034	0.033	0.029	0.025	0.029	0.049	0.038	0.037	0.030	0.033
	(0.007) ***	(0.008) ***	(0.006) ***	(0.008) ***	(0.009) ***	(0.003) ***	(0.007) ***	(0.008) ***	(0.008) ***	(0.009) ***
$Cash_{t-1}$	0.187	0.199	0.105	0.097	0.134	0.207	0.401	0.469	0.256	0.341
	(0.046) ***	(0.054) ***	(0.036) ***	(0.048) **	(0.053) ***	(0.033) ***	(0.088) ***	(0.118) ***	(0.105) ***	(0.110) ***
DFI_tCash_{t-1}	-0.994	-0.836	-0.817	-0.773	-1.429	-0.687	-0.910	-0.667	-1.113	-0.904
	(0.263) ***	(0.288) ***	(0.307) ***	(0.356) **	(0.429) ***	(0.330) **	(0.294) ***	(0.332) **	(0.286) ***	(0.303) ***
DFI_t	0.182	0.106	0.292	0.201	0.328	0.257	0.149	0.023	0.219	0.108
	(0.057) ***	(0.063) *	(0.062) ***	(0.078) ***	(0.097) ***	(0.071) ***	(0.071) **	(0.077)	(0.070) ***	(0.067)
$Control_tCash_{t-1}$	-0.054	-0.102	-0.720	-0.591	0.015	-0.833	-0.420	-0.550	-0.158	-0.258
	(0.029) *	(0.035) ***	(0.789)	(1.020)	(1.100)	(0.730)	(0.135) ***	(0.188) ***	(0.115)	(0.128) **
$Control_t$			-0.497	-0.478	-0.697	0.001	0.006	-0.039	-0.016	-0.008
			(0.165) ***	(0.191) ***	(0.224) ***	(0.125)	(0.040)	(0.061)	(0.029)	(0.037)
Constant	0.008	0.005	0.008	0.005	0.006	0.010	0.007	0.002	0.007	0.004
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***	(0.002) ***	(0.001) ***	(0.002) ***	(0.003)	(0.002) ***	(0.002) **
N obs	22060	12648	22254	12843	12383	28274	21791	12379	21790	12378
N firms	5144	2848	5187	2992	2983	5992	5079	2884	5079	2884
R sq	0.218	0.220	0.028	0.000	0.000	0.220	0.226	0.229	0.149	0.210
Root MSE	0.125	0.122	0.139	0.140	0.140	0.124	0.125	0.122	0.131	0.124

Note:*** denotes significance at 1% level, ** at 5% level and * at 10% level. Robust standard errors are in parentheses.

Table 3. Capital Control Restrictions

	1	2	3	4	5	6
	E2	E2	E1	F1	F2	G
	all firms	rank 150	all firms	all firms	all firms	all firms
I/K_{t+1}	0.409	0.292	0.602	0.699	0.637	0.680
	(0.139) ***	(0.196)	(0.151) ***	(0.164) ***	(0.165) ***	(0.139) ***
I/K_{t-1}	0.218	0.229	0.211	0.205	0.209	0.207
	(0.012) ***	(0.016) ***	(0.013) ***	(0.014) ***	(0.013) ***	(0.013) ***
S/K_t	0.041	0.038	0.033	0.030	0.031	0.031
	(0.007) ***	(0.009) ***	(0.008) ***	(0.008) ***	(0.008) ***	(0.007) ***
$Cash_{t-1}$	0.090	0.081	0.063	0.043	0.064	0.055
	(0.034) ***	(0.052) a	(0.034) *	(0.037)	(0.035) *	(0.038) a
$Restriction_t Cash_{t-1}$	0.138	0.168	-0.018	-0.034	-0.157	-0.018
	(0.050) ***	(0.058) ***	(0.135)	(0.158)	(0.121)	(0.061)
$Restriction_t$	-0.002	-0.007	-0.018	-0.058	0.006	-0.004
	(0.007)	(0.008)	(0.014)	(0.021) ***	(0.014)	(0.012)
Constant	0.008	0.005	0.007	0.007	0.007	0.007
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***
N obs	21843	12575	21843	21843	21843	21843
N firms	5058	2955	5058	5058	5058	5058
R sq	0.233	0.25	0.14	0.07	0.12	0.089
Root MSE	0.128	0.123	0.135	0.14	0.137	0.139

Each restriction is a dummy variable. E2 - restrictions for payments for capital transactions; E1 restrictions for payments for current transactions; F1 Import surcharges; F2 Advance import depostis; G-Export proceeds (repatriation and/or surrender requirements)
Note:*** denotes significant at the 1% level, ** at the 5% level, * at the 10% level and a at the 15% level Robust standard errors are in parentheses.

Table 4. Robustness checks on E2 (capital account restrictions)

	1 M2 all firms	2 M2 rank 150	3 gr GDP all firms	4 gr GDP rank 150
I/K_{t+1}	0.445	0.312	0.479	0.566
	(0.114) ***	(0.153) **	(0.141) ***	(0.164) ***
I/K_{t-1}	0.217	0.230	0.215	0.220
	(0.012) ***	(0.015) ***	(0.013) ***	(0.015) ***
S/K_t	0.038	0.035	0.042	0.033
	(0.006) ***	(0.007) ***	(0.006) ***	(0.007) ***
$Cash_{t-1}$	0.269	0.261	0.103	0.081
	(0.105) ***	(0.129) **	(0.035) ***	(0.051) *
$E2_tCash_{t-1}$	0.111	0.168	0.150	0.153
	(0.054) **	(0.063) ***	(0.050) ***	(0.057) ***
$E2_t$	0.003	-0.005	-0.007	-0.009
	(0.008)	(0.008)	(0.007)	(0.008)
$Control_tCash_{t-1}$	-0.321	-0.358	-1.274	-1.220
	(0.160) **	(0.205) *	(0.730) *	(0.921)
$Control_t$	-0.078	-0.092	-0.147	-0.186
	(0.048) *	(0.071)	(0.152)	(0.168)
Constant	0.005	0.002	0.007	0.004
	(0.002) ***	(0.002)	(0.001) ***	(0.001) ***
N obs	21583	12315	21784	12517
N firms	4984	2881	5054	2951
R sq	0.218	0.24	0.199	0.15
Root MSE	0.129	0.123	0.13	0.13

Note:*** denotes significance at 1% level, ** at 5% level and * at 10% level. Robust standard errors are in parentheses

Table 5. Sample Splits with DFI inflows

	1 G7 all firms	2 non G7 all firms	3 G7 rank 150	4 non G7 rank 150
I/K_{t+1}	0.398	0.258	0.505	0.229
	(0.122) ***	(0.315)	(0.108) ***	(0.311)
I/K_{t-1}	0.225	0.200	0.257	0.210
	(0.015) ***	(0.017) ***	(0.024) ***	(0.017)
S/K_t	0.035	0.035	0.021	0.036
	(0.006) ***	(0.012) ***	(0.007) ***	(0.012)
$Cash_{t-1}$	0.095	0.116	0.082	0.139
	(0.040) **1	(0.067) *	(0.063)	(0.069)
DFI_tCash_{t-1}	0.340	-0.809	-0.722	-0.801
	(0.822)	(0.320) ***	(0.902)	(0.318)
DFI_t	0.402	0.056	0.282	0.056
	(0.108) ***	(0.070)	(0.143) **	(0.069)
Constant	0.017	0.005	0.008	0.004
	(0.003) ***	(0.002) ***	(0.003) ***	(0.002)
N obs	14534	7740	5226	7636
N firms	3156	2035	1012	1984
R sq	0.278	0.21	0.29	0.22
Root MSE	0.11	0.14	0.087	0.139

Note:*** is significant at 1% level, 1 is significat at 2%, ** is significant at 5% and * 10%
Robust standard errors are in parentheses.

Table 6. Sample Splits for Multinationals versus Other Firms

	Defining MNCs as >= 5 % Foreign Assets		Defining MNCs as >=10 % Foreign Assets	
	1	2	3	4
	Non MNCs	MNCs	Non MNCs	MNCs
I/K_{t+1}	0.230	0.706	0.289	0.722
	(0.147) ***	(0.222)	(0.147) ***	(0.241***)
I/K_{t-1}	0.188	0.246	0.195	0.239
	(0.019) ***	(0.024) ***	(0.019) ***	(0.026***)
S/K_t	0.036	0.026	0.036	0.027
	(0.008) ***	(0.011) ***	(0.008) ***	(0.011***)
$Cash_{t-1}$	0.119	0.067	0.119	0.047
	(0.055)	(0.080)	(0.051)	(0.103)
DFI_tCash_{t-1}	-1.444	-0.394	-1.110	-0.414
	(0.574) ***	(0.486)	(0.431) ***	(0.777)
DFI_t	0.271	0.048	0.299	-0.006
	(0.118) ***	(0.087)	(0.106) **	(0.069)
Constant	0.009	0.006	0.009	0.004
	(0.003) ***	(0.002) ***	(0.003) ***	(0.003)
N obs	7716	5974	8493	5197
N firms	1984	1132	2135	981
R sq	0.209	0.17	0.22	0.16
Root MSE	0.13	0.11	0.13	0.11

Note:*** denotes significance at 1% level, ** at 5% level and * at 10% level. Robust standard errors are in parentheses

Appendix 1. Sample Selection

All countries in the Worldscope database (May 1999 Global Researcher CD) with at least 30 firms and at least 100 firm-year observations are included in the sample (the exception is Venezuela (VE) which is included with 80 observations only); former socialist economies are excluded. This results in a sample of 40 countries. The sample does not include firms for which primary industry is financial (one digit SIC code of 6).

In addition we delete the following (see Table A.2 for variable definitions):

- All firms with 3 or less years of coverage;
- All firm-years with missing CAPEX, PPENT, Sales, and cash;
- Observations with zero PPENT (200 obs);
- Observations with negative KBEG (277 obs), Cash/Ta or COGS (27 obs);
- Observations with IK > 2.5 (1% of all obs);
- Observations with SK > 20 (5% of all obs);[26]
- Observations with Cogs/K > 20 (80 obs.);
- Observations with Cash/Totass >0.6 (1% of all obs);
- 50% of all US firms with at least 4 years of data available was selected by random sample.[27]

The resulting dataset has about 59,500 observations; the number of observations by country is given in Table A.1.

[26] This rules excludes firms for which capital is not a big factor in production. Half of these were in the US and UK; Japan, France and Denmark totaled 25%.

[27] The original sample for the US had over 25,700 observations (firm-years) while for all other countries at most there are 12,000 for the UK, 5,000 for Japan, less then 1,000 for most countreis (see Table 1). Even after the sampling, the US has the most data available.

Table A1. Sample Coverage Across Countries

Country	Country code	Number of observations	Percent of total observations	Number of firms	Average number of years per firm
Argentina	AR	198	0.003	28	7.1
Austria	AT	454	0.008	55	8.3
Australia	AU	1571	0.026	197	8.0
Belgium	BE	561	0.009	71	7.9
Brazil	BR	687	0.012	94	7.3
Canada	CA	3382	0.057	391	8.6
Switzerland	CH	1043	0.017	132	7.9
Chile	CL	411	0.007	55	7.5
Colombia	CO	150	0.003	20	7.5
Germany	DE	3970	0.067	468	8.5
Denmark	DK	1045	0.018	126	8.3
Spain	ES	947	0.016	114	8.3
Finland	FI	747	0.013	84	8.9
France	FR	3274	0.055	402	8.1
United Kingdom	GB	9931	0.166	1129	8.8
Hong Kong	HK	969	0.016	142	6.8
Indonesia	ID	531	0.009	84	6.3
Ireland	IE	427	0.007	47	9.1
Israel	IL	152	0.003	29	5.2
India	IN	1507	0.025	269	5.6
Italy	IT	1149	0.019	132	8.7
Japan	JP	4646	0.078	624	7.4
South Korea	KR	1264	0.021	187	6.8
Mexico	MX	502	0.008	69	7.3
Malaysia	MY	1476	0.025	205	7.2
Netherlands	NL	1280	0.021	147	8.7
Norway	NO	680	0.011	84	8.1
New Zealand	NZ	315	0.005	43	7.3
Peru	PE	101	0.002	17	5.9
Philippines	PH	271	0.005	43	6.3
Pakistan	PK	418	0.007	72	5.8
Portugal	PT	254	0.004	42	6.0
Sweden	SE	1162	0.019	137	8.5
Singapore	SG	841	0.014	122	6.9
Thailand	TH	1045	0.018	177	5.9
Turkey	TR	145	0.002	23	6.3
Taiwan	TW	405	0.007	83	4.9
USA	US	10422	0.175	1247	8.4
Venezuela	VE	81	0.001	11	7.4
South Africa	ZA	1151	0.019	135	8.5
Total		59565		7537	
Average number of firms per country				188	
Average number of firms per country, excluding US and GB				136	
Median number of firms per country, excluding US and GB				114	

Table A2. Variable Definitions:

Abbreviation	Description
Firm Level variables (from Worldscope)	
PPENT	Property Plant and Equipment, net of depreciation
CAPEX	Capital expenditure
DA	Depreciation and Amortization expense
K	Beginning period capital = PPENT-CAPEX+DA
IK, I/K	Investment to Capital ratio = CAPEX / K
SK, S/K	Sales to Capital ratio = Sales / K
Cash	Cash plus equivalents scaled by Total Assets (or scaled by K for robustness checks)
CF	Cash Flow (Net income + DA), scaled by K
COGS	Cost of goods sold, scaled by K
Size	Log of total assets in US dollars
Rank	Ranking based on size of PPENT (first, ranked by year, then averaged over the years), largest firm in each country has rank equal to one (described in section 5.1).
Weight	Weight is a country-level variable equal to one over the number of valid observations per country (described in section 5.1).
Country-Level variables	
FDI	Foreign Direct Investment in the recepient country (IMF Balance of Payments Statistics) scaled by the aggregate gross domestic investment (IFS)
FD	Financial Development = equals to the sum of (standardized indices): ratio of liquid liabilities to GDP, ratio of domestic credit to private sector to GDP, market capitalization to GDP, total value traded to GDP, and turnover (total value traded to market capitalization). All indices are from Demirguc-Kunt and Levine (1996).
GNP PC	Log of GNP per capita in US dollars in 1994, World Development Report 1996.
M2	Stock of liquid liabilities of the financial system scaled by GDP (IFS).
Domestic credit	Ratio of credit allocated to the private sector by depositary institutions, scaled by GDP (IFS)
grGDP	Annual real growth rate of GDP (IFS)
E1	Restrictions on Payments on Current Transactions (IMF)
E2	Restrictions on Payments on Capital Transactions (IMF)
F1	Import Surcharges
F2	Advance Import Deposits
GS	Repatriation and Surrender Requirements for Export

Table A.3 Means of Variables Used in Analysis

Country	DFI	Portfolio	Other	GNP per capita	GDP growth	M2	FD
Argentina	0.12	0.21	0.10	8110	0.030	0.145	-1.38
Australia	0.09	0.16	0.08	18000	0.032	0.588	0.42
Austria	0.03	0.15	0.08	24600	0.024	0.867	-0.27
Belgium	0.21	0.55	1.60	22870	0.022	0.615	-0.82
Brazil	0.04	0.13	-0.06	2970	0.022	0.226	-1.04
Canada	0.07	0.20	0.06	19510	0.024	0.723	0.03
Chile	0.21	0.06	0.05	3520	0.077	0.372	-0.75
Colombia	0.09	0.05	0.06	1670	0.040	0.272	-1.6
Denmark	0.06	0.15	0.10	27970	0.021	0.579	-0.49
Finland	0.04	0.19	0.07	18850	0.019	0.555	-0.41
France	0.07	0.09	0.14	23420	0.019	0.672	0.1
Germany	0.01	0.17	0.16	25580	0.024	0.654	1.68
India	0.02	0.03	0.08	320	0.059	0.441	-0.7
Indonesia	0.06	0.03	0.06	880	0.067	0.401	-1.17
Ireland	0.11	0.10	0.85	13530	0.055	0.487	
Israel	0.05	0.04	0.10	14530	0.053	0.706	0.01
Italy	0.02	0.16	0.10	19300	0.019	0.660	-0.64
Japan	0.00	0.04	0.02	34600	0.030	1.825	3.33
Malaysia	0.18	-0.02	0.03	3480	0.086	1.002	1.19
Mexico	0.09	0.09	0.00	4180	0.023	0.228	-0.85
Netherlands	0.15	0.12	0.31	22000	0.027	0.816	0.66
New Zealand	0.24	0.05	-0.01	13350	0.018	0.620	-0.53
Norway	0.05	0.07	0.06	26390	0.029	0.565	-0.15
Pakistan	0.05	0.03	0.22	430	0.046	0.404	-1.28
Peru	0.13	0.03	-0.09	2110	0.022	0.141	
Philippines	0.09	0.07	0.20	950	0.037	0.416	-1.15
Portugal	0.09	0.12	0.21	9320	0.027	0.699	-0.67
Singapore	0.37	0.04	0.37	22500	0.087	1.114	1.6
South Africa	0.02	0.08	-0.01	3040	0.016	0.443	0.25
South Korea	0.01	0.05	0.02		0.077	0.592	0.84
Spain	0.09	0.08	0.09	13440	0.029	0.724	-0.14
Sweden	0.14	0.06	0.35	23500	0.014	0.475	-0.31
Thailand	0.06	0.05	0.16	2410	0.080	0.738	0.36
Turkey	0.02	0.05	0.06	2500	0.042	0.225	-1.2
UK	0.12	0.25	0.72	18340	0.025	0.765	1.68
US	0.05	0.13	0.11	25880	0.030	0.624	1.35
Venezuela	0.12	0.30	-0.22	2760	0.026	0.320	-1.26

Note:All capital flows are scaled by gross domestic investment.

Table A.4 Means of Capital Control Variables

COUNTRY	Restrictions on Payments on Current Transactions	Restrictions on Payments on Capital Transactions	Import Surcharges	Advance Import Deposits	Repatriation and Surrender Requirements for Exports	Sum of 5 Controls
Argentina	0.60	0.60	1.00	0.00	0.60	3.00
Australia	0.00	0.00	0.00	0.00	0.08	0.08
Austria	0.00	0.50	0.00	0.00	0.00	0.55
Belgium	0.00	0.00	0.00	0.00	0.36	0.40
Brazil	0.75	0.75	0.00	0.00	1.00	2.43
Canada	0.00	0.00	0.00	0.00	0.00	0.00
Chile	0.67	0.78	0.44	0.00	0.78	2.75
Colombia	0.80	0.80	0.60	0.60	1.00	3.89
Denmark	0.00	0.18	0.00	0.00	0.18	0.40
Finland	0.00	0.45	0.00	0.00	0.00	0.50
France	0.00	0.64	0.00	0.00	0.64	1.40
Germany	0.00	0.00	0.00	0.00	0.07	0.08
Hong Kong	0.00	0.00	0.00	0.00	0.00	0.00
India	0.78	0.78	1.00	0.00	1.00	3.50
Indonesia	0.00	0.00	1.00	0.00	0.00	1.00
Ireland	0.00	0.55	0.00	0.00	0.64	1.30
Israel	0.20	0.60	0.20	0.00	1.00	2.00
Italy	0.00	0.64	0.00	0.00	0.64	1.40
Japan	0.00	0.08	0.00	0.00	0.08	0.09
Malaysia	0.00	0.10	0.10	0.00	0.40	0.33
Mexico	0.29	0.86	0.14	0.00	0.71	2.08
Netherlands	0.00	0.00	0.00	0.00	0.00	0.00
New Zealand	0.00	0.00	0.00	0.00	0.00	0.00
Norway	0.00	0.73	0.00	0.00	0.64	1.50
Pakistan	0.78	0.78	1.00	0.56	1.00	4.13
Peru	0.38	0.50	1.00	0.00	0.38	2.43
Philippines	0.67	0.78	0.44	0.44	0.44	3.00
Portugal	0.11	0.56	0.00	0.00	0.56	1.38
Singapore	0.00	0.00	0.00	0.00	0.00	0.00
South Africa	0.67	0.83	0.75	0.58	1.00	4.00
South Korea	0.10	0.80	0.00	0.00	1.00	1.89
Spain	0.00	0.71	0.00	0.00	0.71	1.54
Sweden	0.00	0.64	0.00	0.00	0.00	0.70
Thailand	0.00	0.78	0.78	0.00	1.00	2.63
Turkey	0.22	0.78	0.56	1.00	1.00	3.63
UK	0.00	0.00	0.00	0.00	0.00	0.00
US	0.00	0.00	0.00	0.00	0.00	0.00
Venezuela	0.30	0.80	0.40	0.10	1.00	2.44

Note these are means by country over all years in the sample, basically it is a proportion of years that the control was in effect.

Table A.5 Cross-Country Correlations of DFI with Restrictions on international transactions and Macro Variables

DFI and Restrictions on international transactions

	DFI	Restrictions on Payments on Current Transactions	Restrictions on Payments on Capital Transactions	Import Surcharges	Advance Import Deposits	Repatriation and Surrender Requirements for Export
Sum of 5 controls	-0.3242*					
	0.00					
	334					
Restrictions on Payments on Current Transactions	-0.1690*	1.00				
	0.00					
	371	400				
Restrictions on Payments on Capital Transactions	-0.3321*	0.5257*	1.00			
	0.00	0.00				
	371	400	400			
Import Surcharges	-0.1184*	0.5292*	0.2888*	1.00		
	0.02	0.00	0.00			
	371	400	400	400		
Advance Import Deposits	-0.1820*	0.4751*	0.3023*	0.4253*	1.00	
	0.00	0.00	0.00	0.00		
	371	400	400	400	400	
Repatriation and Surrender Requirements for Export	-0.2960*	0.4858*	0.7004*	0.3600*	0.3310*	1
	0	0	0	0	0	
	371	400	400	400	400	400

DFI and Macro Variables

	DFI (scaled by I)	DFI (Scaled by GDP)	FD	GNP per capita	GDP growth	M2	Private Credit
FDI scaled by GDP	0.9209*	1.00					
	0.00						
	452	468					
FD	-0.01	0.06	1.00				
	0.76	0.22					
	429	444	450				
GNP PC	0.00	-0.02	0.6530*	1.00			
	0.98	0.64	0.00				
	441	456	438	473			
growth GDP	0.2610*	0.2739*	0.0262	-0.1835*	1.00		
	0.00	0.00	0.5865	0.00			
	438	451	432	455	467		
M2	0.05	0.1593*	0.7789*	0.6023*	0.0690	1.00	
	0.28	0.00	0.00	0.00	0.1665		
	403	418	402	411	404	422	
Private credit	-0.02	0.03	0.8007*	0.6408*	-0.0257	0.7706*	1
	0.64	0.56	0.00	0.00	0.6075	0.00	
	402	417	400	410	403	420	421

Note: Star denotes significance at the ten percent level. The first number reported is the correlation coefficient, the second is the p-value and the third is the number of observations.