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Abstract

According to neoclassical economic theory capital scarce countries with an open capital account will attract foreign capital because the rate of return in these countries is high. Capital inflows will be channelled towards investment projects in order to reap the benefits of the higher rate of return, and this will lead to economic growth. Empirically it is not clear that this mechanism is at work. This paper extends the current literature by combining the insight that domestic finance matters for growth into the empirical literature on the effects of capital inflows. A panel of 39 countries between 1976 and 2003 is used to estimate the effects of capital inflows on fixed investment. I use panel data on 39 developing countries between 1976 and 2003 to show that the effect of capital inflows on physical investment depends on the type of flow and on the level of domestic financial development. It is shown that the effect of capital inflows on physical investment depends on the type of flow and on the level of domestic financial development. The effects of aggregate capital inflows on investment are positive, small and increasing with the level of domestic financial development. Only for debt inflows there is an indication that a higher level of financial development increases the effect the inflows have on investment.

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1 Introduction

1.1 Capital flows to developing countries

According to neoclassical economic theory, if capital is perfectly mobile across countries it will flow from rich, capital abundant countries to poor countries where the rate of return to capital is high. Therefore, non-industrial countries are supposed to benefit from the liberalization of international capital flows as this would lead to an inflow of capital in the country, which lowers the cost of capital, increases the rate of physical investment and will lead to a higher rate of economic growth. Besides this, capital inflows could be beneficial through indirect channels. Kose, Prasad, Rogoff and Wei (2009)[20] point at several potential ‘collateral benefits’ from financial openness: domestic financial sector development, better corporate and public governance could all lead to higher long-run growth.

No consensus has emerged among economists and policymakers on the topic of the desirability of capital account openness for less developed countries. A clear understanding of the link between capital inflows and investment is important for policy reasons as well as for theoretical reasons. First, a better understanding of the link between capital inflows and macroeconomic variables can help us in developing a more accurate theory of financial openness and the macroeconomic effects. Second, a better understanding might also lead to better informed policy decisions on capital account openness in developing countries.

Recent empirical research has found no convincing evidence that capital entering a developing country leads to higher economic growth. A great number of empirical papers testing the link between capital market liberalization and growth have been published but the evidence they have produced is mixed. See for example the recent survey of the literature by Obstfeld (2008)[28]. On the other hand, there are indications that capital inflows might play a role in financial instability in developing countries. Calvo et al argue (Calvo, Leiderman and Reinhart, 1996)[12] that capital inflows might lead to exchange rate appreciation and widening of the trade deficit, which in turn might trigger financial destabilization and banking crises if the domestic financial system is not able to cope with the capital inflows. The Asian financial crisis of the end of the 1990s shows that these conjectures were not purely hypothetical. Ranciere, Tornell and Westermann (2006)[31] do show that although financial inflows might trigger the occasional financial crisis in emerging markets, in the long run the growth effects are positive. If this is the case, it is interesting to take a closer look at the channels through which capital flows might have this beneficial effect.

Financial inflows might have a direct or indirect effect on growth. On the one hand, capital inflows might directly lead to higher economic growth by increasing the fixed capital stock through an increase in investment or by increasing consumption during a temporary boom. On the other hand, the effects of capital flows might be indirect. As evidence for direct growth effects is hard to find, Kose, Prasad, Rogoff and Wei (2009)[20] urge researchers to look for growth effects due to productivity growth. They name the indirect effects on growth, via the productivity channel, ‘collateral benefits’.

The focus of this paper is on the direct, short term effect of capital inflows: more specifically, Capital Inflows and Investment in a 1 to 4 year horizon. When focusing on long term effects, the question is whether in the long run economies that attract more foreign capital perform better than countries that attract less foreign capital. One example of this is given by Quinn (1997)[30]. He finds that capital account openness is related with higher long-term growth rates. In general long term growth effects could be running through a variety of channels. Financial integration might lead to better macroeconomic policies, might increase productivity growth or the rate of investment, or it might lead to greater integration in the world economy which all could increase the growth rate in the long term.

1.2 The role of the domestic financial sector

This paper extends the current literature by combining the insight that domestic finance matters for growth and the empirical literature on the effects of capital inflows. Unlike the link between capital flows and growth, the link between finance and growth has been widely established in the development literature. Honohan (2004)[17] concludes that the causal link between financial development and growth is one of the most striking empirical macroeconomic relationships uncovered in the past decade. King and Levine (1993)[18] find, using a cross-section analysis, that financial development is strongly associated with real per capita GDP growth and the rate of physical capital accumulation. Benhabib and Spiegel (2000)[8] repeat the exercise with panel data. They find the same positive correlation but it disappears when including country fixed effects. Klein and Olivei (1999)[19] find a positive link between financial development and growth in developed countries but no effect in less developed countries. Time series techniques have also been used to analyse the link between financial development, investment and growth.¹

1.3 Thresholds: the absorptive capacity of the developing country

The effects of capital flows might be dependent on the absorptive capacity of the host country. A certain threshold of development in the host economy might be necessary for capital inflows to have positive effects. We know financial development matters for investment and economic growth. The primary function of a financial system is the allocation of resources in an environment full of uncertainty and transaction costs. Levine (1997)[25] decomposes this primary function into five basic functions: facilitating trading, hedging, diversifying and pooling of risk, allocating resources, monitoring managers and exerting corporate control, mobilising savings and facilitating the exchange of goods and services. If the financial system is effectively carrying out these functions, the result could be a higher growth rate through increased capital accumulation or through increased productivity.

¹An example is a paper by Rousseau and Vuthipadadorn (2005). Time series methods (vector autoregressive models (VARs) and vector error correction models (VECMs)) are applied to ten Asian countries between 1950 and 2000. It is found that in nearly all cases financial development leads investment.

Foreign Direct Investment (FDI), loans and portfolio equity flows into developing countries can be used for either investment or consumption and the degree to which foreign money is used for investment might be dependent on the level of domestic financial development. Capital inflows, be it FDI, loans or equity bring foreign money into the domestic economy and so increase the pool of available savings. This might lead to lower interest rates and a greater availability of credit. Both should make it easier for domestic firms to borrow money for their investment projects. A developed domestic financial system that can provide domestic credit for investment projects might be a necessary precondition for these mechanisms to exist. FDI might also increase investment through vertical or horizontal spillovers to domestic firms. Alfaro, Chanda, Kalemli-Ozcan and Sayek (2003)[1] and Hermes and Lensink (2003)[16] find that only countries with a well developed domestic financial market gain significantly from FDI. They argue that a decent domestic financial sector is needed before positive spillovers from FDI, which will increase the domestic growth rate, can take place. Spillovers may require extra investments for which external money is needed. Spillovers via backward linkages run not only through economies of scale in the existing firms but also through the creation of new firms, for which external finance is necessary.²

I show that the level of financial development directly influences the effect capital inflows (the sum of FDI, portfolio equity and debt and other investments such as loans and trade credit) have on domestic investment. This result is mainly driven by debt inflows, which have a larger positive effect on domestic investment, the higher the level of domestic financial development. FDI and equity inflows do not have strong effects on the level of domestic investment and the domestic level of financial development seems to be irrelevant in determining the impact of these flows on investment.

2 Empirical Literature

There is limited evidence that foreign capital entering a capital scarce developing country, this capital leads to higher growth. Numerous papers have been written on the effects of capital inflows on non-industrial countries. One branch of research focuses on the potential effects on macroeconomic variables as growth and investment, while a second branch of research tests the link between financial liberalization and financial fragility. Ranciere, Tornell and Westermann (2006)[31] combine the growth effects and increased probability of financial crises in one model. A third branch of research has focused on the costs of capital controls. An example is Forbes (2005)[14].

The research focusing on the effects of capital inflows on macroeconomic variables is very heterogeneous. First, the aspects of the economy that could be affected by capital account openness differ. Most research addressing the link between financial openness and the performance of the economy has focused on growth.³

²There is also anecdotal evidence that foreign firms even explicitly provide credit for investment for their suppliers.

³Kose, Prasad, Rogoff and Wei (2009)[20] synthesise the literature on the growth effects of capital liberalization and capital

But others have considered effects on the level and quality of domestic investment, productivity effects or wages. A second major difference between these papers is the choice of measure of financial liberalization. A choice has to be made between de jure versus de facto measures.⁴ Third, some papers test long-term effects and other look for temporary effects. Fourth, some papers allow nonlinear effects while others just test linear equations. Finally there is great heterogeneity between different research designs used. Different choices have been made concerning the use of cross-sectional or panel data, and the estimation techniques to be used. The decision about the optimal model and estimation method depends on the specific research question and model that is tested. Limited data availability leads to differences in country samples and time periods.

2.1 Effect on investment

The effect of capital flows Bosworth and Collins (1999)[11] and Mody and Murshid (2005)[27] have estimated the impact of financial inflows on investment. Bosworth and Collins considered 58 developing countries between 1978 and 1995, whereas Mody and Murshid's sample consists of 60 developing countries and the time span runs from 1978 to 1999. Bosworth and Collins use OLS and Instrumental Variable (IV) regression, both with fixed effects. IV regression is supposed to solve the potential endogeneity problem of capital flows. Therefore capital inflows to an individual country are instrumented by the total gross capital flows to the developing countries, that is the cumulative sum of capital flows divided by the cumulative sum of GDPs, both expressed in US dollars. As additional instruments, Bosworth and Collins include the IMF indicator of the presence or absence of controls on financial accounts transaction, the change in terms of trade, one prior year's capital inflows and the lagged change in GDP.

Mody and Murshid also use this IV estimation method (after first-differencing to remove the influence of unchanging country characteristics). Their instruments are global capital flows (the sum of gross long-term flows to our sample of countries divided by the GDP aggregate in their sample). A similar variable was calculated for FDI, bank loans, and portfolio flows. Additional instruments are lagged values of all endogenous variables including capital flows. But they extend the research of Bosworth and Collins by estimating a dynamic panel data model, where lagged investment shows up as a regressor. This dynamic model is estimated using GMM, an estimation based on Arellano and Bond (one-step first-difference). Another extension compared to Bosworth and Collins is that Mody and Murshid are interested in nonlinearities. Especially they test potential interactions of the effect of financial inflows with the quality of domestic policy, and with the level of financial integration of the country. As a policy measure the World Bank Country Policy Institutional flows on growth. They conclude that the evidence on growth effects of financial openness is mixed. Ranciere, Tornell and Westermann (2006)[31] decompose the final growth effect in a direct positive growth effect following financial liberalization and an indirect negative effect on growth due to an increased probability of a financial crisis. They conclude that the direct growth effect is larger than the cost.

⁴A de jure measure of financial development is a regulatory indicator of legal restrictions to cross-border capital flows. De facto measures are based on the observed amount of capital flows.

Assessment (CPIA) index is used. A de jure measure of financial integration is used based on four proxies for government restrictions that affect capital mobility.⁵

Bosworth and Collins find a positive effect of all three kinds of capital flows (FDI, portfolio and loans) on investment with the strongest effect of FDI, a smaller effect of portfolio investment and the smallest effect of loans. When using the IV estimation the coefficient of portfolio investment is no longer significant. FDI still has the strongest effects and loans are significant but have a smaller impact on investment. The control variables, the change in terms of trade and the first and second lag of the growth rate of GDP, are both significant in most specifications.

The estimation results of Mody and Murshid follow closely the Bosworth and Collins results. The IV estimation shows that FDI has the biggest effect on investment, followed by loans and portfolio investment. GMM results in a significant positive effect of FDI, but loans and portfolio investment become insignificant. The better the policy, the more effect FDI has on investment. This interaction term is both significant in the IV as in the GMM specification. The IV estimation results in a positive interaction effect of loans and portfolio investment with the policy indicator, but these estimates become insignificant when using the Arellano-Bond method.

The effect of financial openness Bonfiglioli (2008)[9] decomposes the growth effect in the effect on total factor productivity (TFP) and on capital accumulation finding a strong direct effect on TFP, but only an indirect effect on the accumulation of capital (through the TFP effect). A binary de jure measure of financial openness as well as a de facto measure are used. On data between 1975 and 1999 and 93 countries, she uses yearly panel difference in difference estimation, cross-sectional analysis, and system GMM on data in the same time period using 5-year averages.

Using de jure measures, Alfaro and Hammel (2006)[2] address a related question. They argue that one mechanism through which capital inflows can lead to growth is through the rate of investment. The import of capital goods is taken as a proxy for productive investment. In this way one can exclude investment in residential structures. Moreover, equipment investment is seen as having a higher social return in developing countries because the link between investment and growth is strongest for machinery and equipment investment. Underlying this idea is the finding that productive investment is related with TFP growth. Therefore they investigate the effect of equity market liberalization on the import of capital goods. The dependent variable is the percentage of capital goods imports to GDP and the percentage of capital goods imports to total imports (both in logarithms). The measure of capital account openness is based on de jure stock market liberalization dates determined by Bekaert, Harvey and Lundblad (2005)[7]. The regression results indicate

⁵These four measures are (a) the openness of the capital account, (b) the openness of the current account, (c) the stringency of requirements for the repatriation and/or surrender of export proceeds, and (d) the existence of multiple exchange rates for capital account transactions.

there is a positive effect of stock market liberalization on the import of capital goods.

To conclude, there is some evidence that capital inflows and financial openness are related with higher rates of investment but more research into the nature of this relation, using updated data and more advanced econometric techniques, can be insightful.

2.2 Threshold effects

Kose et al. (2009)[20] indicate that there is evidence that capital flows may only have positive growth effects when certain domestic initial conditions have been met, namely the presence of a well developed, well supervised financial system, good institutions and sound macroeconomic policies. It might be the interaction between domestic financial flows and the set of initial conditions that determines the growth outcome.

Several papers allow the effects of capital inflows on investment to be nonlinear. Mody and Murshid (2005)[27], as discussed before, allow for interaction effects. Durham (2004)[13] also pays attention to potential thresholds in the effects of FDI and equity portfolio investment on growth. He uses cross-sectional data on 80 countries between 1979 and 1998. He considers potential nonlinearities between FDI and education, trade, stock market capitalization, regulation, property rights and corruption. Extreme Bound Analysis is used to test the robustness of the estimates. He concludes that the effects are contingent on the absorptive capacity of the host countries, especially on the level of financial or institutional development.

Domestic financial development The literature so far has investigated several potential thresholds that might have to be reached before financial openness is beneficial. An important one is the level of financial development. Several papers have investigated the link between positive effects of FDI and the level of domestic financial development: Hermes and Lensink (2003)[16], Omran and Bolbol (2003)[29] and Alfaro, Chanda, Kalemli-Ozcan and Sayek (2003)[1]. The idea is that a certain level of financial development is needed to enable the country to absorb new technologies and to maximise the spillovers to the rest of the economy. Hermes and Lensink use data on 67 developing countries between 1970 and 1995. The cross-sectional growth regressions show that the higher the level of financial development (measured as the percentage of domestic credit to the private sector to GDP), the larger the positive effect of FDI on the growth rate becomes. Alfaro, Chanda, Kalemli-Ozcan and Sayek (2003)[1] also find that only countries with well developed financial markets gain significantly from FDI. They use several measures of financial development. A cross-sectional analysis is carried out both on OECD and on non-OECD countries. OLS estimation shows a positive interaction effect on growth between FDI and financial development. Consequently IV estimation is used. Both FDI inflows and financial development are instrumented by variables that are not subject to reverse causality. Financial development is instrumented by the origins of a country's legal systems and creditor rights and FDI by the real exchange rate as it is a determinant of FDI (the real exchange rate changes FDI decisions either through altering relative costs or relative wealth). An additional instrument is lagged FDI.

The results of IV estimation continue to support the finding that FDI promotes growth through financial markets.

3 Empirical setup

The aim of this paper is to estimate the short term effect of capital inflows on domestic investment. I allow for the possibility that the effect depends on the absorptive capacity of the host country as captured by the level of domestic financial development. First, I discuss the data sources and econometric methodologies. The estimation results can be found in section 4.

Estimation model The following equations will be estimated:

$$I_{it} = \alpha_i + \alpha_t + \beta_1 Flow_{it} + \beta_2 Findev_{it} + \beta_4 Growth_{it-1} + \epsilon_{it} \quad (1)$$

$$I_{it} = \alpha_i + \alpha_t + \beta_1 Flow_{it} + \beta_2 Findev_{it} + \beta_3 (Flow_{it} * Findev_{it}) + \beta_4 Growth_{it-1} + \epsilon_{it} \quad (2)$$

I = Aggregate investment

$Flow$ = Capital Inflows, decomposed by type

$Findev$ = Measure of the level of development of the domestic financial sector

$Growth$ = growth rate of GDP

If capital inflows have a positive effect on investment, β_1 will be significant and have a positive sign. When including the interaction term, a positive and significant β_3 means capital inflows have a bigger effect on investment the more the domestic financial sector is developed. The data used in this exercise are discussed in the following section.

3.1 Data

This research focuses on a time period that is as long as possible and includes as many non-industrial countries as possible. Due to data constraints, I use a sample of 39 developing countries between 1976 and 2007.

3.1.1 Capital flows

De jure vs de facto measure of financial openness A choice has to be made between de jure or de facto measures of financial openness. De jure measures are based on the regulatory environment regarding

capital flows. Often a binary indicator from IMF's Exchange Arrangements and Exchange Restriction is used. De jure measures are often an imprecise indicator of the real amount of capital that is entering a country. They are often binary indicators, which lead to a very coarse measurement of change and difference in financial openness.

De facto measures look at observed international capital flows as reported by the IMF or World Bank.

A third way to model the explanatory variable is the determination of liberalization dates or episodes. Both de jure and de facto measures can be used for this purpose. First, one could try to determine the liberalization dates or episodes from the data. Ranciere, Tornell and Westermann (2006)[31] determine liberalization times by estimating the timing of actual change in patterns of portfolio flows, bank flows and foreign direct investments. Otherwise one could look at the regulation concerning capital flows. For example Henry (2003)[15], in establishing the date of stock-market liberalization, infers the date on which foreigners could first hold domestic shares by determining the first date on which a closed-end country fund was established.

As I am interested in the direct effect capital flows have on domestic investment, the choice for de facto measures is straightforward. As de facto indicators, measures of capital flows or stocks can be used.

Gross vs net flows When using capital flow data one must decide whether to use gross or net flows. The IMF International Financial Statistics provide data on net inflows and on net outflows. Capital inflow data measures the net purchases or sales of domestic financial assets by non-residents. So purchases of domestic assets by non-residents are seen as capital inflows with a positive sign.⁶

Decomposition of capital flows into different types Data on capital inflows, decomposed into FDI, portfolio debt, portfolio equity and other investment (mainly loans and trade credit) are available from the IMF International Financial Statistics (IFS). According to the IMF's International Financial statistics are defined as follows: "Direct Investment in Rep. Econ., n.i.e. (Direct Investment in the Reporting Economy, n.i.e.) (line 78bed) represents the flows of direct investment capital into the reporting economy. Direct investment includes equity capital, reinvested earnings, other capital, and financial derivatives associated with various intercompany transactions between affiliated enterprises. Excluded are flows of direct investment capital into the reporting economy for exceptional financing, such as debt-for-equity swaps. Direct investment in the reporting economy is generally shown with a positive figure, reflecting an increase in net inward investment by nonresidents, with a corresponding net payment inflow into the reporting economy. Equity Securities Liabilities (line 78bmd) include shares, stocks, participation, and similar documents (such as American depository receipts) that usually denote ownership of equity. Debt Securities Liabilities (line

⁶Data on gross inflows, purchases of domestic assets by non-residents without taking into account sales of domestic assets by non-residents, are not available.

78bnd) cover (1) bonds, debentures, notes, etc., and (2) money market or negotiable debt instruments. Other Investment Liabilities, n.i.e. (line 78bid) include all financial transactions not covered in direct investment, portfolio investment, financial derivatives, or reserve assets. Major categories are transactions in currency and deposits, loans, and trade credits.”

In some countries debt restructuring has taken place between 1976 and 2000. Private debt has been converted into public debt using a variety of methods. These debt restructuring episodes show up in the data as a sharp drop in loan inflows coinciding with an increase by an equivalent amount in portfolio debt inflows. For two countries, Ecuador and Venezuela, these changes are very substantial. This type of debt restructuring might have taken place in other countries and in other years as well, but it is not straightforward to detect them in the data. Therefore I restrict the estimation to using only three categories of capital inflows: FDI, loans and debt. Debt is the sum of loans and bonds. When private debt has been transferred to public debt, this will be cancelled out in the debt category.

Figure 1 plots the average of total capital flows as a percentage of GDP of all the developing countries in the sample. Figure 2 illustrated the evolution of FDI, debt and equity inflows into the 40 developing countries in the sample.

3.1.2 Fixed investment

The variable ‘domestic investment’ is the share of real investment in GDP. Data on domestic investment are available from the Penn World Tables (nominal and real investment as a share of GDP). It is the investment Share of Real GDP per capita (Constant Prices: Laspeyres) (unit: in 2000 Constant Prices) We also use Gross Fixed Capital Formation Data from WDI. 311 ”Default Label: Gross fixed capital formation (current US\$) (NE.GDI.FTOT.CD) Definition: Gross fixed capital formation (formerly gross domestic investment) includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. Data are in current U.S. dollars. Source: World Bank national accounts data, and OECD National Accounts data files.”

3.1.3 Control variable: growth rate of real GDP

The control variable is the growth rate of real GDP (lagged) taken from the World Bank -World Development Indicators.

3.1.4 Instrument for capital inflows: US Treasury bill rate

As will be explained, instrumental variables will be used to control for the potential endogeneity of capital inflows. One of the instruments used is short term US interest rate. The US 3 month Treasury bill is taken from the IMF's International Financial Statistics (60CS.ZF T-BILL RATE-3 MNTH CONS. MAT. (Units: Percent per Annum))

3.1.5 Financial development

It is difficult to measure the level of financial development directly. The most common indicator used in the literature is the level of credit to the private sector as a percentage of GDP. Private credit excludes credit issued to governments, government agencies, and public enterprises. The World development indicators provide a measure of domestic credit to the private sector as a percentage to GDP (Domestic credit to private sector % of GDP). We also use private credit by deposit money banks as percentage of GDP compiled by Beck, Demirguc-Kunt and Levine (2000)[6] (The World Bank Financial Structure Database provides the necessary data (World Bank, International Finance Corporation)). In addition we use liquid liabilities as a percentage of GDP. Liquid liabilities, or broad money, includes interest-bearing deposits of banks and other financial intermediaries of less than 1 year and currency. It is a measure of size of the financial intermediation or financial depth.

3.2 Econometric Issues

Several econometric difficulties that arise in the panel data framework will be discussed in this section.

Unobserved country heterogeneity Because we are working with countries, it is very likely that there is unobserved heterogeneity between the different country groups. By including fixed country effects it is possible to control for these unobserved and unchanging country characteristics. If these country characteristics are correlated with the explanatory variables (for example with capital inflows) this will lead to biased coefficients on these explanatory variables if we do not include fixed effects. The time effect is the same for all countries. Another way of removing country specific heterogeneity is working with the data in first differences.

Serial correlation in the error terms Another issue that needs to be taken into account is that of serial correlation in the error terms. The data in each country group have a time series structure, so we expect the error terms for each country group to exhibit some serial correlation. An unobserved shock to investment this period will probably affect the following periods as well. If serial correlation is present, this will lead to consistent but inefficient estimates and to biased standard errors when applying basic econometric methods such as OLS. First, using cluster robust covariance estimates allows for intra cluster (a cluster is a country

in this panel) autocorrelation but assumes independence across clusters (Wooldridge, 2002)[35]. Second, including lagged investment in the regression equation reduces this problem. When using OLS, the inclusion of lagged investment among the explanatory variables adds a explanatory variable that is correlated with the error term. This leads to a failure of the strict exogeneity assumption. But the bias this entails is limited with a large number of time periods (T). There are 25 time periods on our sample, we can assume the bias due to the presence of a lagged dependent variable is small. Difference or system GMM allows for the inclusion of a lagged dependent variable.

Potential endogeneity of capital inflows We control for the potential reverse causality or simultaneity between investment and inflows. Inflows might have an effect on domestic investment, but it is not unlikely that domestic rates of investment influence the capital flows the country receives. In this case there is reverse causality and the assumption of strict exogeneity, necessary for (fixed effects) OLS estimation to be consistent, is violated. If investment is influencing the amount of capital that flows into the country, the explanatory variables (flows) might be correlated with the error term. That is, if random noise is affecting the investment rates which in turn affect the inflows. If our model is perfect and all determinants of investment are included in the regression and investment is never influenced by random shocks; this is not a problem. But as we cannot rule out correlation between the explanatory variables and the error term, we use instrumental variables, which control for this unwarranted correlation between explanatory variables and errors.⁷

3.2.1 Instrumental variables

The potentially endogenous capital inflows have to be instrumented. The instruments must fulfill two conditions: relevance (correlated with the variable it is instrumenting) and validity (uncorrelated with error process).

Capital flows Bosworth and Collins (1999)[11] and Mody and Murshid (2005)[27] use the US interest rate and the pool of capital available to developing countries as instruments for capital inflows.

In this paper, capital inflows are also instrumented with the 3-month US Treasury bill rate and with a measure of the global pool of capital available to countries in the sample.⁸

The first instrument is chosen because it has been shown in the literature on the determinants of capital flows to matter for capital inflows. Calvo, Leiderman, Reinhart (1994)[12] indicate that there are

⁷This problem can also be caused by simultaneity. Maybe investment is not influencing capital inflows (reverse causality), but capital inflows and investment could be influenced by a same third factor (simultaneity). This would lead to correlation between the capital inflows (or other explanatory variables) and the error terms.

⁸Lags of the explanatory variables could also be included. But these lags will only be valid instruments if there only is contemporaneous correlation between the explanatory variable and the error term (so if capital inflows in period t-1 do not affect investment in period t which is a strong assumption).

both external and internal determinants of capital flows. The external determinants might help us in finding a suitable instrument for capital inflows. First of all the global interest rate seem to be important. Global capital flows surge when global interest rates are low.

The idea behind the second instrument is that the total amount of capital available is the same for all countries, hence unrelated with shocks in domestic investment. In this paper we use the average of the inflows into the countries in the sample as a percentage of GDP. Mody and Murshid point out that this assumption is less likely to hold during a financial crisis. A downturn in domestic investment can go together with a fall in capital inflows in all countries, which leads to a correlation between the shock in investment and the global pool of capital. Beside the pool of flows, Bosworth and Collins also use lagged flows as instruments. The use of lagged flows might invalidate the IV regression because it might lead to violation of the orthogonality condition between the instruments and the error terms.

Financial development The level of domestic financial development could be endogenous. In the literature it has been suggested to use institutions/legal origins as an instrument for financial development (La Porta et al. (1997, 1998)[21][22]) This instrument is time invariant and therefore impossible to use in a panel framework. In the instrumental variable estimation financial development is treated as an exogenous variable.

Interaction effects We allow for nonlinear effects. We treat financial development as exogenous. This means that we are including interactions between exogenous and endogenous (capital inflows) variables. The basic equation without interaction effects need to be identified if the equation with interaction effects is to be identified. If it is, there is a great chance the nonlinear version of the equation will be identified as well, even when endogenous variables are interacted with exogenous ones (Wooldridge, 2002)[35]. We instrument the interaction term of the particular inflow and the measure of financial development with an interaction term of the total pool of this flow with the measure of financial development.

Specification tests of instruments It is necessary to test whether the estimated equations are identified and whether the orthogonality assumption of the instruments is valid. If this is not the case we should not pay too much attention to the estimation results.

First of all, we need relevant instruments. For this purpose I use an underidentification test based on the Anderson canonical correlations test. The null hypothesis of the test is that the matrix of reduced form coefficients has rank $K-1$ where K is number of regressors. This means the equation is underidentified. A rejection of the null indicates that the model is identified. We apply the Kleibergen-Paap test which allows for various forms of heteroskedasticity, autocorrelation, and clustering.

Another possibility is to use a partial R-squared measure that takes the intercorrelation into account: the Shea statistic. Standard partial R-squared measures might not be sufficient. As Baum et al (2003)[5] point

out, they might fail to indicate an underidentification problem when there are multiple endogenous regressors and not enough relevant instruments.

Second, we want valid instruments that are unrelated with the error process. We need an overidentified equation in order to be able to test whether the errors and instruments are orthogonal. Usually a Sargan-Hansen test is used for this purpose, which has asymptotically a Chi-squared distribution with as degrees of freedom the number of instruments minus the number of explanatory variables. Hansen's J test assumes that at least enough instruments are valid to identify the equation exactly. If this is not the case, the test is biased and inconsistent. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

3.2.2 GMM estimation

In empirical research working with a large number of individuals (N) and a small number of time periods, it has become standard to use Arellano-Bond or system GMM once lags are included. These estimators solve the problem that with small T and a lagged dependent variable the results are biased. Moreover, they remove country specific characteristics and are robust to endogeneity. These methods are developed for large N , small T samples. In these methods the number of instruments depends on T . With large T , the number of instruments will be very large which leads to poor finite sample properties. See for example Roodman (2009a)[32]. For small T the bias in OLS is large, so the estimation results using Arellano-Bond type of estimators might be more reliable than the OLS estimation. When using difference GMM, developed by Arellano and Bond (1991)[3], differenced endogenous variables are instrumented with lags in levels. These instruments are weak when the endogenous variables are close to a random walk. Arellano and Bover (1995)[4] enrich the difference GMM estimator by making use of more instruments: the variables in levels are instrumented with lags of their first difference. These instruments are only valid if the change in a variable in year t does depend on the unobserved country specific effect. This method is referred to as system GMM.

We apply both difference and system GMM. To reduce the number of time dimension four-year averages are used. These methods enable us to control for the potential endogeneity of capital inflows and of financial development.

The potential problems with both difference and system GMM estimators are numerous. First, it has been shown that when the number of instruments generated internally is large, the Hansen specification test for validity of the instrument set can become unreliable. A high number of instruments might prevent the Hansen test to reject the hypothesis of invalid instruments. Second, difference GMM often suffers from weak instrument problems. In difference GMM, right hand side variables are differenced and instrumented with lagged levels. Often lagged values of the regressors are poor predictors for future changes of the regressor. For this reason system GMM was developed, which creates more instruments internally. In system GMM, lagged differences are used as instruments for the levels equation. In order to do this system GMM relies on

more specific assumptions: the changes in the instrumenting variables must be uncorrelated with the fixed effects.

Two specification tests are used. First, autocorrelation in the idiosyncratic error terms can make some lags of the instruments invalid. The full disturbance is presumed to be autocorrelated because it contains fixed effects. Therefore, in order to test for autocorrelation aside from the fixed effects, the Arellano-Bond test is applied to the residuals in differences. First order correlation of the residual in differences is expected because they contain both the first lag of the residual. The presence of first order correlation in differences is therefore uninformative. Thus, to check for first-order serial correlation in levels, we look for second-order correlation in differences. We need to fail to reject the null hypothesis of no second order correlation, as evidence for the absence of first order autocorrelation in levels.

Second we test for validity of the instruments using both the Sargan and the Hansen specification test. We need to fail to reject the null hypothesis that the instruments are valid, i.e. that the instruments are exogenous (We are looking for p-values greater than 0.05). The Sargan test assumes homoskedasticity in the error process, whereas the Hansen test allows for heteroskedasticity but can be weakened by many instruments. (Roodman, 2009b)[33]

4 Econometric results

I estimate the effects of capital inflows on total investment using the following equation and instrumenting capital inflows as discussed before.

$$I_{it} = \alpha_i + I_{it-1} + Flow_{it} + Findev_{it} + Flow_{it} * Findev_{it} + Growth_{it-1} + \epsilon_{it} \quad (3)$$

I = investment as a % of GDP

Flow = Capital Inflows as a % of GDP

Findev = A measure of domestic financial Development

Growth = GDP growth

4.1 Base specification

There are 39 developing countries in the sample over 25 years (see Table 1 for a list of the countries in sample). An overview of the correlations between the variables used in the estimation is provided in Table 2.

Estimation results

OLS with instrumental variables In Table 3 the estimation results of the instrumental variables regression using a dynamic specification can be found. Next, total inflows are decomposed into three different types of capital flows: FDI, debt and equity inflows. The results can be found in Table 4. Several diagnostic statistics are included in the table: the Shea Partial R squared, the p value of the Anderson canonical correlation statistic and the p value for the Sargan statistic. These diagnostic statistics were presented in section 3.2. In almost all cases the Anderson statistic indicates we can reject the null hypothesis of underidentification and the Hansen statistic indicates in all cases that the instruments are valid. Still, the instrumental variable results have to be treated with caution because the Shea partial R-squared indicates that the instruments are weak which might lead to biased estimates.

The results in Table 3 indicate that total inflows have a positive effect on domestic investment, dependent on the level of domestic financial development. The interaction term of total flows and a measure of domestic financial development is significant for two of the three measures of financial development. When using the regression results for the second measure of financial development, private credit as a share of GDP, the economic significance can be illustrated as follows. If we ignore the direct effect of capital inflows, which is not significant, a 10% increase in total inflows to GDP, will lead to 3.5 percentage points increase in investment to GDP when the level of financial development is set to the mean of the sample. This is (35%) for the the second measure of private credit to GDP. When taking the insignificant direct effect into consideration, a 10% increase in total inflows leads to a 5.5 percentage point increase in investment to GDP. In Table 4 it becomes clear this effect is mainly driven by debt inflows. In Figure 3 the total effect of a 10 percentage point increase in total capital inflows as a percentage of GDP on the share of investment in GDP is plotted, for different levels of private credit as a percentage of GDP. It illustrates that an increase in capital inflows has a larger effect on domestic financial development, the larger the share of private credit in the economy, which is our measure of financial development.

When decomposing total flows into different types (Table 4), the interaction term of debt inflows with the two measures of private credit is significant. On the other hand, when using liquid liabilities as a measure of financial development, the effect of equity inflows depends on financial development, whereas debt inflows have a highly significant effect irrespective of the level of liquid liabilities as a percentage of GDP. FDI does not seem to have a direct effect on investment.

GMM The results based on four-year averages of the yearly data and the method of difference and system GMM are presented in Table 5 and Table 6. For the GMM estimation both p values for the Arellano-Bond autocorrelation test and the Hansen test are reported in the Table 5. The AR(2) autocorrelation test indicates that there is no second order autocorrelation in the error term in differences, which indicates the

the necessary condition of no autocorrelation of the first order in the levels of the error terms is fulfilled. The Sargan test for instrument validity indicates that the instruments are valid, only in the case of system GMM with the capital inflows decomposed into different types. The Hansen test on the other hand indicates that the instruments are valid. This test is robust but can be weakened if there are many instruments, which is the case here. In the estimation with capital flows decomposed by type, the number of instruments is particularly large. The p value of 1 for the Hansen statistic is an indication that the test is invalidated by the large number of instruments (see Roodman(2009a)[32]). Because there are some indications that the instruments might not be valid, we should again interpret the estimation results with caution.

Both difference and system GMM estimations result in a positive interaction effect between total inflows and the different measures of financial development. This result is in line with the one found using the instrumental variables method. The size of the coefficient on the interaction term is the same as in the OLS instrumental variable regressions.

The economic significance of the results for the estimation using difference GMM and the second measure of financial development, private credit as a share of GDP, can be illustrated with the following numerical example. When private credit as a share of GDP is at its mean value 35% it is found that a 10% increase in total capital inflows will lead to a 2.8 percentage point increase in fixed income, ignoring the direct effect. When we take the direct effect into account, the total effect of a 10% increase in total capital inflows will lead to a 2.1 percentage point increase in fixed income as a share of GDP. In Figure 3 the total effect of a 10% increase is plotted for every level of private credit as a percentage of GDP as found in the sample. The main difference with the OLS instrumental variable results is that the direct effect of capital flows in investment is now negative, but again it is insignificant.

When assessing the different types of capital flows separately, the effect debt inflows have on investment are dependent on the domestic level of financial development in all specifications (see Table 6). The system GMM estimation results give a positive interaction effect with debt inflows when using liquid liabilities as a measure of domestic financial development. But, as mentioned before, the p values of the Hansen test of 1 indicates that the number of instruments is too large to result in unbiased estimates. Using system GMM, equity inflows have a significant interaction term with financial development, but with a negative sign.

The results provide some support for the hypothesis that the level of financial development matters for the effects of total capital inflows on investment. The more developed the domestic financial system, the larger the impact of total inflows on domestic investment. This result is mainly driven by debt inflows. The interaction term between debt inflows with domestic financial development is positive and significant using instrumental variables and GMM for most specifications. Our finding that debt inflows have the strongest impact on investment is in contrast with the findings of Bosworth and Collins (1999)[11] and Mody and Murshid (2005)[27], who both find the strongest link between the FDI type of inflows on investment.

4.2 Potential caveats

The role of economic development One could worry that the level of domestic credit to GDP is an indicator of economic sentiment in the country rather than an indicator of financial development. During an economic boom one expects an increase in the rate of domestic credit to the private sector to GDP and during a recession a decrease. Another possibility is that the financial depth indicator is related with the level of economic development. Richer countries have more developed financial systems so they might have a higher level of domestic credit to the private sector. We could control for this possibility by using the level of GDP and the growth rate of GDP as an extra interaction term in the equations. But as the number of interaction terms and instruments is already very large, this approach is not feasible.

Measures of financial development As a measure of financial development, private credit as a % of GDP and liquid liabilities as a % of GDP is used, as is standard in the empirical literature on financial development. The advantages of this measure is that it is widely available, even for developing and emerging economies. It is also a plausible measure, especially in less developed systems and for the purpose of our research where we are interested in the role of the domestic financial system in channeling funds to investment projects. The measure would be less useful for the purpose of comparing financial development among advanced economies. The main disadvantage is that private credit is likely to be more volatile than the level of financial development. Especially during an economic boom that is associated with a credit boom, our measure of financial development will rise more than the the level of financial development in reality. But, because of lack of a better widely available measure we still decide to use this measure. Moreover, in the GMM estimation we work with 5 year averages, which will soften the cyclical movements in private credit as a % of GDP.

Financial crises During the 1980s and 1990s capital markets have been liberalized in many countries, and this period has also been confronted with a high number of financial crises. This fact is indicated by Bordo, Eichengreen, Klingebiel and Martinez-Peria (2001) who gather data on financial crises (banking crises, currency crises and twin crises). They conclude that after 1973 crisis frequency was double compared to the Bretton Woods (1946-1971) or gold standard period (1880-1913). Only the 1920s and 1930s had similar crisis rates as the current era. Some authors take into account the increased risk of a financial crisis induced by opening up (Ranciere, Tornell, Westermann (2006)[31]), while others ignore the issue.

In some cases financial inflows might have led to a strong increase in investment followed by a bust, for example in South East Asia. If these busts are triggered by capital inflows in earlier periods, this negative effect has to be taken into account when assessing the long term effects of capital inflows on investment.

If capital account openness and capital inflows increase the probability of a financial crisis in the medium or long term, one should be careful in drawing conclusions about the effects of financial flows on domestic

investment. If inflows immediately increase investment, but lead to a drop in investment once a financial crisis occurs, we cannot conclude that inflows are beneficial for investment. Finding a positive immediate effect does not exclude the possibility of a long term negative effect due to financial crises.

Could we try to incorporate this potential negative effect?

First, we could add a control variable that controls for the presence of a banking crisis. If there are capital inflows during a time of a financial crisis, this dummy variable will probably capture the negative effect this has on investment. This is only desirable if we make the assumption that capital inflows and financial crises are not related in any sense. If we assume that capital inflows partly trigger financial crises, we want this negative effect to be included in the effect capital inflows have on domestic investment.

Second, we could estimate without any attempt of including a variable controlling for financial crises. This approach has been taken in this paper. By not controlling for banking crises, the potential negative effects of such a crisis on investment are incorporated in the coefficient on capital inflows. The coefficient on flows will be lower if there is financial crisis. But this logic only holds if during crisis periods capital is still flowing into the country. This reasoning might be flawed if, in case of a crisis, the amount of capital inflows decreases. Then, the coefficient on capital inflows does not take into account the negative effects of a crisis. Different types of capital flows are likely to behave differently during a financial crisis. FDI is thought to be the most stable capital inflow. This means that the investment is less likely to be withdrawn in a period of financial turmoil, compared to other types of capital. But we still expect less FDI flowing into a country during a financial crisis.⁹ We can conclude that it is very likely that the amount of each type of capital is likely to decrease during a financial crisis. We cannot distinguish between negative levels of net inflows (sales of domestic assets by non-residents are bigger than purchases of domestic assets by non-residents) being correlated with decreases in investment rates and high levels of net inflows (purchases of domestic assets by non-residents are bigger than sales) being correlated with increases in domestic investment rates. We are primarily interested in the second relation. So it is possible that the results are driven by crisis episodes characterized by a reversal of capital flows (negative inflows) and a general unfavourable economic situation with low investment rates.

A third way to deal with the problem is to explicitly model the link between capital inflows, financial crises and capital inflows. Ranciere, Tornell and Westermann (2006)[31] have used a treatment model for this purpose. This allows them to decompose the effect of capital account openness in a positive growth effect and a negative growth effect through financial crises.

⁹For example, Lehmann (2002)[23] shows that reinvested earnings for U.S. affiliates in emerging markets, which are a part of FDI, decrease during a financial crisis.

5 Conclusion

In this paper we extend the research on the effects of capital inflows in developing and emerging economies. Our focus is on the potential effect of capital inflows in investment because investment is important for economic growth. In this we follow research by Bosworth and Collins (1999)[11] and Mody and Murshid (2005)[27]. We extend their research by allowing for the effect of capital inflows to be dependent on the level of domestic financial development. Foreign capital might have a bigger effect on investment if there exists a domestic financial sector that is able to channel foreign funds to domestic investment projects.

Our estimation results indicate that the level of financial development directly influences the effect total capital inflows (the sum of FDI, portfolio equity and debt inflows) have on domestic investment. First we use OLS with instrumental variables on yearly data. Capital inflows are instrumented to address the potential endogeneity of capital inflows. Next, we proceed with difference and system GMM on four-year averages of the yearly data., we find a positive coefficient on the interaction term of capital inflows and several measures of financial development. When we decompose total inflows into different subtypes, in most specifications, only the interaction term with debt inflows is significant. This means debt inflows have a larger positive effect on domestic investment, the higher the level of domestic financial development. This means that the positive link between financial development and the effect capital inflows have on investment is mainly driven by debt inflows. FDI and equity inflows on the other hand do not have a significant effect on the level of domestic investment and the domestic level of financial development does not to affect the link between these two types of inflows and investment.

Although we find a significant positive effect of capital inflows in investment, that increases with the level of financial development, the size of the effect is not very large, especially for using the GMM estimation. An increase in ten percentage point in total inflows as a share of GDP leads to an increase of 2.8 to 5.5 percentage points in investment as a share of GDP.

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Figure 1: Average capital inflows into developing countries (% of GDP)



Figure 2: Average capital inflows into developing countries (% of GDP) - by type

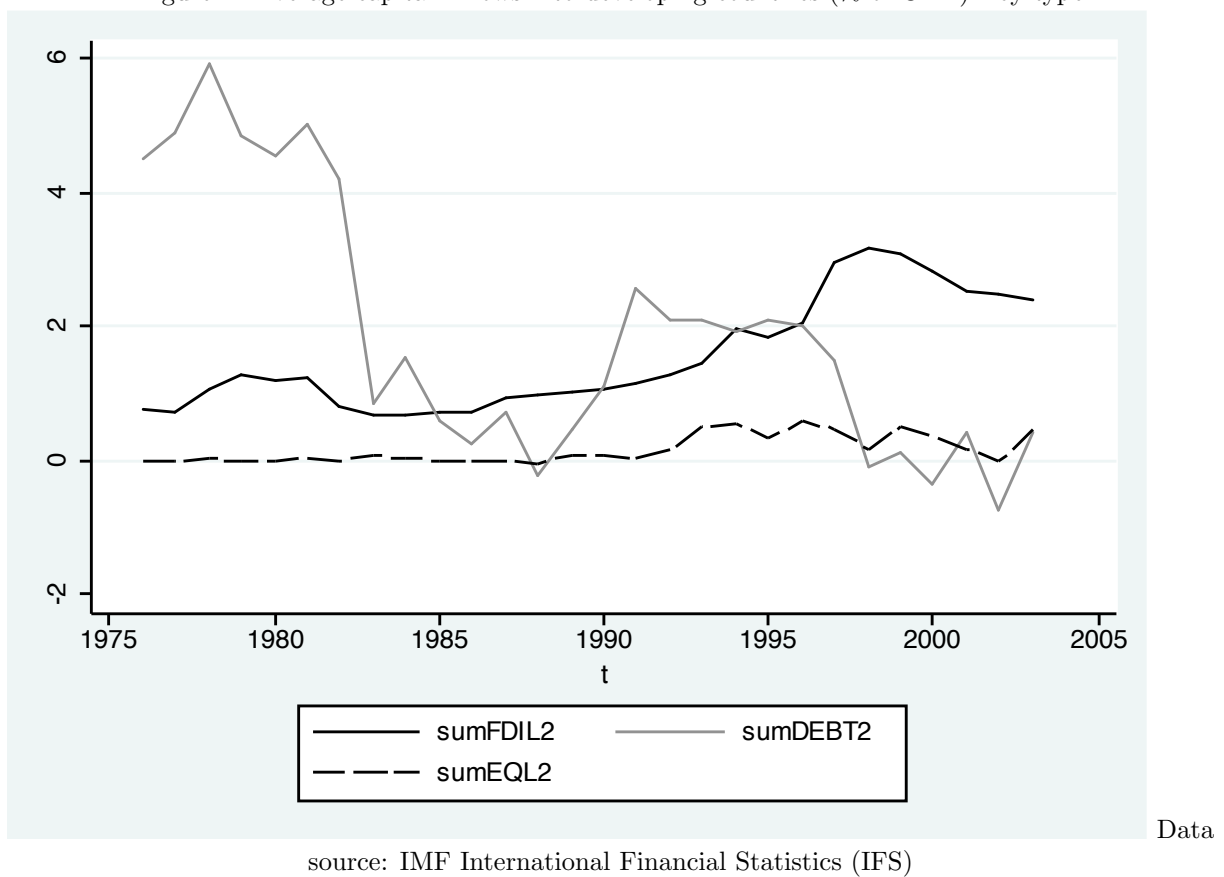


Table 1: Countries in the sample

Argentina	Ecuador	Morocco	Syrian Arab Republic
Bolivia	Egypt, Arab Rep.	Mexico	Thailand
Brazil	Guatemala	Mauritius	Trinidad and Tobago
Botswana	Indonesia	Malaysia	Tunisia
Chile	India	Oman	Turkey
Ctte d'Ivoire	Israel	Pakistan	Uruguay
Colombia	Jamaica	Peru	Venezuela, RB
Costa Rica	Jordan	Philippines	South Africa
Dominican Republic	Korea, Rep.	Paraguay	Zimbabwe
Algeria	Sri Lanka	El Salvador	

Table 2: Correlations between variables - yearly data 1976-2003

	ki	L.gdp	inflows	FDI	debt	equity	findev1	findev2	findev3
investment	1								
L.gdp	0.3	1							
inflows	0.28	0.16	1						
FDI	0.11	0.07	0.3	1					
debt	0.23	0.17	0.93	-0.05	1				
equity	0.17	0.05	0.15	0.04	0.03	1			
findev1	0.37	0.07	0.09	0.14	0.01	0.29	1		
findev2	0.44	0.08	0.06	0.14	-0.02	0.3	0.95	1	
findev3	0.16	0.02	0.03	0.12	-0.02	0.05	0.66	0.64	1

ki: Fixed investment as a % of GDP. findev1: Domestic credit to private sector % of GDP (WDI); findev2: private credit by deposit money banks % GDP (Beck, Demirguc-Kunt and Levine (2000)) ; findev3: liquid liabilities as a percentage % GDP (Beck, Demirguc-Kunt and Levine (2000)).

Table 3: OLS Fixed Effects Instrumental Variables: total inflow

	1	2	3
L.investment	0.62*** (0.04)	0.55*** (0.06)	0.55*** (0.07)
L.GDPgrowth	0.05** (0.03)	0.05 (0.03)	0.07** (0.03)
FLOW	0.20 (0.12)	0.18 (0.11)	0.11 (0.10)
findev1	-0.02* (0.01)		
FLOWfindev1	0.00 (0.00)		
findev2		-0.02** (0.01)	
FLOWfindev2		0.01* (0.00)	
findev3			-0.01 (0.01)
FLOWfindev3			0.01* (0.00)
Observations	959	862	861
R-squared	0.57	0.48	0.39
Number of C	40	39	39
Shea statistic			
flow	0.06	0.08	0.13
flow*findev	0.07	0.07	0.05
Underidentification test	0	0	0
Hansen J statistic	0.5	0.9	0.47

Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Time fixed effects are not included. Included instruments are the total pool of capital as a percentage of total GDP of the countries in the sample and US interest rate and these instruments interacted with a measure of financial development. findev1: Domestic credit to private sector % of GDP (WDI); findev2: private credit by deposit money banks % GDP (Beck, Demirguc-Kunt and Levine (2000)) ; findev3: liquid liabilities as a percentage % GDP (Beck, Demirguc-Kunt and Levine (2000)).

Table 4: OLS fixed effects instrumental variables: per type of inflow

	1	2	3
L.investment	0.60*** (0.05)	0.52*** (0.07)	0.55*** (0.08)
L.GDPgrowth	0.06* (0.03)	0.05 (0.04)	0.08*** (0.03)
FDIL	0.41 (0.39)	0.55 (0.59)	0.33 (0.62)
DEBT	0.13 (0.13)	0.18 (0.13)	0.24* (0.12)
EQL	-0.12 (0.97)	-0.51 (1.03)	-3.40* (1.84)
findev1	0.00 (0.02)		
FDILfindev1	-0.01 (0.01)		
DEBTfindev1	0.00* (0.00)		
EQLfindev1	0.02 (0.02)		
findev2		0.02 (0.03)	
FDILfindev2		-0.01 (0.02)	
DEBTfindev2		0.01* (0.00)	
EQLfindev2		0.02 (0.02)	
findev3			-0.01 (0.02)
FDILfindev3			-0.01 (0.02)
DEBTfindev3			0.00 (0.01)
EQLfindev3			0.10* (0.05)
Observations	959	862	861
R-squared	0.50	0.34	0.36
Number of C	40	39	39
Shea statistic			
FDIL	0.07	0.05	0.08
DEBT	0.07	0.09	0.15
EQL	0.1	0.11	0.13
FDIL*findev	0.06	0.04	0.05
DEBT*findev	0.09	0.09	0.04
EQL*findev	0.09	0.1	0.1
Underidentification test	0	0.03	0.24
Hansen J statistic	0.06	0.23	0.2

Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Time fixed effects are not included. Included instruments are the total pool of capital as a percentage of total GDP of the countries in the sample and US interest rate and these instruments interacted with a measure of financial development. findev1: Domestic credit to private sector % of GDP (WDI); findev2: private credit by deposit money banks % GDP (Beck, Demirguc-Kunt and Levine (2000)) ; findev3: liquid liabilities as a percentage % GDP (Beck, Demirguc-Kunt and Levine (2000)).

Table 5: Difference and system GMM, 4-year averages: total inflows

VARIABLES	1	2	3	4	5	6
L.investment	0.18 (0.13)	0.08 (0.16)	0.12 (0.12)	0.76*** (0.06)	0.73*** (0.06)	0.79*** (0.06)
L.GDPgrowth	0.11 (0.09)	0.12 (0.10)	0.11 (0.10)	0.23** (0.11)	0.23** (0.09)	0.16 (0.12)
FLOW	-0.06 (0.12)	-0.07 (0.13)	-0.06 (0.16)	-0.17 (0.12)	-0.04 (0.11)	-0.10 (0.17)
findev1	-0.07*** (0.02)			-0.03** (0.01)		
FLOWfindev1	0.01*** (0.00)			0.01*** (0.00)		
findev2		-0.06** (0.03)			-0.02 (0.02)	
FLOWfindev2		0.01*** (0.00)			0.01*** (0.00)	
findev3			-0.07*** (0.02)			-0.04*** (0.01)
FLOWfindev3			0.01*** (0.00)			0.01*** (0.00)
Observations	187	169	169	230	211	211
Number of c	40	39	39	40	39	39
Number of instruments	51	51	51	80	80	80
A-B test for AR(2)	0.42	0.47	0.43	0.43	0.57	0.57
Sargan test	0.03	0.01	0.01	0.01	0.01	0.01
Hansen test	0.86	0.93	0.96	1	1	1

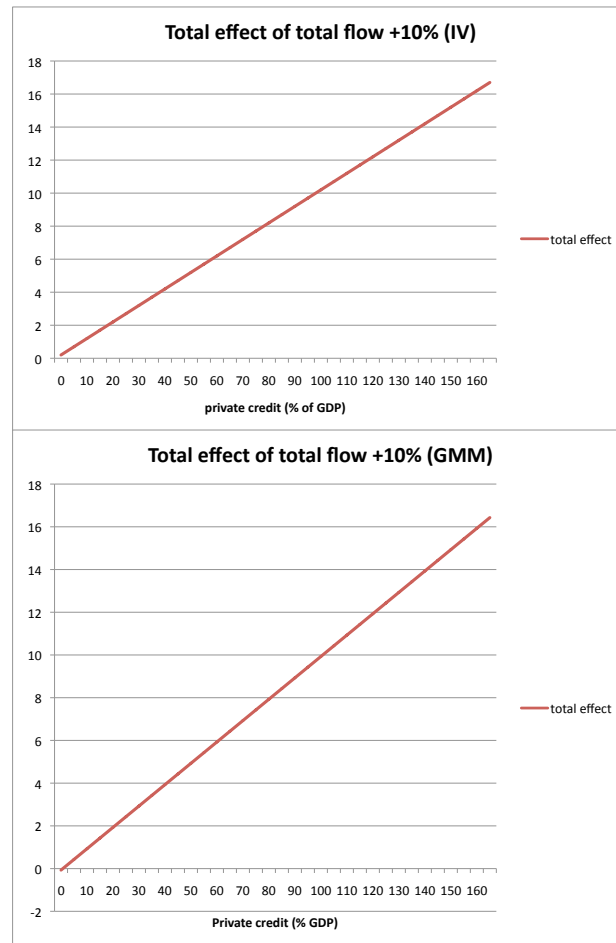
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Column 1-6 is based on difference GMM, column 7-12 is based on system GMM using Windmeijer finite-sample correction. findev1: Domestic credit to private sector % of GDP (WDI); findev2: private credit by deposit money banks % GDP (Beck, Demirguc-Kunt and Levine (2000)) ; findev3: liquid liabilities as a percentage % GDP (Beck, Demirguc-Kunt and Levine (2000)). Internal instrument lag 1 to 2 for L.Investment, L.gdp growth, findev, inflows and interactions between inflows and the different measures of financial development. External instruments: total pool of inflows % of GDP and US interest rate.

Table 6: Difference and system GMM, 4-year averages: per type of inflow

	1	2	3	4	5	6
L.investment	0.25* (0.14)	0.14 (0.15)	0.23* (0.12)	0.81*** (0.04)	0.82*** (0.05)	0.82*** (0.04)
L.GDPgrowth	0.13 (0.10)	0.14 (0.10)	0.14 (0.09)	0.28*** (0.10)	0.23** (0.09)	0.26*** (0.09)
FDIL	-0.27 (0.37)	-0.28 (0.37)	0.34 (0.64)	0.05 (0.35)	0.07 (0.54)	0.37 (0.37)
EQL	1.11 (1.12)	0.61 (0.88)	-0.02 (0.83)	3.55*** (0.66)	1.40 (1.52)	3.38*** (0.75)
DEBT	-0.11 (0.11)	-0.10 (0.11)	-0.07 (0.18)	-0.18 (0.18)	-0.28 (0.20)	-0.11 (0.16)
findev1	-0.08*** (0.02)			-0.03** (0.01)		
FDILfindev1	0.02** (0.01)			0.00 (0.01)		
EQLfindev1	-0.01 (0.01)			-0.02*** (0.01)		
DEBTfindev1	0.01*** (0.00)			0.01** (0.00)		
findev2		-0.04 (0.03)			-0.01 (0.02)	
FDILfindev2		0.01 (0.01)			-0.00 (0.01)	
EQLfindev2		-0.00 (0.01)			-0.02** (0.01)	
DEBTfindev2		0.01*** (0.00)			0.01** (0.00)	
findev3			-0.05*** (0.02)			-0.04 (0.03)
FDILfindev3			0.00 (0.01)			0.00 (0.01)
EQLfindev3			0.01 (0.01)			-0.00 (0.02)
DEBTfindev3			0.01** (0.00)			0.01*** (0.00)
Observations	187	169	169	230	211	211
Number of c	40	39	39	40	39	39
Number of instruments	91	91	91	144	144	144
A-B test for AR(2)	0.55	0.59	0.51	0.57	0.58	0.71
Sargan test	0.01	0.01	0.01	0.19	0.43	0.16
Hansen test	1	1	1	1	1	1

Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Column 1-6 used difference GMM, column 7-12 is based on system GMM using Windmeijer finite-sample correction. findev1: Domestic credit to private sector % of GDP (WDI); findev2: private credit by deposit money banks % GDP (Beck, Demirguc-Kunt and Levine (2000)) ; findev3: liquid liabilities as a percentage % GDP (Beck, Demirguc-Kunt and Levine (2000)). Internal instrument lag 1 to 2 for L.Investment, L.gdp growth, findev, inflows and interactions between inflows and the different measures of financial development. External instruments: total pool of inflows % of GDP and US interest rate.

Figure 3: Total effect of a 10% increase in total capital inflows in domestic fixed investment (as % of GDP)



Notes: Based on the estimation results using the second measure of financial development: private credit by deposit money banks % GDP (Beck, Demirguc-Kunt and Levine (2000)). GMM is difference GMM.

