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Global capital flows and financing constraints

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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 banks, multinational firms 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—direct foreign investment (DFI)—is associated with a reduction in financing constraints. Second, we show that restrictions on capital account transactions negatively affect firms' financing constraints. We also show that DFI inflows are associated with lower sensitivity of investment to cash flow for firms without foreign assets and for domestically owned enterprises. Finally, the results indicate that these effects are stronger for low-income than for high-income regions.

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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).

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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 multinational firms. 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.³ Yet most observers assume that joint venture activity and acquisitions by multinationals are accompanied by significant capital inflows.⁴ Although we cannot measure the amount of local borrowing by multinationals, we can examine the impact of incoming DFI on firm investment behavior.⁵

There 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 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 the sensitivity of firm-level investment to cash flow, which is consistent with a reduction in firm-level financing constraints. First, we test whether different types of capital inflows are associated with a reduction in financing constraints. Our main focus is DFI, but we also test for the effect of portfolio inflows and

³ 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.

⁴ For example, Stiglitz (1998) in an address to the Chicago Council on Foreign Relations 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 (1988) 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.

⁵ More generally, there are different types of foreign direct investment. One type is a joint venture between a local company in need of capital and a foreign company. In this setup, the local company typically receives financing from the foreign company in the form of an equity injection. Clearly, this arrangement is expected to reduce the financing constraints of the local company. Another type of foreign direct investment is where a foreign company sets up a subsidiary. As the foreign company typically limits its loan exposure to the local subsidiary, the subsidiary will need to borrow to finance investments. The net effect on the financing constraints under this second type of foreign direct investment are therefore less clear. Our data on DFI inflows is aggregate, and thus, we cannot separate the two types of DFI. Therefore, our main results represent the "average" effect of DFI on the "average" firm in our sample. However, to get at the issue of which type of DFI is more prevalent, we do separate domestically owned firms from foreign-owned firms to test whether the "spillover" effects are positive or negative later in the paper.

other flows such as commercial bank loans. We find that only 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. Finally, we show that DFI inflows are associated with less sensitivity of investment to cash flow for firms without foreign assets and for domestically owned enterprises. These results suggest that foreign inflows are associated with a reduction in firm-level credit constraints even for domestically owned enterprises. The results also indicate that these effects are stronger in low-income countries.⁶

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 the Euler equation methodology to estimate the effect of financing constraints on investment, with most studies concentrating on firms in developed countries. Surveys suggest that financing constraints are an even more important deterrent to investment in developing countries.⁷ 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.⁸

Most empirical evidence of financing constraints in developing countries comes from studies on individual countries, which are difficult to generalize.⁹ 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 \(2003\)](#). [Demirguc-Kunt and Maksimovic \(1998\)](#) 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 \(2003\)](#) 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 \(2003\)](#) finds that financial liberalization

⁶ Our results are in contrast to [Harrison and McMillan \(2001\)](#), who found that financing constraints of firms in Cote d'Ivoire were exacerbated by the presence of foreign firms, which borrowed heavily on domestic credit markets and crowded out local firms. However, that paper is quite different in two respects. First, it examines the impact of multinational firm borrowing on domestic firms' behavior—this information is not available across countries. Second, it focuses on a very poor country with a variety of credit market imperfections, which drove foreign firms to borrow heavily from local banks. However, this current 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 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.

⁷ 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 ([Harvard Institute for International Development and World Economic Forum, 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.

⁸ See, for example, [Aghion et al. \(1999\)](#) and [Banerjee and Newman \(1994\)](#).

⁹ See, for example, [Jaramillo et al. \(1996\)](#) for Ecuador; [Harris et al. \(1994\)](#) 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.

reduces firms financing constraints, especially for small firms. Galindo et al. (2001) find that financial reform has led to an increase in the efficiency with which investment funds are allocated. Bekaert et al. (2001) and Henry (2000) find that the cost of equity capital decreases significantly after financial liberalizations. In addition, Bekaert et al. (2001) find that equity market liberalizations increase real economic growth by approximately 1% per year. Yet none of these studies examine the impact of restrictions on international transactions or capital flows on firm-level financing constraints. 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.

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.

An important question is which types of firms are most likely to benefit from capital inflows. Using data available both through *Worldscope* and from another database, *Amadeus*, we are able to identify two different types of firms in our data. First, we distinguish between domestically owned firms and firms with some foreign ownership. Second, we distinguish between firms with foreign assets abroad (which are more likely to be multinational firms) and enterprises with no foreign assets. We find domestically owned firms are more constrained, on average, than firms with either foreign ownership or foreign assets. We also find that incoming DFI has a significant impact on investment-cash flow sensitivities for domestically owned firms and firms with no foreign assets. These results are consistent with the hypothesis that foreign investment is associated with a greater reduction in the credit constraints of firms which are less likely to have access to international capital markets. We argue that this is plausible because incoming foreign investment provides an additional source of capital, freeing up scarce domestic credit which can then be redirected towards domestic enterprises.

We also examine whether our results vary across income levels. We show that DFI is associated with a larger reduction in credit constraints and a larger increase in investment in lower income countries. This is not surprising as we expect DFI to have the largest effects in countries where credit market imperfections are most important.

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 robustness checks. Section 5 examines the impact of restrictions on international transactions on credit constraints, Section 6 presents extensions and sample splits, 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 and Euler equations to study financing constraints.¹⁰ Both the Q theory and Euler model of investment come from the same optimization problem (reproduced below). However, the assumptions required to estimate the Q model are stronger than those required to estimate the Euler equation model. Specifically, the Q model requires that stock market valuations be in line with the manager's valuation of the marginal return on capital. This assumption is questionable, especially 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 other 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). Therefore, our preferred methodology is the Euler equation model of investment.

A series of recent papers have questioned the validity of using investment-cash flow sensitivities as a proxy for financing constraints. The debate, started by Kaplan and Zingales (1997), was continued by numerous studies, some of which support the use of investment-cash flow sensitivity as an indicator of credit constraints (Fazzari et al., 2000; Allayannis and Abon, 2004; Chirinko and von Kalckreuth, 2003) while others question it (Gomes, 2001; Moyen, 2002; Altı, 2003). Most papers which question this methodology relate more directly to the Q model of investment rather than an Euler equation model (although some criticisms apply to both models). In addition, none of the recent theoretical models that question this methodology were derived in a dynamic multi-period setting with investment adjustment costs (see Bond et al., 2003).

Since no theoretical consensus has been reached, the relationship between investment and cash flow sensitivities continues to be an important empirical question. In a recent paper, using the Euler equation methodology, Love (2003) finds that firms in less financially developed countries exhibit higher investment-cash flow sensitivities, especially the small firms. Independently, the survey evidence (see, for example, Beck et al.,

¹⁰ See, for example, Whited (1992), Hubbard and Kashyap (1992), Hubbard et al. (1995), and Calomiris et al. (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.

2002) confirms that firms in countries with lower levels of financial development are more financially constrained, especially small firms. Taken together, these results support the intuition that investment-cash flow sensitivities are a reflection of a higher degree of financing constraints.

Recognizing the limitations of our approach, we test the sensitivity of our results to model specification by investigating two alternative investment models: a sales accelerator model and the Q model of investment.

2.1. The model

The model used to derive the Euler equation and Q model specifications is standard in the literature (see references in footnote 8) and follows closely the specification in Love (2003). The firm value is given by:

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

where

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

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

$$D_t \geq 0 \quad (1d)$$

Here, D_t is the dividend paid to shareholders and is given by the “sources equal uses” constraint (Eq. (1b)); β_{t+s-1} is a discount factor from the period $t+s$ to period t . In the capital accumulation constraint (Eq. (1c)), K_t is the beginning of the period capital stock; I_t is the investment expenditure, and δ is the depreciation rate.¹¹ The restricted profit function 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 nonnegativity constraint on dividends (Eq. (1d)), and the multiplier on this constraint is denoted λ_t . This multiplier is interpreted as a shadow cost associated with raising new equity, which implies that external (equity) financing is costly.¹²

The Q model of investment is obtained as a first-order condition from the above model and is given by:

$$\left(\frac{\partial C}{\partial I} \right)_t = \text{const} + \beta_t E_t [q_{t+1}] \quad (2)$$

¹¹ 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.

¹² This interpretation of the nonnegativity constraint on dividends is common in the literature (see, for example, Whited (1992)). This does not imply that firms cannot raise any equity finance, but only that there is a premium associated with equity issuance.

where $(\partial C/\partial I)$ is the marginal adjustment cost of investment and q_{t+1} is the “marginal q ,” i.e., it is the shadow value of capital equal to the increase in the value of the firm after a 1 unit increase in capital.

Combining this first-order condition with the envelope condition and rearranging, we obtain the Euler equation:

$$1 + \left(\frac{\partial C}{\partial I}\right)_t = \beta_t E_t \left[\Theta_t \left\{ \left(\frac{\partial \Pi}{\partial K}\right)_{t+1} + (1 + \delta) \left(1 + \left(\frac{\partial C}{\partial I}\right)_{t+1}\right) \right\} \right] \quad (3)$$

where $\Theta_t = ((1 + \lambda_{t+1})/(1 + \lambda_t))$.

Here, $(\partial \Pi/\partial K)$ is the marginal profit of capital, i.e., the contribution of an extra unit of capital to the firm’s profits, referred to below as MPK. The intuition behind this Euler equation is that the marginal cost of investing today on the left-hand 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).

In the Euler equation, the factor Θ_t is the relative shadow cost of external finance in periods t and $t+1$, and it serves as a proxy for the degree of financing constraints. If the shadow cost of external funds is higher in period t than it is expected to be in period $t+1$, 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. 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 can be identified with observable firm characteristics. In this paper, as a proxy for Θ_t , we use the stock of liquid assets, specifically the stock of cash and marketable securities scaled by fixed capital (hereafter referred to as cash stock). The cash stock has an intuitive interpretation as “cash on hand” that firms can use for investment if the opportunity presents itself (as in the Myers and Majluf, 1984 model). We also use the cash flow as an alternative measure of liquidity. The cash stock is our preferred measure because it is less likely to be associated with the future growth opportunities than the cash flow measure (see Love, 2003 for further discussion).

Unlike the Euler equation model in which financing variables enter as a parameterization of the discount factor Θ_t in the Q model, these financing factors are simply appended to the model. In this sense, the Euler equation has a more structural interpretation of the effect of financing constraints than the Q model.

2.2. Parameterizing the model

We closely follow Love (2003) in parameterizing the model and refer to that paper for a detailed discussion. We measure MPK using a sales-to-capital ratio (assuming a

Cobb–Douglas production function). The fixed effects help us to capture the firm-specific capital intensity and markups. We assume a quadratic adjustment cost function, which results in a linear marginal adjustment cost of investment:

$$\frac{\partial C}{\partial I_{it}} = \alpha \left(\frac{I}{K_{it}} - g \frac{I}{K_{it-1}} - v_i \right) \quad (4)$$

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.¹³

To simplify the estimation and interpretation of the coefficients, we linearize the Euler equation using a first-order Taylor approximation around the means. In this sense, our model is a first-order approximation to the true model, which has a somewhat richer structure. This approximation improves the tractability of the model and allows us to focus on the most important effects. As a result, we ignore some second-order effects.¹⁴

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.

2.3. Empirical model and estimation

As we discussed above, we measure financing constraints by the sensitivity of investment to cash stock (or cash flow). 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 capital controls on the investment-cash sensitivity which we capture using an interaction term of DFI with cash stock. We substitute our

¹³ 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 v_i could be interpreted as some firm-specific level of investment at which adjustment costs are minimized.

¹⁴ For example, we ignore the derivative of the adjustment costs with respect to capital which results in the addition of the squared investment-to-capital ratios to the model. We have tested the model with these terms, and our results are unchanged. A more subtle issue arises because of our generalized specification of the adjustment cost function. Allowing lagged investment to enter into this specification affects the derivation of the Euler equation as the value function would have to depend on two state variables (lagged investment and current capital stock). However, the result is the addition of the second-order terms to the model (more specifically, the squared product of two financial constraints factors and adjustment costs) which we ignore. However, our results are robust to adding $I/K(t+2)$ term to the model.

parameterizations of the MPK and adjustment costs in a linearized version of Eq. (3) to obtain our empirical model:

$$\frac{I}{K_{it}} = \beta_1 \frac{I}{K_{it+1}} + \beta_2 \frac{I}{K_{it-1}} + \beta_3 \frac{S}{K_{it}} + \beta_4 \text{Cash}_{it-1} + \beta_5 \text{Cash}_{it-1} \text{DFI}_{ct} + \beta_6 \text{DFI}_{ct} + f_i + d_t + e_{it} \quad (5)$$

Here, f_i denotes firm fixed effects¹⁵ and d_t denotes time dummies. We also test the alternative specifications, which present a variation on the above model. In the Q model, the first and the third terms are replaced by Tobin's Q , and in the accelerator model, they are replaced by current and lagged sales growth. In the Q model, Tobin's Q captures the expected marginal return on investment and in the accelerator model current and lagged sales growth proxy for expected future growth. Our specifications of the Q model and accelerator model also allow for slow adjustment of the capital stock to its desired level and hence include lagged investment and the firm-specific user cost of capital (captured by the fixed effects).

We focus on the coefficient β_5 , the interaction of the level of cash stock (a firm-level variable) with the country-time level of DFI inflows. If DFI reduces firms' financing constraints, this coefficient should be negative, which implies that the total sensitivity of investment to the cash stock (given by the sum of $\beta_4 + \beta_5 \text{DFI}$) is reduced with DFI inflows. Alternatively, a positive coefficient on β_5 would suggest a crowding out effect. The coefficient β_4 measures the sensitivity of investment to the cash stock in an average country-year with zero DFI inflows. It is expected to be positive if some of the firms in our sample are credit constrained.

We use the same framework to test for the effect of restrictions on international transactions by replacing the DFI measure in Eq. (5) 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, private domestic credit, M2, inflation, and country risk) to the model in Eq. (5) to test if the DFI effect (on the cash coefficient) is robust to controlling for other potential effects on financing constraints.

To estimate the model, we first remove fixed effects using 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.¹⁶ 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 . Therefore, we use the GMM procedure, with $t - 1$ and $t - 2$ lags of all of the regressors as instruments. Our instruments include only lagged DFI (i.e., time $t - 1$ and $t - 2$), which

¹⁵ Fixed effects capture firm-specific parameters in the adjustment cost function and the MPK. They also capture the average firm-specific level of financing constraints and the price of investment goods.

¹⁶ This transformation is otherwise known as "orthogonal deviations" or the Helmert transformation and is described in Arrellano and Bover (1995) and Bond and Meghir (1994). Unlike 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.

allows for the endogeneity of current DFI. This is important if current flows and current investment are simultaneously determined. We test the validity of the instruments by reporting both a Sargan test of the over-identifying restrictions and direct tests of serial correlation in the residuals.¹⁷

3. Data

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 38 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 A. 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 et al. \(1997\)](#). [Table A1](#) 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 underrepresented. This creates a problem with pooled cross-country estimation, as overrepresented countries may influence the coefficients in a nonsystematic way. To correct for this problem, we rerun all main results including only the 150 largest firms in each country.¹⁸

Unfortunately, our main data source, *Worldscope*, does not contain data on the nationality of the owners. This omitted information is potentially important because it would allow us to identify whether DFI inflows benefit only foreign firms and joint ventures or whether DFI also benefits wholly domestically owned firms. To obtain foreign ownership data, we used the *Amadeus-Bureau Van Dijk* database, which includes firm-level data on over 5 million private and publicly owned firms located in 34 European countries.¹⁹ Only 14 countries (all relatively high-income countries) are present in both databases, and only 1006 firms (which represent about 20% of the total observations) from *Worldscope* match with the *Amadeus* data. Therefore, we run a separate set of tests using only the *Amadeus* data.²⁰ In addition to providing information on ownership, the *Amadeus* data covers a wider spectrum of firms since it includes both publicly traded and small privately held firms. We are able to split this sample on the basis of the level of development since it includes data for 8 eastern European countries and 14 western European countries and on the basis of ownership (see [Table A1](#) for details). Finally, to obtain ownership information for the 15 low-income countries in our original sample, we use current and past issues of [Dun and Bradstreet's \(various issues\) *Who Owns Whom*](#). Information for Latin America is only available beginning in 1996. Since we observe no changes in ownership over the period 1996–2001, we classify firms that are

¹⁷ Our tests of serial correlation are based on a Gauss–Newton regression and described in [Davidson and MacKinnon \(1993, pp. 357–373\)](#). Following [Arrellano and Bover \(1995\)](#), reported standard errors are based on the first-step results.

¹⁸ 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).

¹⁹ From this universe of firms, we select only those firms for which 5 consecutive years of fixed capital are available. This leaves us with 22 countries.

²⁰ Because the *Amadeus* data set is so large, we use a randomly selected sample of 1000 firms per country.

foreign during this subperiod as foreign throughout our entire sample period (see Table A1 for details).²¹

The main firm-level variables are investment, sales, and cash stock, all scaled by the beginning of the period capital for consistency.²² 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 IMF publication *International Financial Statistics*, CD-ROM, (1988–1998). 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 many other private flows which are neither portfolio investment nor DFI. Direct foreign investment occurs when foreigners purchase over 10% of the total equity of the firm. Investments of less than 10% are considered portfolio investment.

Other country-time varying control variables include growth rate in real GDP, the stock of liquid liabilities (M2) scaled by GDP, credit to private sector by deposit money banks and nonfinancial institutions, inflation rate (all come from the IMF’s IFS database) and country risk (from the International Country Risk Guide, IRIS, [2001]). As an additional robustness check, we add a country-level measure of financial development, denoted FD, constructed using indicators developed by Demircuc-Kunt and Levine (1996).²³

Table A3 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. 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 our 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 A4 reports country-level means of the (time-varying) restrictions on international transactions obtained 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)

²¹ Using Dun and Bradstreet, we are able to identify roughly 62% of the firms in our sample. Of these firms, only 7.5% are foreign owned. Dun and Bradstreet includes only firms that are conglomerates and only identifies majority ownership. Published volumes do not provide the date that the information is recorded. Based on consultations with the publishers, we take the information to be valid two periods prior to the publication date.

²² 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.

²³ 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.

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 UK, the US, 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 A4](#) suggests that the most open countries are Canada, the Netherlands, New Zealand, Singapore, the US, and the UK. The most closed economies are Pakistan and South Africa, followed by Colombia and India. These rankings correspond with anecdotal evidence concerning the openness of the current and capital account across our sample countries.

[Table A5](#) 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 A5](#), 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 Eq. (5). The basic specification is reported in column (1). The validity of the instruments, tested by the Sargan test and serial correlation tests, is easily accepted for most specifications. Thus, in our discussion of the results, we note only those cases in which the instruments are rejected. We report first-stage GMM estimates (which are likely to have better small-sample properties, see Arellano and Bond, 1991); however, our estimates from the second stage are qualitatively very similar. As an extra

Table 1
Main results on FDI flows

Dependent variable: I/K_t	Scaled by gross domestic investment				Scaled by GDP			Manufacturing only	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All firms	Rank 150	0 < DFIN < 0.5	(3) and Rank 150	All firms	Rank 150	(6) and 0 < DFIN < 0.5	Scaled by GDI	Scaled by GDP
I/K_{t+1}	0.093 (0.051)	0.095 (0.057)	0.056 (0.028)	0.204 (0.113)	0.314 (0.155)	0.119 (0.073)	0.216 (0.116)	0.067 (0.037)	0.485 (0.296)
I/K_{t-1}	0.231 (0.024)	0.241 (0.032)	0.229 (0.021)	0.227 (0.018)	0.224 (0.019)	0.237 (0.03)	0.223 (0.024)	0.252 (0.014)	0.206 (0.024)
S/K_t	0.025 (0.007)	0.029 (0.009)	0.034 (0.012)	0.023 (0.008)	0.019 (0.011)	0.022 (0.01)	0.018 (0.013)	0.030 (0.006)	0.022 (0.015)
$Cash_{t-1}$	0.061 (0.012)	0.067 (0.008)	0.064 (0.014)	0.084 (0.02)	0.044 (0.013)	0.072 (0.024)	0.063 (0.02)	0.042 (0.008)	0.032 (0.015)
$DFI_t \times Cash_{t-1}$	-0.458 (0.148)	-0.636 (0.309)	-0.409 (0.128)	-0.566 (0.274)	-2.212 (0.654)	-2.729 (1.311)	-2.183 (1.042)	-0.377 (0.172)	-2.518 (1.251)
DFI_t	0.937 (0.449)	1.149 (0.447)	0.954 (0.304)	0.867 (0.373)	6.891 (2.445)	8.132 (3.914)	4.671 (2.161)	0.697 (0.339)	6.479 (2.489)
Observations	22,504	13,221	20,867	12,756	23,796	13,964	13,609	13,043	13,924
<i>Diagnostic tests (p-values)</i>									
Sargan test	0.741	0.887	0.618	0.501	0.835	0.804	0.529	0.728	0.844
First-order serial correlation	0.515	0.481	0.512	0.463	0.601	0.627	0.642	0.522	0.325
Second-order serial correlation	0.834	0.723	0.826	0.714	0.472	0.519	0.531	0.816	0.546

Robust standard errors are in parentheses (clustered at the firm level). All specifications include time dummies. Estimated by GMM, instruments used are the first and second lags of all of the regressors. Variable definitions are given in Table A2.

precaution, we allow for “clustering” of errors on the firm level to correct for any possible nonindependence of errors on the firm level (although the direct tests of serial correlation are rejected).

In column (1) of Table 1, direct foreign investment (DFI) is scaled by gross domestic investment (GDI). This specification imposes no cutoffs on DFI and includes all firms with non-missing observations. The coefficient on lagged cash stock is positive and statistically significant, which indicates that, on average, investment is sensitive to the stock of cash, which is consistent with the existence of credit constraints. 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 $DFI \times Cash$. The coefficient is negative and statistically significant. This indicates that inflows of DFI are associated with a reduction in the sensitivity of investment to the cash stock. The coefficient on cash stock is equal to 0.06, 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 0.04 decrease in the cash sensitivity; that is a change from 0.06 to 0.02, roughly 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.

Column (3) restricts the sample to all observations where country-level inward DFI is greater than zero and less than 50% 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 and leaves the results virtually unchanged. Further restricting the sample to the largest 150 firms in each country has no significant impact (column (4)) on the results.

In columns (5)–(7), 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 (6) further restricts the sample to observations where DFI values are not extreme, and columns (7) in addition restricts to the largest 150 firms in each country (similarly to column (4)). Finally, in columns (8) and (9), we restrict our sample to include only manufacturing firms (i.e., excluding agriculture, utilities, and trade), and again, the results are similar.

Table (2) checks the robustness of these results to different model specifications. We use two alternative empirical specifications: a sales accelerator model (column (1)) and the Q model of investment (columns (2) and (3)). Because our instruments are rejected in the simple Q model in column (2), we add lagged investment to the model in column (3). Columns (4) and (5) are replications of the Euler model used in Table 1, except that instead of using cash stock, we use two alternative measure of cash flow: the first measure is net income (before preferred dividends) plus depreciation, and the second measure is cash flow from operations (equal to the first measure plus changes in working capital). Column (6) is a replication of column (1) from Table 1 with the addition of a debt-to-assets ratio. For each of the investment models that we consider, investment is sensitive to the cash stock, but this sensitivity is significantly reduced by inflows of foreign direct investment. In addition, foreign direct investment has a direct positive effect on firm level investment. We conclude that these results are not driven by model choice. The possibility still remains that cash stock proxies for future investment opportunities and that the sensitivity of investment to cash stock does not reflect financing constraints. However, if cash stock does represent future growth opportunities, it is hard to think of a reason why DFI would lessen the sensitivity of investment to future growth opportunities. Our preferred interpretation is that the

Table 2
Robustness to alternative specifications

Dependent variable: I/K_t	(1)	(2)	(3)	(4)	(5)	(6)
	Accelerator model	Q model	Q model	Euler model	Euler model	Euler model
I/K_{t+1}				0.469 (0.222)	0.267 (0.109)	0.056 (0.029)
I/K_{t-1}	0.439 (0.101)		0.267 (0.011)	0.201 (0.019)	0.217 (0.023)	0.234 (0.022)
S/K_t				0.014 (0.012)	0.022 (0.014)	0.034 (0.011)
$(I/K_{t-1})^2$	-0.203 (0.119)					
Sales growth _t	-0.049 (0.032)					
Sales growth _{t-1}	0.042 (0.011)					
Q_{t-1}		0.023 (0.011)	0.019 (0.009)			
Debt/ K_{t-1}						-0.112 (0.074)
Cash _{t-1} (or cash flow)	0.054 (0.012)	0.039 (0.012)	0.063 (0.009)	0.088 (0.019)	0.063 (0.02)	0.039 (0.013)
$DFI_t \times \text{Cash}_{t-1}$ (or cash flow)	-0.239 (0.088)	-0.803 (0.159)	-0.301 (0.094)	-0.864 (0.40)	-1.289 (0.511)	-0.501 (0.16)
DFI_t	0.087 (0.292)	2.573 (0.594)	0.432 (0.321)	0.428 (0.337)	0.802 (0.445)	1.048 (0.468)
Observations	22,690	25,348	25,348	22,800	22,802	21,842
<i>Diagnostic tests (p-values)</i>						
Sargan test	0.601	0.249	0.623	0.456	0.813	0.867
First-order serial correlation	0.239	.011	0.564	0.446	0.767	0.782
Second-order serial correlation	0.528	0.012	0.93	0.526	0.986	0.926

Robust standard errors are in parentheses (clustered at the firm level). All specifications include time dummies. Estimated by GMM, instruments used are the first and second lags of all of the regressors. Variable definitions are given in Table A2. Columns (4) and (5) report results using two alternative measures of liquidity; the first measure is defined as net income plus depreciation, and the second measure includes changes in the working capital, in addition. Column (6) is our column (1) from Table 1 with a measure of debt.

sensitivity of investment to cash stock is an indicator of financing constraints and that DFI reduces this sensitivity.

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. Incoming foreign investment could also be driven by domestic policies which expand the availability of domestic credit. In both of these cases, the results could simply arise from omitted variable bias, where DFI proxies for the expansion of domestic credit or other measures economic well being. To test for this possibility, Table 3 redoes the specification reported in Table 1 (model 1), but includes a number of country-specific variables as robustness checks on DFI. In the first column, we add the interaction of cash stock and financial development (FD) to check whether DFI is essentially a proxy for

Table 3
Robustness to correlates of FDI

Dependent variable: I/K_t	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Financial development	GDP growth	M2	Private credit	Inflation	Country risk	Country-time dummies
I/K_{t+1}	0.245 (0.139)	0.172 (0.109)	0.229 (0.141)	0.267 (0.156)	0.689 (0.267)	0.878 (0.312)	0.255 (0.093)
I/K_{t-1}	0.232 (0.021)	0.242 (0.018)	0.234 (0.024)	0.222 (0.024)	0.201 (0.023)	0.191 (0.022)	0.226 (0.018)
S/K_t	0.019 (0.011)	0.029 (0.011)	0.028 (0.014)	0.021 (0.012)	0.011 (0.012)	0.007 (0.014)	0.023 (0.007)
$Cash_{t-1}$	0.039 (0.013)	0.038 (0.013)	0.029 (0.011)	0.028 (0.013)	0.022 (0.011)	0.023 (0.009)	0.044 (0.013)
$DFI_t \times Cash_{t-1}$	-0.549 (0.167)	-0.454 (0.137)	-0.278 (0.084)	-0.343 (0.122)	-0.201 (0.073)	-0.132 (0.054)	-0.117 (0.032)
DFI_t	1.127 (0.511)	0.876 (0.365)	0.392 (0.201)	0.666 (0.386)	0.165 (0.143)	-0.044 (0.113)	
$Control_t \times Cash_{t-1}$	-0.244 (0.113)	6.861 (5.262)	0.137 (0.101)	-0.354 (0.122)	-0.013 (0.010)	0.009 (0.013)	
$Control_t$		-1.618 (1.313)	0.086 (0.065)	0.066 (0.065)	0.008 (0.014)	0.011 (0.012)	
Observations	22,293	22,484	22,023	22,022	17,078	17,306	22,601
<i>Diagnostic tests (p-values)</i>							
Sargan test	0.887	0.618	0.476	0.332	0.538	0.713	0.341
First-order serial correlation	0.919	0.582	0.132	0.719	0.578	0.509	0.223
Second-order serial correlation	0.867	0.434	0.721	0.483	0.944	0.567	0.546

Robust standard errors are in parentheses (clustered at the firm level). All specifications include time dummies (except model 7 that includes country-time dummies). Estimated by GMM, instruments used are the first and second lags of all of the regressors. Variable definitions are given in Table A2.

financial development. However, the inclusion of FD, which varies across countries but not over time, does not affect the coefficient on $DFI \times Cash$. Consistent with Love (2003) in countries with more financially developed markets, firms appear to be less credit constrained.

Next, we test several country and time-varying indicators that could be associated with larger DFI inflows. In column (2), 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. Inclusion of GDP growth interacted with cash stock has no impact on the $DFI \times Cash$ coefficient.

In columns (3) and (4), 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 domestic credit (only using the private credit measure) eases the financing constraints of firms, as expected, inclusion of this variable does not affect the significance of the coefficient on $DFI \times Cash$, although its magnitude is reduced.

In columns (5) and (6), we add two additional measures of economic well-being that vary by country and time: inflation and country risk. Again, the idea is that DFI may simply be a proxy for a country's overall performance and that in countries that perform better, firms may be less credit constrained. The interaction between DFI and cash remains significant after the inclusion of these two variables, although the magnitude is again much smaller. Also, the direct relationship between firm-level investment and DFI is weaker with the inclusion of these variables. Finally, in column (7), we add country-time dummies as a proxy for any macroeconomic factors that vary by country over time (and we exclude DFI in levels since now it is captured by country-time dummies). Our main results remain intact though the magnitudes become somewhat smaller. To summarize, the results in Table 3 suggest that the impact of direct 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 4 presents the results of testing for the impact of restrictions on international transactions on firm-level financing constraints. 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 (i.e., restrictions on capital account transactions), which covers direct restrictions on inflows or outflows of foreign investment. Other controls, however, could also have an indirect effect, by reducing the overall profitability of investment and thus discouraging foreign investment inflows.

Table 4 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, $\text{Restriction} \times \text{Cash}$. 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 country-years with restrictions on payments for capital transactions have more credit-constrained firms. In addition, the coefficient on the restriction alone is significant and negative. This suggests that restricting capital flows negatively affects firm-level investment.

The second to fifth columns of Table 4 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. This suggests that openness to trade could be a critical factor in encouraging domestic investment. Columns (6) and (7) check the robustness of the results on 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

Table 4
Restrictions on the movement of capital

Dependent variable: I/K_t	Scaled by gross domestic investment				Scaled by GDP		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	E2	E1	F2	F1	GS	E2 and M2	E2 and GDP growth
I/K_{t+1}	0.589 (0.211)	0.543 (0.234)	1.019 (0.393)	0.409 (0.22)	0.828 (0.289)	0.618 (0.189)	0.667 (0.218)
I/K_{t-1}	0.278 (0.022)	0.278 (0.031)	0.212 (0.03)	0.289 (0.028)	0.222 (0.034)	0.277 (0.032)	0.278 (0.024)
S/K_t	0.033 (0.012)	0.032 (0.014)	0.028 (0.009)	0.033 (0.012)	0.032 (0.011)	0.028 (0.008)	0.039 (0.014)
Cash_{t-1}	0.078 (0.044)	0.109 (0.054)	-0.019 (0.093)	0.128 (0.056)	0.028 (0.067)	0.067 (0.029)	0.078 (0.045)
$\text{Restriction}_t \times \text{Cash}_{t-1}$	0.201 (0.057)	0.063 (0.156)	-0.011 (0.224)	-0.143 (0.16)	-0.014 (0.089)	0.223 (0.067)	0.223 (0.073)
Restriction_t	-0.024 (0.007)	-0.032 (0.033)	0.009 (0.017)	-0.078 (0.034)	-0.019 (0.014)	-0.021 (0.011)	-0.018 (0.011)
$\text{Control}_t \times \text{Cash}_{t-1}$						0.013 (0.234)	-1.473 (1.021)
Control_{t-1}						-0.012 (0.049)	-0.213 (0.254)
Observations	21,910	21,190	21,190	21,190	21,190	21,650	21,851
<i>Diagnostic tests (p-values)</i>							
Sargan test	0.33	0.828	0.161	0.445	0.113	0.489	0.422
First-order serial correlation	0.94	0.211	0.118	0.132	0.139	0.956	0.212
Second-order serial correlation	0.44	0.743	0.323	0.928	0.245	0.973	0.143

Robust standard errors are in parentheses (clustered at the firm level). All specifications include time dummies. Estimated by GMM, instruments used are the first and second lags of all of the regressors. Variable definitions are given in Table A2. Each restriction is a country-year dummy variable defined as follows: E2—restrictions for payments for capital transactions, E1—restrictions for payments for current transactions, F2—advance deposit required for imports, F1—import surcharges, and GS—government surrender requirements or restrictions on the repatriation of capital.

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 other types of flow

A natural question to ask is whether the impact of DFI on firm financing constraints in host countries is a unique characteristic of DFI or may be extended to the effects of other types of flows. In Table 5, we explore whether other types of flows have the same impact on financing constraints as incoming DFI. We test for the impact of net DFI (inflows less

Table 5
Do other types of capital flows ease credit constraints?

Dependent variable: I/K_t	(1)	(2)	(3)	(4)	(5)
	FDI net	Portfolio inflows	Portfolio net	Other inflows	Other net
I/K_{t+1}	0.348 (0.167)	0.023 (0.014)	1.074 (2.063)	0.274 (0.314)	0.275 (0.368)
I/K_{t-1}	0.239 (0.032)	0.238 (0.022)	0.219 (0.063)	0.239 (0.022)	0.238 (0.027)
S/K_t	0.038 (0.012)	0.037 (0.012)	0.043 (0.013)	0.024 (0.009)	0.028 (0.011)
$Cash_{t-1}$	0.078 (0.022)	0.018 (0.013)	0.017 (0.067)	0.021 (0.012)	0.055 (0.019)
$Flow_t \times Cash_{t-1}$	-0.945 (0.256)	-0.912 (1.254)	7.153 (17.443)	-0.598 (0.442)	-2.62 (2.128)
$Flow_t$	0.223 (0.056)	0.343 (0.228)	-1.332 (3.044)	0.045 (0.035)	0.342 (0.263)
Observations	21,372	22,473	20,648	22,526	21,626
<i>Diagnostic tests (p-values)</i>					
Sargan test	0.467	0.138	0.334	0.028	0.023
First-order serial correlation	0.512	0.078	0.312	0.067	0.075
Second-order serial correlation	0.373	0.222	0.956	0.112	0.244

Robust standard errors are in parentheses (clustered at the firm level). All specifications include time dummies. Estimated by GMM, instruments used are the first and second lags of all of the regressors. Variable definitions are given in Table A2. Net flows are inflows minus outflows.

outflows), portfolio investment, and other investment. Other investment typically includes commercial bank loans. The results in column (1) show that net DFI inflows are also significant, which is consistent with our earlier results on gross DFI inflows. The portfolio inflows do not have a significant effect on financing constraints. The coefficient on cash interacted with other inflows in columns (4) and (5) is negative, but not significant (plus the model is rejected with Sargan test p -values of 0.028 and 0.023). Thus, based on the evidence, it appears that DFI plays a unique role in easing financing constraints. In addition, direct foreign investment is the only type of flow which is positively and significantly associated with firm-level investment in our sample.

It is not that surprising that portfolio flows have no impact on firms' financing constraints. Portfolio flows tend to be short term in nature and more volatile than DFI (World Bank, 2001). In addition, while DFI implies a direct injection of funds into the firm, portfolio investment (which could be equivalent to purchasing stocks on the stock market) does not necessarily result in injections of liquidity. Our results are consistent with Collins and Bosworth (1999) who find that—in the aggregate—DFI has a highly beneficial effect on domestic investment, while portfolio flows have no discernible effect on investment. They also find that there is very little correlation between DFI, portfolio flows, and bank loans. One difference between our results and Collins and Bosworth is our finding that other inflows have no effect. This may be due to differences in samples—Collins and Bosworth have 58 developing countries in their sample and look at aggregate investment as opposed to firm-level investment.

6.2. Impact of DFI on financing constraints by income levels

In this section, we test whether the impact of foreign investment on host-country financing constraints varies with the level of development. It is likely that the impact of foreign investment would be smaller in countries where credit markets are well developed and constraints on credit are less pervasive. Column (1) of Table 6 tests this hypothesis by splitting the *Worldscope* sample into high-income and medium–low-income countries (using World Bank definitions of income categories). Column (2) performs the split between western and eastern Europe using our *Amadeus* sample. We first observe that the coefficient on cash stock in low-income countries is twice that in high-income countries, suggesting that firms in low-income countries are more constrained, on average. In addition, we find that the coefficient on the interaction between cash and DFI is between three and five times greater in low-income than in high-income countries. This suggests that DFI eases financing constraints more in low-income countries. These results are consistent with the work by Bond et al. (2003), suggesting that an important determinant of financing constraints is differences in financial systems. For example, they find that firms' investment is highly sensitive to financial variables in the United Kingdom and not sensitive to financial variables in Belgium. They argue that this finding is consistent with the suggestion that financial constraints on investment are more severe in the more market-oriented U.K.

6.3. Which firms benefit most from the DFI inflows?

We would 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 we cannot answer these questions in any definitive way, we attempt to better understand these mechanisms by splitting our sample by firm type. In particular, we separately estimate the impact of DFI inflows on firms with or without foreign assets and on firms with and without foreign ownership. We expect that firms with foreign assets are more likely to have access to international capital markets and therefore be less affected by DFI. Similarly, we expect firms with foreign ownership to be less financially constrained than those without foreign ownership.

In Table 6, column (3), we redo the basic specification, but we separate firms with foreign assets from other firms. Only half the firms in *Worldscope* have information concerning foreign assets, and we define a firm with foreign assets as a firm with foreign assets greater than zero (we also used sample splits based on the 5% or 10% cutoffs of the foreign assets and obtained similar results). The results indicate that firms with and without foreign assets exhibit similar sensitivities of investment to the cash stock, the point estimate on cash stock is statistically indistinguishable for the two samples. In addition, DFI reduces the sensitivity of investment to the cash stock for both types of firms. The evidence suggests that the level of DFI in a particular economy affects not just firms with foreign assets, which are more likely to be multinational firms and have access to international capital markets, but also firms without such access.

Table 6
Does the impact of FDI vary according to sample?

Database	(1)		(2)		(3)		(4)		(5)	
	Worldscope		Amadeus		Worldscope		Amadeus		Worldscope	
Dependent variable: I/K_t	High income	Low income	Western Europe	Eastern Europe	Without foreign assets	With foreign assets	Foreign owned	Not foreign owned	Foreign owned	Not foreign owned
I/K_{t+1}	0.209 (0.121)	0.789 (0.232)	0.087 (0.038)	0.067 (0.022)	−0.011 (0.066)	0.133 (0.064)	0.234 (0.122)	0.502 (0.229)	0.400 (0.245)	0.334 (0.143)
I/K_{t-1}	0.247 (0.018)	0.142 (0.054)	0.096 (0.033)	0.077 (0.039)	0.078 (0.013)	0.173 (0.021)	0.010 (0.033)	0.147 (0.041)	0.233 (0.033)	0.234 (0.036)
S/K_t	0.032 (0.014)	0.019 (0.008)	0.018 (0.008)	0.022 (0.014)	0.054 (0.012)	0.043 (0.009)	0.031 (0.012)	0.022 (0.009)	0.015 (0.007)	0.023 (0.008)
$Cash_{t-1}$	0.033 (0.011)	0.059 (0.018)	0.033 (0.015)	0.057 (0.019)	0.063 (0.014)	0.059 (0.012)	0.042 (0.018)	0.038 (0.009)	0.042 (0.011)	0.034 (0.009)
$DFI_t \times Cash_{t-1}$	−0.167 (0.059)	−0.519 (0.167)	−0.056 (0.022)	−0.271 (0.088)	−0.467 (0.063)	−0.292 (0.043)	−0.060 (0.017)	−0.032 (0.013)	−0.609 (0.133)	−0.189 (0.061)
DFI_t	0.072 (0.033)	0.253 (0.111)	0.194 (0.077)	1.621 (0.054)	0.332 (0.054)	0.114 (0.039)	0.142 (0.053)	0.145 (0.057)	0.136 (0.066)	0.219 (0.066)
Observations	18,669	3835	5686	1826	4977	3278	483	2250	192	2186
<i>Diagnostic Tests (p-values)</i>										
Sargan test	0.545	0.353	0.531	0.519	0.643	0.389	0.812	0.516	0.223	0.235
First-order serial correlation	0.423	0.223	0.422	0.355	0.348	0.369	0.771	0.333	0.199	0.233
Second-order serial correlation	0.532	0.352	0.768	0.645	0.567	0.519	0.534	0.377	0.278	0.301

In addition, we would like to understand whether foreign investment inflows make it easier for other firms—those without foreign assets or without foreign partners—to invest. The answer to this question is likely to depend on the nature of the foreign investment. One type of foreign investment is a joint venture between a local company in need of capital and a foreign company. In this setup, the local company typically receives financing from the foreign company in the form of an equity injection. Clearly, this arrangement is expected to reduce the financing constraints of the local company. Another type of foreign direct investment is where a foreign company sets up a subsidiary. As the foreign company typically limits its loan exposure to the local subsidiary, the subsidiary will need to borrow to finance investments. New subsidiaries of multinationals or greenfield investments may exacerbate the credit constraints of domestic firms to the extent that an increased number of firms are now competing for the same limited amount of resources. The net effect on financing constraints under this second type of foreign direct investment are therefore less clear.

Our measure of DFI is an aggregate measure that does not distinguish between joint ventures and new subsidiaries. Although we do not have separate DFI inflows for each type of investment, however, we can separate out the firms that never received DFI to determine whether “spillover” effects are positive or negative.²⁴ Although Worldscope data do not include information on foreign ownership, we were able to obtain ownership information from two additional sources, Amadeus and *Dun and Bradstreet’s (various issues) Who Owns Whom*. The Amadeus sample includes most of the high-income countries in our original sample plus eight eastern European countries. Additionally, it includes a larger spectrum of firms since it is not restricted to publicly traded firms. Of the firms with foreign ownership, none has less than 25%. Therefore, we split our sample based on whether or not the firm has any foreign ownership. For the low-income countries in our Worldscope sample, we use *Dun and Bradstreet’s (various issues) Who Owns Whom* to identify foreign-owned firms, and a firm is classified as foreign if foreigners hold a majority ownership.

Columns (4) and (5) of *Table 6* report the results of our basic specification, separating firms with foreign ownership from domestically owned firms. For both sets of firms, investment exhibits sensitivity to changes in the cash stock. In addition, DFI reduces the sensitivity of investment to changes in the cash stock for both types of firms. However, the magnitude of the impact for foreign-owned firms is two times the magnitude of the impact for domestically owned firms. This is consistent with the notion that firms receiving DFI would benefit more from these inflows. These results are also consistent with the notion that DFI inflows affect investment-cash flow sensitivities for wholly domestically owned firms, i.e., firms that do not directly benefit from DFI.

We caution the reader on three counts. First, although our sample includes both high- and low-income countries, it does not include many of the very poorest countries. For example, South Africa is the only African country included in the sample. However, these are the countries where financing constraints are likely to be the most severe. Second, the

²⁴ Although we are unable to identify which firms receive DFI in which year, we are certain that firms that have no foreign ownership and no foreign assets have never received DFI. This allows us to see if DFI has any effect on financing constraints of firms that do not receive DFI.

impact of DFI on financing constraints is also likely to depend on the policy environment.²⁵ Third, our measure of DFI is an aggregate measure that does not distinguish between types of DFI. Therefore, our results are biased in favor of the type of DFI that is more prevalent in our sample. This implies that one should be cautious about interpreting the results at the country level. In any case, it is clear that there is scope for much more work on this topic, particularly in low-income countries.

7. Conclusion

This paper tests 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 result 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. Other types of exchange controls—such as repatriation requirements for exporters or import surcharges—have no impact on firm financing constraints. We also find that capital account restrictions and import surcharges negatively affect firm-level investment, after controlling for other factors.

Finally, we examine whether the impact of DFI varies across the level of economic development. Our results show that direct foreign investment eases domestic financing constraints in both high- and low-income countries, although the magnitudes are larger in low-income countries. To understand better the mechanism through which DFI eases financing constraints, we split our sample based on whether or not the firm is a multinational and whether or not the firm has any foreign ownership. Our results confirm that DFI reduces the sensitivity of investment to cash for all types of enterprises. These results are consistent with a story in which DFI eases credit constraints even for purely domestic firms.

8. Uncited references

Bekaert and Campbell, 2000

Fazzari et al., 1988

²⁵ For example, [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. Though [Harrison and McMillan \(2001\)](#) examines the effects of ownership rather than capital flows, to some extent, we expect the two to be correlated. In that paper, we argue that the policy environment in the Ivory Coast had much to do with the result that foreign ownership had a crowding out effect.

Gilchrist and Himmelberg, 1995
 Gilchrist and Himmelberg, 1998
 Hart, 1995
 Hayashi, 1982
 International Monetary Fund, various issues
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 Jensen and Meckling, 1976
 Kim et al., 1998
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Appendix A. 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 38 countries. The sample does not include firms for which the primary industry is financial (one digit SIC code of 6).

In addition, we delete the following (see [Table A2](#) for variable definitions):

- All firms with 3 or less years of coverage;
- All firm years with missing *ikb*, *skb*, *cash*, and *FDI*;
- Observations with zero *PPENT* (200 observations);
- Observations with negative *KBEG* (277 observations) or *Cash/K* (25 observations);
- Observations with $IK > 2.5$ (1% of all observations);
- Observations with $SK > 20$ (5% of all observations),²⁶
- Observations with $Cash/K > 1.9$ (1% of all observations);
- 50% of all US firms with at least 4 years of data available was selected by random sample.²⁷

²⁶ This rule 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, 5000 for Japan, less than 1000 for most countries (see [Table 1](#)). Even after the sampling, the US has the most data available.

The resulting data set has about 46,000 observations; the number of observations by country is given in Table A1.

Table A1
Sample coverage across countries^a

Country	Worldscope			Amadeus		Dun and Bradstreet	
	Observations	Firms	Average firm years	Firms	Percent foreign	Firms	Percent foreign firms
Argentina	189	25	3.6			19	26.32
Austria	434	55	7.9				
Australia	1307	185	7.1				
Belgium	525	70	7.5	711	6.87		
Brazil	587	93	6.3			54	11.11
Canada	2933	368	8.0				
Switzerland	1016	132	7.7	347	28.45		
Chile	391	54	7.2			37	5.41
Colombia	128	20	6.4			10	10.00
Germany	2437	461	5.3				
Denmark	962	122	7.9	354	18.87		
Spain	859	113	7.6	990	8.45		
Finland	679	85	8.0	973	35.62		
France	3148	403	7.8	992	6.58		
United Kingdom	8911	1089	8.2	677	10.01		
Indonesia	493	83	5.9			50	8.01
Ireland	357	45	7.9	54	71.11		
Israel	145	29	5.0				
India	1377	266	5.2			183	2.19
Italy	1105	133	8.3	999	8.24		
Japan	3623	591	6.1				
South Korea	901	185	4.9				
Mexico	483	69	7.0			50	9.06
Malaysia	1292	202	6.4			153	1.96
Netherlands	1270	146	8.7	23	0.00		
Norway	627	84	7.5	879	2.37		
New Zealand	273	41	6.7				
Peru	103	17	5.5			11	18.18
Philippines	286	42	6.8			45	4.44
Pakistan	368	70	5.3			5	40.00
Portugal	231	42	5.5	1000	21.28		
Sweden	1063	135	7.9				
Singapore	744	118	6.3				
Thailand	949	177	5.4			48	8.33
Turkey	110	18	4.6			10	0.00
USA	8222	1168	7.0				
Venezuela	69	11	6.3			9	11.11
South Africa	1047	132	7.9			49	30.61
Greece				940	12.37		
Luxembourg				142	58.90		
Bulgaria				999	7.76		

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Table A1 (continued)

Country	Worldscope			Amadeus		Dun and Bradstreet	
	Observations	Firms	Average firm years	Firms	Percent foreign	Firms	Percent foreign firms
Czech Republic				983	29.29		
Croatia				181	25.39		
Hungary				332	36.82		
Poland				677	40.97		
Romania				939	6.39		
Slovakia				330	69.23		
Slovenia				153	2.51		
Total	46,044	7079	6.7	13,675	15.09 ^b	733	7.51 ^b

^a Outliers excluded and including only observations for which all of *ikb*, *skb*, *cash*, and *FDI* are non-missing. Average number of firms per country is 127 excluding the US and the UK.

^b These numbers represent the average foreign ownership over all countries weighted by the number of firms per country.

Table A2

Variable definitions

Abbreviation	Description
<i>Firm level variables (from Worldscope)</i>	
PPENT	property plant and equipment, net of depreciation
CAPEX	capital expenditure
DA	depreciation and amortization expense
<i>K</i>	beginning period capital = PPENT – CAPEX + DA
<i>IK</i> , <i>I/K</i>	investment-to-capital ratio = CAPEX/ <i>K</i>
<i>SK</i> , <i>S/K</i>	sales-to-capital ratio = Sales/ <i>K</i>
Cash	cash plus equivalents scaled by <i>K</i>
CF	cash flow (net income + DA), scaled by <i>K</i>
Debt	total liabilities, scaled by <i>K</i>
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 1 (described in Section 5).
Weight	weight is a country-level variable equal to one over the number of valid observations per country (described in Section 5).
<i>Country-level variables</i>	
FDI	foreign direct investment in the recipient country (IMF balance of payments statistics) scaled by aggregate gross domestic investment (IFS)
Portfolio flows	portfolio investment in the recipient country (IMF Balance of Payments Statistics) scaled by aggregate gross domestic investment (IFS)
Other flows	composed primarily of bank loans to the recipient country (IMF Balance of Payments Statistics) scaled by 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).

Table A2 (continued)

Abbreviation	Description
Domestic credit	ratio of credit allocated to the private sector by depositary institutions, scaled by GDP (IFS)
GDP and grGDP	gross domestic product and 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 (IMF)
F2	advance import deposits (IMF)
GS	repatriation and surrender requirements for export (IMF)
Inflation	annual % change in consumer prices (IFS)
Country risk	index of country risk; Source: IRIS (2001). Sum of following five variables, with the first three transformed into 10-point scales. Quality of the Bureaucracy: high scores indicate “autonomy from political pressure” and “strength and expertise to govern without drastic changes in policy or interruptions in government services;” also existence of an “established mechanism for recruiting and training.” Scored 0–6. Corruption in government: lower scores indicate “high government officials are likely to demand special payment” and “illegal payments are generally expected throughout lower levels of government” in the form of “bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans.” Scored 0–6. Rule of law: this variable “reflects the degree to which the citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes.” Higher scores indicate “sound political institutions, a strong court system, and provisions for an orderly succession of power.” Lower scores indicate “a tradition of depending on physical force or illegal means to settle claims.” Upon changes in government in countries scoring low on this measure, new leaders “may be less likely to accept the obligations of the previous regime.” Original variable name in ICRG is “law and order tradition.” Scored 0–6. Expropriation risk: assessment of risk of “outright confiscation” or “forced nationalization.” Scored 0–10, with lower scores for higher risks. Repudiation of contracts by government: indicates the “risk of a modification in a contract taking the form of a repudiation, postponement, or scaling down” due to “budget cutbacks, a change in government, or a change in government economic and social priorities.” Scored 0–10, with lower scores for higher risks.

Table A3

Means of variables used in analysis

Country	DFI	Portfolio	Other	GNP per capita	GDP growth	M2	FD	Inflation	Country risk
Argentina	0.12	0.21	0.10	8110	0.030	0.145	– 1.38	6.76	6.72
Australia	0.09	0.16	0.08	18,000	0.032	0.588	0.42	3.45	9.47
Austria	0.03	0.15	0.08	24,600	0.024	0.867	– 0.27	2.66	9.62
Belgium	0.21	0.55	1.60	22,870	0.022	0.615	– 0.82	2.34	9.46
Brazil	0.04	0.13	– 0.06	2970	0.022	0.226	– 1.04	11.77	6.99
Canada	0.07	0.20	0.06	19,510	0.024	0.723	0.03	2.76	9.80
Chile	0.21	0.06	0.05	3520	0.077	0.372	– 0.75	12.79	7.18
Colombia	0.09	0.05	0.06	1670	0.040	0.272	– 1.6	23.66	5.95
Denmark	0.06	0.15	0.10	27,970	0.021	0.579	– 0.49	2.44	9.93
Finland	0.04	0.19	0.07	18,850	0.019	0.555	– 0.41	2.77	9.84
France	0.07	0.09	0.14	23,420	0.019	0.672	0.1	2.32	9.42

(continued on next page)

Table A3 (continued)

Country	DFI	Portfolio	Other	GNP per capita	GDP growth	M2	FD	Inflation	Country risk
Germany	0.01	0.17	0.16	25,580	0.024	0.654	1.68	2.58	9.74
India	0.02	0.03	0.08	320	0.059	0.441	-0.7	9.52	6.93
Indonesia	0.06	0.03	0.06	880	0.067	0.401	-1.17	8.45	6.75
Ireland	0.11	0.10	0.85	13,530	0.055	0.487	N/A	2.54	9.19
Israel	0.05	0.04	0.10	14,530	0.053	0.706	0.01	11.11	8.72
Italy	0.02	0.16	0.10	19,300	0.019	0.660	-0.64	4.87	8.39
Japan	0.00	0.04	0.02	34,600	0.030	1.825	3.33	1.19	9.46
Malaysia	0.18	-0.02	0.03	3480	0.086	1.002	1.19	3.74	7.29
Mexico	0.09	0.09	0.00	4180	0.023	0.228	-0.85	18.59	6.42
Netherlands	0.15	0.12	0.31	22,000	0.027	0.816	0.66	2.29	9.93
New Zealand	0.24	0.05	-0.01	13,350	0.018	0.620	-0.53	3.38	9.89
Norway	0.05	0.07	0.06	26,390	0.029	0.565	-0.15	2.94	9.74
Pakistan	0.05	0.03	0.22	430	0.046	0.404	-1.28	10.99	5.75
Peru	0.13	0.03	-0.09	2110	0.022	0.141	N/A	13.52	5.61
Philippines	0.09	0.07	0.20	950	0.037	0.416	-1.15	8.94	5.70
Portugal	0.09	0.12	0.21	9320	0.027	0.699	-0.67	6.09	8.54
Singapore	0.37	0.04	0.37	22,500	0.087	1.114	1.6	2.26	8.77
South Africa	0.02	0.08	-0.01	3040	0.016	0.443	0.25	11.22	7.51
South Korea	0.01	0.05	0.02	10,874	0.077	0.592	0.84	5.48	8.29
Spain	0.09	0.08	0.09	13,440	0.029	0.724	-0.14	4.92	8.44
Sweden	0.14	0.06	0.35	23,500	0.014	0.475	-0.31	4.22	9.95
Switzerland	0.06	0.12	0.41	37,930	0.011	1.191	2.20	2.37	9.97
Thailand	0.06	0.05	0.16	2410	0.080	0.738	0.36	5.08	7.78
Turkey	0.02	0.05	0.06	2500	0.042	0.225	-0.2	31.40	6.62
UK	0.12	0.25	0.72	18,340	0.025	0.765	1.68	4.34	9.39
US	0.05	0.13	0.11	25,880	0.030	0.624	1.35	3.33	9.48
Venezuela	0.12	0.30	-0.22	2760	0.026	0.320	-1.26	28.34	6.39

All capital flows are scaled by gross domestic investment. N/A indicates not available.

Table A4

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 five 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

Table A4 (continued)

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 five controls
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 that 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 A5

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			

(continued on next page)

Table A5 (continued)

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
Import surcharges	– 0.1184* 0.02 371	0.5292* 0.00 400	0.2888* 0.00 400	1.00 400		
Advance import deposits	– 0.1820* 0.00 371	0.4751* 0.00 400	0.3023* 0.00 400	0.4253* 0.00 400	1.00 400	
Repatriation and surrender requirements for export	– 0.2960* 0 371	0.4858* 0 400	0.7004* 0 400	0.3600* 0 400	0.3310* 0 400	1 400

DFI and macro-variables

	DFI (scaled by DFI I)	DFI (scaled by GDP)	FD	GNP per capita	GDP growth	M2	Private Credit
FDI scaled by GDP	0.9209* 0.00 452	1.00 468					
FD	– 0.01 0.76 429	0.06 0.22 444	1.00 450				
GNP PC	0.0 0.98 441	– 0.02 0.64 456	0.6530* 0.00 438	1.00 473			
growth GDP	0.2610* 0.00 438	0.2739* 0.00 451	0.0262 0.5865 432	– 0.1835* 0.00 455	1.00 467		
M2	0.05 0.28 403	0.1593* 0.00 418	0.7789* 0.00 402	0.6023* 0.00 411	0.0690 0.1665 404	1.00 422	
Private credit	– 0.02 0.64 402	0.03 0.56 417	0.8007* 0.00 400	0.6408* 0.00 410	– 0.0257 0.6075 403	0.7706* 0.00 420	1 421

Note: Star denotes significance at the 10% level. The first number reported is the correlation coefficient, the second is the p -value, and the third is the number of observations.

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