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## Growing Up with Capital Flows

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**IMF Working Paper**

Research Department

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**Abstract**

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In a sample of 60 developing countries, we find evidence of a strong—almost one-to-one—relationship between capital inflows and domestic investment. However, this relationship has evolved over time. While growing financial integration with the rest of the world has increased access to foreign private capital, the relationship between foreign capital and domestic investment has weakened, reflecting changes in the composition of inflows, offsetting outflows, and increased foreign–currency reserve requirements. In contrast, better policies have not only brought in more capital but also, especially for foreign direct investment, have tended to strengthen the relationship between foreign capital and domestic investment.

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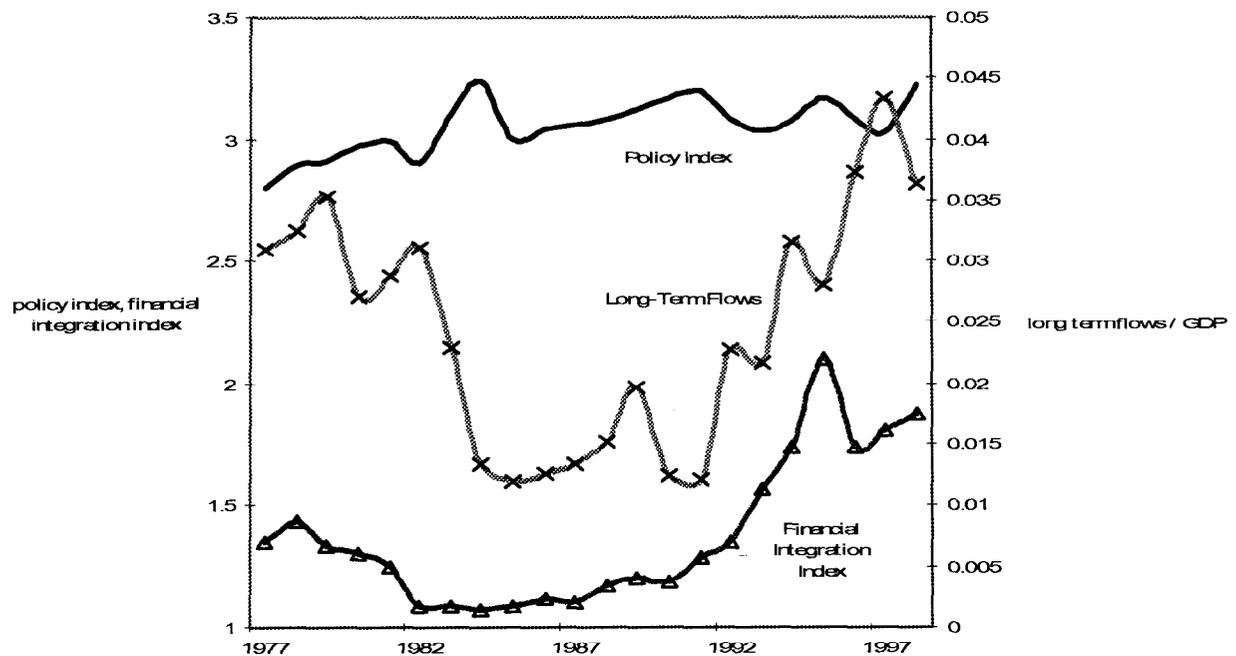
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## I. INTRODUCTION

As countries eased restrictions on external capital in the early 1990s (Figure 1), the boom in inflows was much celebrated as a source of funds and of ideas to accelerate development. But concerns arose early on with respect to possible adverse macroeconomic (inflationary and real exchange rate) consequences and a serious reconsideration followed as a series of international financial crises unfolded through the latter part of the decade. Moreover, since the surge in external private flows did not seem to result in commensurate growth (Easterly 2000), some questioned, more fundamentally, the longer-term benefits of capital flow liberalization (Grilli and Milesi-Ferretti, 1995 and Rodrik 1998). Thus a more tempered view has come to urge caution with respect to fully-fledged capital account liberalization (Bhagwati 1998).

**Figure 1. Financial Integration, Domestic Policies, and Long-Term Capital Inflows<sup>1</sup>**



<sup>1</sup>“Long-term flows” refers to gross long-term private capital flows (net of amortizations on principal repayment) to a sample of 60 developing countries (as a share of GDP). The policy index is the cross-sectional average of the World Bank’s Country Policy and Institutional Assessment (or CPIA) rating (see Section III of this paper). The financial integration index is based on four measures of the intensity of capital controls that are published in the IMF’s Annual Report on Exchange Arrangements and Exchange Restrictions (see Section III of this paper).

Yet, though the celebration may have been premature, is the present distrust of capital flows just another case of “overshooting?” Recent studies suggest that capital flows do stimulate growth, though important non-linearities and threshold effects characterize that

relationship.<sup>2</sup> Others have examined the preconditions for exploiting the benefits of capital inflows. Arteta et. al. (2001) find some evidence that capital account liberalization has a favorable effect on growth when macroeconomic stability has first been achieved. These studies clearly point to the need for a more nuanced analysis. In this paper, we attempt to provide further structure to the ongoing discussion.

Our results suggest that the flush of capital inflows in the 1990s was more a “push” into developing countries than a “pull” based on a significant unmet demand for investment financing. As a consequence, much of the new wave of inflows was diverted into alternative uses, a part of which (specifically, the accumulation of reserves) was a direct consequence of the inflows. However, a striking aspect of the 1990s experience was the large volume of capital outflows from the very same countries that received significant inflows. Thus, the observed marginal relationship between capital inflows and domestic investment fell even as countries liberalized to attract new flows. This may seem paradoxical because developing countries are, by definition, short of capital and alleviation of that constraint has been a long-standing goal of domestic and international policymakers. But the results of this paper imply either that the shortage of capital was not the problem, as in many countries of East Asia, or that the ability to absorb that capital was limited, particularly when faced with a rush of volatile flows. Clearly, however, the 1990s were a decade of transition—of growing up. Developing countries opened their doors wider to international flows. They now face the challenge of learning to handle and harness these flows. Stronger policy environments that raise the marginal product of the flows will likely lead to both more inflows and more productive uses.

In contrast to most studies that focus on capital inflows (or capital account liberalization) and *growth*, we follow Bosworth and Collins (1999) in examining the relationship between long-term foreign capital inflows and domestic investment. There are both substantive and econometric reasons for analyzing the impact on domestic investment. If an important element of underdevelopment is the scarcity of capital, then additional investment in developing countries has a high payoff (Lucas, 1990 and Summers, 2000). By easing restrictions on external flows, developing countries can hope to attract more international financing, which, if managed appropriately, can bolster investment and consequently growth. At the same time, the link between foreign capital inflows and domestic investment should, in principle, be easier to trace than the link between foreign flows and growth. Growth is influenced over a longer period of time and is likely to have strong feedback effects on foreign capital inflows, rendering the endogeneity problem difficult to resolve. In contrast, changes in investment are more immediate, allowing the use of higher frequency data and controls for endogeneity.

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<sup>2</sup> For instance, Blomstrom et. al. (1994), find that higher-income countries gain more from capital flows than poor countries, and similarly Edwards (2000) finds that measures of a country’s capital account liberalization are negligibly (or even negatively) related to growth in low-income countries but that the relationship turns positive as income levels increase. Borensztein et. al. (1998) conclude that FDI is positively associated with growth, but only where human capital is sufficiently high.

Our empirical findings are easily summarized. For 60 developing countries over the past two decades, a dollar of foreign capital inflow has, on average, been associated with just under an additional dollar of domestic investment. However, this relationship has evolved over time. As financial integration with the rest of the world has increased access to foreign private capital, the relationship between foreign capital and domestic investment has weakened, reflecting changes in the composition of inflows, offsetting outflows, and increased foreign currency reserve requirements. In contrast, better policies have not only brought in more capital but, especially for foreign direct investment, they have tended to strengthen the foreign capital-domestic investment relationship.

The composition of capital flows matters since their impact on domestic investment varies across different types flows. Bosworth and Collins (1999) find that an additional dollar of foreign direct investment (FDI) is associated with a significant increase in domestic investment, but an additional dollar of portfolio flows seems to have little or no impact. Our results support their findings. There are plausible reasons for this observed difference. FDI is typically undertaken with new (“greenfield”) projects in view whereas portfolio flows are associated with the objective of sourcing lower cost funds and/or to diversify risk and, hence, are likely to finance ongoing projects. The weakening, over time, of the relationship between aggregate capital flows and investment is consistent with an increase in the share of portfolio flows in long-term capital (Table 1). Note, though, that the share of FDI also increased in the 1990s, while “other” flows (that are in the nature of bank loans) lost share. Importantly, the character of FDI has changed over time. “Mergers and acquisitions”—as distinct from the traditional “greenfield” foreign investments—have become more prominent, implying that more of the foreign capital is being used to purchase assets rather than finance new investments.<sup>3</sup>

Table 1. Composition of Private Long-Term Flows, 1975–98

	Percent of Gross Long-Term Private Flows				
	75–79	80–84	85–89	90–94	95–98
FDI	18	19	49	48	55
Loans	63	62	17	7	15
Portfolio	5	4	11	38	29
Other	14	15	23	7	0

Source: World Bank, *Global Development Finance*, 2001

For some countries, the changing composition of external capital flows reflected greater financial integration with the rest of the world. However financial integration appears to have influenced the capital flows-investment relationship independently of its

<sup>3</sup> For instance, Mody and Negishi (2001), report sharp increases in cross-border M&A in East Asia between 1996 and 2000; a reflection of recent trends in foreign-entry into the service sector. As a consequence, mergers and acquisitions have accounted for an increasing share of foreign direct investment flows to East Asia, rising from 6 percent in 1995 to 30 percent by 1999.

implications for the composition of flows (Feldstein 1994, Mishra et. al. 2001). Where restrictions on capital mobility exist, the level of domestic investment is constrained by available savings. An inflow of foreign capital relaxes this constraint and hence allows an increase in the level of domestic investment (Figure 2). By contrast, in a world of perfect capital mobility, countries will face a perfectly elastic supply curve for capital. As such, capital will play an accommodating role, responding to shifts in the demand for investment (Figure 2). Hence when gross capital inflows are not pulled in through changing demand conditions, foreign capital that enters will be directed into alternative uses, such as reserves-accumulation, or offset by capital outflows, consequently weakening the relationship between gross capital inflows and investment.<sup>4</sup>

Unrestricted capital movement entails that individual firms may continue to undertake cross-border investments based on their economic and strategic goals, however the “macroeconomic general equilibrium,” in Feldstein’s (1994) terms, would adjust in the high capital mobility world to one guided by risk-adjusted returns. It is, of course, possible that opportunities abound to such an extent that both foreign and domestic investors find profitable ventures within the country—and, as suggested above, the presumption has been that underdevelopment implies the existence of these unbounded opportunities. Whether, in fact, this has been the case is the empirical question that we examine.

Between 1990 and 1994, when the first rush of private capital flows led to a doubling of inflows relative to the previous five-year period (Table 2), the increase in reserves was more than eight times that in the previous period—about 25 percent of the gross inflows between 1990 and 1994 were used to augment foreign currency reserves.<sup>5</sup> Between 1995 and 1998, the increase in reserves remained high and, in addition, there was a large increase in capital “outflows.”<sup>6</sup> Thus, almost three-quarters of gross inflows between 1995 and 1998 were used either to augment reserves or were not deployed within the country. It appears, therefore, that private inflows in the 1990s, especially in the second half, were considerably in excess of domestic investment capacity.

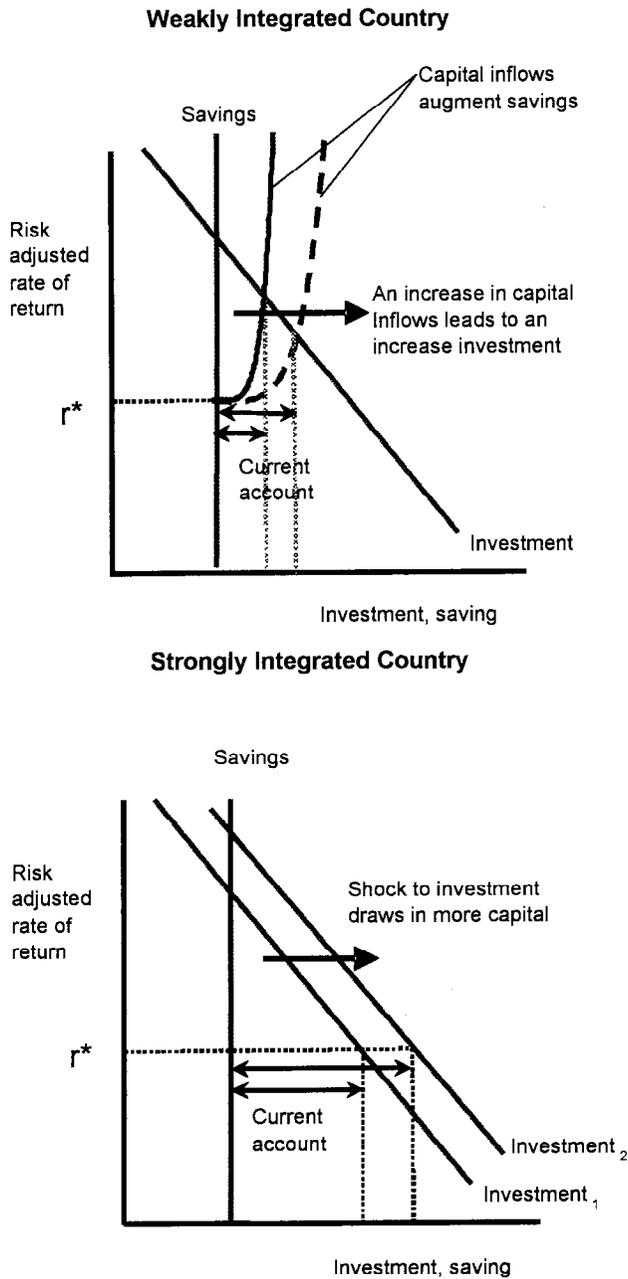
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<sup>4</sup> Although the link between foreign capital and domestic investment may weaken as capital mobility increases, the nature of the investment (and hence implications for growth) is also likely to evolve. Obstfeld (1994) argues that greater capital mobility allows for greater risk sharing and hence permits a shift from low risk, low return, to higher risk, higher return activities. This shift, in turn, raises growth prospects. Thus, while a unit of foreign capital may do less for raising the level of investment, it may change the composition of investment with significant long-term benefits. Some, however, would argue that the higher risk investments might not be growth enhancing where the “risk” can be transferred to governments through implicit guarantees.

<sup>5</sup> With more integration, capital flow volatility also becomes more of a factor in the management of domestic economies (see, for example, Feldstein 1998, and Reinhart and Reinhart 2001).

<sup>6</sup> “Outflows” include errors and omissions.

Figure 2. Capital Flows-Investment Relationship and Financial Integration



Partially offsetting these trends in composition and use of foreign capital, developing countries experienced a general improvement in their economic institutions and policies. Higher quality domestic policies—as also the increase in literacy rates, the development of competitive markets, and numerous other structural changes—create the potential for more rapid growth. These changes affect the capital flows-investment relationship. Borensztein et. al. (1998) emphasize the role of human capital in enhancing the relationships between foreign direct investment and domestic investment and growth. Studies that have found a strong association between financial sector depth and growth

(King and Levine 1993; Beck et. al. 2000) also imply that financial sector deepening may bolster the impact of certain types of flows. As we argue in this paper, broadly defined improvements in policy—implied by greater macroeconomic stability, low government deficits, and structural policies aimed at promoting higher growth—can reinforce the relationship between capital flows, in particular FDI, and investment. Between 1977 and 1999, in our sample of 60 developing countries, the World Bank’s country policy institutional assessment (CPIA) rating of developing countries increased from an average value of 2.8 to 3.22 (Figure 1). Where such policy improvements occurred, our results show that more capital was attracted and such capital was associated with greater incremental domestic investments.

Table 2. Sources and Uses of Foreign Capital, 1978–98 (\$ billion)<sup>1</sup>

	1978–79	1980–84	1985–89	1990–94	1995–98
Source of funds	81.9	93.8	83.5	195.0	330.9
Net long-term resource flows	67.0	82.7	71.6	163.6	311.3
Net short-term resource flows	14.9	11.1	11.9	31.4	19.6
Use of funds	81.9	93.8	83.5	195.0	330.9
Current account deficit	26.9	49.1	40.2	81.5	93.5
Change in reserves	26.7	-6.0	6.0	48.6	69.3
Capital outflows and E&O	28.4	50.7	37.2	64.9	168.1

Source: World Bank, *Global Development Finance*, 2001

<sup>1</sup>Although data on capital flows are available from 1975, data on the current account and change in reserves are not available prior to 1978.

The remainder of this paper is organized as follows. In Section II, we briefly review the relevant empirical literature and highlight the main econometric pitfalls that are intrinsic to such analyses. In particular, we emphasize issues relating to endogeneity and omitted variables bias in cross-country studies and dynamics and slope heterogeneity in panel regressions. In Section III, we describe the data. In Section IV, we discuss the results of the first stage regressions for the determinants of capital flows; these then also provide us with the instruments needed for dealing with endogeneity. In Section V, we first present the base regressions characterizing the relationship between the various components of long-term capital flows (FDI, bank lending, and portfolio flows) and domestic investment. We then examine cross-regional differences and over-time variations. In addition, we consider an “augmented” model to help explain the regional and inter-temporal heterogeneity, by interacting capital inflows with the degree of a country’s openness and the quality of its policy environment. In Section VI, we discuss the robustness of our findings. Finally, in Section VII, we summarize and interpret this evidence.

## II. THE PITFALLS OF EMPIRICAL ANALYSIS: A REVIEW OF THE RECENT LITERATURE

Several studies have investigated the impact of capital flows on investment and growth but these have differed in the empirical approach adopted. For instance, Borensztein et. al. (1998) and Gruben and McLeod (1998) focus on the cross-sectional variation, i.e., the differences across countries, while Bosworth and Collins (1999) and Carkovic and Levine (2000) use panel data to examine the within-country time-series variation.<sup>7</sup> Of these Gruben and McLeod (1998), Bosworth and Collins (1999) and Carkovic and Levine (2000) use instrumental variables estimators, with differing degrees of success.

The differing methodologies adopted reflect the differing objectives of the research. For instance, by taking averages over twenty-year windows, Borensztein et. al. (1998) are able to explore the long-run implications of capital flows for investment and growth. By contrast, Bosworth and Collins (1999) and Gruben and McLeod (1998) use annual data, and it is therefore unclear to what extent we can extrapolate their findings to draw conclusions as to the role of capital flows in supporting higher long-run growth.

The decision to rely on annual data reflects the endogeneity of capital flows. The two-way relationship between capital inflows and domestic investment (or growth), implies that estimates of the regression coefficients may be biased. In such situations, researchers have often relied on the persistence of capital flows and have used lagged values to construct appropriate instruments (Gruben and McLeod 1998, Bosworth and Collins 1999, Carkovic and Levine 2000). Lagged values of capital flows will not provide a satisfactory instrument when the analysis centers on average trends over, say, ten-year windows. That is, where the assumption that year-to-year capital flows are somewhat persistent is uncontroversial, it is not clear that the average value of capital flowing to a country in the 1970s, will be a good predictor of the volume of flows it received in the 1980s.<sup>8</sup>

Moving to higher frequency data may improve the quality of our instruments however lagged values cannot account for contemporaneous shocks to variables. To resolve this issue researchers have, on occasion, turned to variables that are associated with the

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<sup>7</sup> Another recent study by Greene (2002) utilizes fixed-effects regressions to examine the effect of capital flows reversals on investment. The results of that study suggest a positive short-term relationship between private capital flows and investment. In addition, Greene finds private capital flows and investment to be co-integrated, suggesting the possibility of a long-term relationship as well.

<sup>8</sup> Another very different approach has sidestepped the endogeneity issue altogether by focusing, not on the impact of capital flows on investment or growth, but on the impact of capital account liberalization instead (e.g., Grilli and Milesi-Ferretti 1995, Rodrik 1998, Edwards 2000, and Eichengreen and Arteta 2001). Although such analyses are less susceptible to endogeneity, they are silent as to the magnitude of the impact that capital flows have on various macroeconomic aggregates, such as investment.

supply of capital to developing countries as a whole. For instance, Calvo et. al. (1993) use U.S. interest rates in this capacity. U.S. interest rates are a good instrument, since they predict movements in the supply of capital to developing countries, but are largely exogenous to developments within these countries.

The approach taken by Bosworth and Collins (1999), who focus on aggregate gross flows to developing countries themselves, is more direct, and therefore likely to offer sharper estimates. However, this approach implicitly assumes that shocks to the supply of capital are positively correlated across countries, but shocks to the demand for capital are uncorrelated across countries. This is a reasonable assumption, except perhaps during crisis-episodes, when total capital flowing to developing countries may be demand-driven. During these periods, a common pattern across developing countries would be a downturn in investment, which will be met with a fall in total flows. These negative shocks to investment will be correlated with the reduction in capital flows and thus the plausibility of total flows as an instrument may be brought into question. However, some sensitivity analysis conducted for the World Bank's *Global Development Finance (2001)*, implied that crisis-episodes were not a significant contaminant, which were leveraging the observed relationships between capital flows and investment.

There have been significant differences across studies in the manner in which the data has been utilized. In order to shed light on the role of FDI in promoting growth and understand how this relationship is conditioned by the level of human capital, Borensztein et. al. (1998), focus on the cross-sectional variation in the data. Whereas, such interactions can be analyzed within a panel framework, it is more natural to examine these cross-sectional interactions using pooled data. Others, such as Bosworth and Collins (1999), have focused on the within-country relationships. They argue that since the question of interest is the within-country impact of an additional dollar of capital flows, the fixed-effects panel regression framework is the more natural way to proceed.

However, the decision to use pooled data or panel data may be based on statistical considerations. For instance, as Bosworth and Collins (1999) correctly note, cross-sectional studies necessarily place a considerable burden on their control variables. Important omitted variables can significantly bias the results, if the omissions are correlated with the regressors in the model. This has often been the guiding consideration that motivated the estimation of fixed effects panel regressions, for instance in the growth literature (Knight et. al., 1993, Islam 1995).

However, the panel approach has its own drawbacks. A panel regression eliminates, of course, cross-sectional information. Moreover, the standard fixed-effects model assumes homogeneous slope coefficients (i.e., the coefficients are assumed to be same across countries). When this assumption is violated, in a non-random fashion, such that the slope coefficient varies systematically with the regressors, the estimated coefficients are biased (see Pesaran and Smith 1995, Haque and others, 1999). In addition, macro-variables display considerable persistence. If the model is misspecified in the sense that it does not allow for any dynamics, the slope estimates could be biased (see, again, Pesaran and Shin 1999, Haque and others, 1999). It becomes increasingly important to allow for these dynamics as we move to data of higher frequencies.

Significant serial correlation in the annual domestic investment data would have required incorporating dynamics in the estimating equation by including lagged values of domestic investment as explanatory variables. However, correlation between the instruments for capital flows and the lagged dependent variable made it difficult then to obtain precise estimates of the investment-capital flows relationship. Thus, in allowing for dynamics, whilst also correcting for endogeneity, we were in effect making an unreasonable set of demands on the data. Based on these considerations, we chose to run the regressions using three-year averages. The use of the three-year averages largely sidestepped the issues arising on account of serial correlation but, by removing much of the time series variation in the data, offered a solution at the cost of some efficiency.<sup>9</sup> On the issue of slope heterogeneity, as we report in our discussion of sensitivity tests in Section VI, the mean-group estimator leads to qualitatively similar results. However, we deal more directly with the possibility of differences in slope coefficients by presenting results for different regions, within which we expect greater homogeneity.

### III. DATA

Our data consists of a balanced panel of 60 countries observed at an annual frequency over a period from 1977 to 1998. Allowing for lags in variables, this makes available 1260 observations. The period and coverage of our study reflects various constraints on data availability. Although data on capital flows were available for some countries as early as 1970 and for as many as 94 countries going back to 1976, the addition of various controls, such as the domestic interest rates, decreased the country coverage. Moreover, our measure of policy was available only starting in 1977.

The data on investment corresponds to gross domestic fixed capital formation, normalized by GDP. The capital flows data—all long-term capital flows and the components of long-term flows: foreign direct investment, commercial bank loans, portfolio flows—are reported in the World Bank's *Global Development Finance* on a gross basis, though net of amortizations on account of principal repayment. For the purposes of the regression analyses, we normalize capital flows by country GDPs. Table 3 reports the mean and standard deviation along with a brief description of the variables used in the analysis. Details on the sources of these data are provided in the data appendix.

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<sup>9</sup> Moreover, independently of issues arising through multicollinearity, the standard fixed effects estimator is biased when lagged dependent variables are included in the specification (see Nickell 1981, and Anderson and Hsiao, 1982), although the size of this bias decreases with the number of time periods.

Table 3. Descriptive Statistics

	Mean	Std. Dev.	Description
Investment	0.21	0.08	Gross domestic fixed capital formation/GDP
Growth rate	0.03	0.05	Change in log GDP.
Change in terms of trade	-1.15	17.43	The change in net barter terms of trade (base year 1995 = 100)
Crisis dummy	0.09	0.28	The crisis-dummy, obtained from Gupta et. al. (2000), is based on a review of various chronologies of financial crises in the recent literature.
Real interest rate <sup>1</sup>	-0.05	4.24	Nominal interest rate - rate of inflation
Financial depth	0.32	0.19	M2/GDP
Policy	3.05	0.86	World Bank's Country Policy Institutional Assessment (CPIA) Index
Financial integration	1.37	0.70	Constructed as the sum of four dummy variables characterizing the degree of openness of a country's capital account, current account, the stringency of requirements for the repatriation and/or surrender of export proceeds, and the existence of multiple exchange rates for capital account transactions.
Long-term flows	0.02	0.04	(FDI + loans + portfolio flows + other long-term flows)/GDP
FDI	0.02	0.03	FDI/GDP
Loans	4.5E-03	0.02	Loans/GDP
Portfolio	2.4E-03	0.01	(Bond + Equity)/GDP

Source: *Global Development Finance, World Development Indicators, International Financial Statistics, Exchange Arrangements and Agreements*. For details, see Appendix I.

<sup>1</sup>Three outliers removed.

Three of the variables, namely the measures of policy, financial integration, and financial depth, deserve additional explanation. The measure of policy we use is the World Bank's Country Policy Institutional Assessment (CPIA) Index. The overall rating is based on ratings obtained for 20 indicators that capture the quality of policies aimed at economic management, structural reform, social inclusion and public sector management. This variable has been used in recent studies such as Collier and Dollar (1999).

The financial integration index was constructed using four dummy variables that characterize: (a) the openness of a country's 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. For each variable a one indicates a relatively open regime and a zero otherwise.<sup>10</sup> Thus our measure of financial integration can take values between zero and four, where a zero indicates that a country has closed capital and current accounts, places restrictions on its export receipts and further operates a system of multiple exchange rates, while a value of four is indicative of an open regime.

<sup>10</sup> This is the opposite of the convention sometimes used of treating a one as a restriction and a zero as the lack of restrictions.

Our index of financial integration was first introduced in a systematic dataset by Grilli and Milesi-Ferretti (1995) and is an attempt to deal with the constraints in measuring the degree of financial integration (see Eichengreen 2000 for a discussion of these measures). Two key problems arise. First, until recently, the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* reported openness of the capital account as a zero or one variable and, as such, a measure of the *degree* of a country's openness was not available. Second, where capital controls do exist, they can be avoided through current account transactions and, as such, consideration of restrictions on the current account and other restrictions is necessary to measure the effectiveness of the controls. Combining these four measures is thus a compromise to get a graded overall index of a country's financial integration with the rest of the world. Quinn (1997) has also constructed a continuous measure of capital controls based on the details provided in the IMF publication. However, this index is available only for a few years. Moreover, Chinn (2001) regresses the Quinn index on the four measures and finds that they explain 71 percent of the variation in that index. Thus, it seems reasonable at this point in time that the measure used for this paper is about the best available.

An important change occurred in the measurement of the intensity of controls on the capital account starting in 1996. Instead of presenting only a dummy variable, the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* stopped reporting the summary measure and started presenting details on several aspects of the capital account, permitting, in principle, a more finely grained measure taking values between 0 and 1. Though this is a superior alternative, it does result in a discontinuity in the series. It is, moreover, the case that in 1996 the average value of the financial integration index shows a marked decline (Figure 1). However, closer scrutiny reveals that this drop in financial integration is driven not by the capital accounts measure but almost entirely by a sharp decrease in the current account transactions measure, which had earlier risen sharply in 1995. Sensitivity analyses, where we truncate the data at 1995, prior to when the break in the financial integration index occurred, did not appreciably affect any of our main results.

Our proxy for financial depth, the ratio of M2, or liquid liabilities, to GDP, has traditionally been used in this capacity (see Goldsmith 1975, King and Levine 1993, Beck et. al. 2000), since it provides a measure of the size of the financial sector relative to the size of the economy, and therefore is an indicator of the development of the financial sector. However, this measure has some drawbacks. In part, because it is not always the case that the size and development of the financial sector will be positively related, as increases in the size of the financial sector need not necessarily imply an improvement in the provision of financial services. But also because the usefulness of this variable is compromised when countries experience lending booms and the outstanding liabilities of the banking sector increase.

#### IV. THE DETERMINANTS OF CAPITAL FLOWS

In this section, we present the results from our first stage regressions, which are used in the construction of instruments for the various types of capital flows. These results, however, are of independent interest as they cast light on the determinants of capital

flows to developing countries. The results (Table 4) show that long-term capital flows in the aggregate are persistent, though the degree of persistence varies by the type of flow. The higher coefficient on the lagged value of FDI implies that FDI is more persistent than portfolio flows and especially more so than bank loans.<sup>11</sup>

Table 4. Determinants of Capital Flows, 1981–98

Method: OLS; Regression:	(1)	(2)	(3)	(4)
Dependent Variable:	Long-term Flows	FDI	Bank Loans	Portfolio Flows
Capital flows, lagged <sup>1</sup>	0.1771 (2.85)	0.4102 (7.35)	0.0064 (0.11)	0.2076 (3.19)
Flows to Developing Countries <sup>2</sup>	-1.2083 (-2.21)	-0.1753 (-0.23)	-1.2722 (-2.04)	-1.3142 (-5.08)
Growth, lagged	0.1016 (1.97)	0.0411 (1.06)	0.0275 (1.17)	0.0126 (1.13)
Change in terms of trade	-0.0001 (-0.66)	0.0001 (0.86)	-0.0001 (-1.38)	-0.000 (-0.16)
Crisis, lagged	0.0019 (0.16)	-0.0095 (-1.18)	-0.0055 (-1.19)	-0.0014 (-0.64)
M2/Y, lagged	-0.0445 (-1.88)	0.0408 (2.21)	-0.0153 (-1.47)	0.0044 (0.83)
Financial integration	0.0035 (0.78)	0.0038 (1.21)	-0.0036 (-2.72)	0.0009 (1.23)
Policy, lagged	-0.0062 (-1.38)	-0.0016 (-0.50)	-0.0008 (-0.45)	-0.0016 (-2.44)
(Crisis*Capital flows <sup>1</sup> ), lagged	-0.2193 (-0.64)	1.5528 (7.99)	0.1455 (0.66)	-0.1576 (-0.51)
Financial integration*Flows to developing countries <sup>2</sup>	0.0286 (0.22)	-0.0402 (-0.22)	0.6542 (3.66)	0.1343 (2.16)
Policy lagged*Flows to developing countries <sup>2</sup>	0.5581 (3.17)	0.1945 (0.78)	0.4232 (2.17)	0.4897 (5.94)
R-squared	0.52	0.72	0.42	0.61
Durbin-Watson statistic	1.99	1.98	1.90	2.00
Number of observations	360	360	360	360

<sup>1</sup>The variable “capital flows, lagged” refers to long-term flows in regression (1), to FDI in regression (2), to bank loans in regression (3), and to portfolio flows in regression (4).

<sup>2</sup>The variable “flows to developing countries” refers to aggregate long-term flows in regression (1), to FDI in regression (2), to bank loans in regression (3), and to portfolio flows in regression (4).

<sup>11</sup> For earlier evidence on the persistence of FDI, see Wheeler and Mody (1992) and Mody and Srinivasan (1998). Also, Sarno and Taylor (1999) show FDI to be less volatile than loans and portfolio flows.

The coefficient on the crisis dummy is typically negative, though not significant at conventional levels. Note, however, that the interaction between FDI and the crisis variable is positive and highly significant. Thus, following a crisis, FDI flows become even more persistent. The implication of this result seems to be that while the amount of FDI entering a country may decline in the aftermath of a crisis, the decrease, expressed as a fraction of previous years inflows, will be lower in countries that have historically received large inflows of FDI. With annual data (results not shown here), we see, in addition, a negative and significant interaction between debt flows and the crisis dummy, which suggests that the volatility of both loans and portfolio flows increases during a financial crisis consistent with the recent experience when portfolio flows were often quick to reverse during periods of financial instability. However, in many instances, these flows were also quick to rebound, which may explain the weaker associations between flows and the crisis variable that we observe in the three-year data.

Although the coefficient on the financial integration variable is positive for long-term flows, FDI, and portfolio flows, it is never significant and hence there is only a weak indication that capital account liberalization can “pull in” more flows, independently of developments that affect the supply of capital flowing to developing countries as a group. For loans and portfolio flows, the interaction of the index of financial integration with the respective aggregate flow to all developing countries is positive and significant, implying that greater financial liberalization increases the chances of a country receiving more foreign loans or portfolio investment. By contrast, the interaction between FDI flows to developing countries and financial integration is insignificant, suggesting that greater financial integration does not affect a country’s chance of receiving more FDI.

Our findings indicate that better policies will typically improve a country’s access to flows. However, as with greater financial integration, better policies will increase a country’s share of total flows received by developing countries. This finding holds for long-term flows in aggregate, and also for loans and portfolio flows, though not for foreign direct investment. Thus, our evidence suggests that developing countries typically lack the pulling power to attract additional flows; however, capital will react positively to increased openness and improvements in policy when outflows from developed countries increase.

In addition, we find long-term flows in aggregate are pro-cyclical. There is also a weak indication of such a pattern across each type of flow. Also, capital flows are largely unresponsive to terms of trade shocks over the medium term, although there is some suggestion that the quantity of loans may decline following an improvement in the terms of trade.

## **V. THE IMPACT OF CAPITAL FLOWS ON DOMESTIC INVESTMENT**

As noted above, we focus on the medium-to long-term relationships between capital flows and investment, reporting the regressions based on three-year averages of the data. The discussion in this section proceeds in three steps. First, we report a baseline model using the three-year data. In addition to analyzing the impact of long-term flows in general, we consider the relationship between the various components of long-term flows

and investment. Second, we examine the heterogeneity in coefficients both across regions and over time. Finally, we report the results from an augmented model, which allows the coefficient on capital flows to be a function of the level of financial integration and domestic policies.

### A. Implications of the Composition of Capital Flows

Table 5 presents fixed-effects panel regressions of domestic investment against aggregate long-term flows using the three-year averages.<sup>12</sup> In column (1), the results imply a strong relationship between long-term capital flows and investment. Specifically, a one percent increase in capital flows accounts for a 0.94 percent increase in domestic investment.

In columns (2) to (4), we consider the impact of the various components of long-term flows—foreign direct investment, bank loans, and portfolio flows—on investment. We find that each type of flow is associated with investment, however to varying degrees. We find, as do Bosworth and Collins (1999), evidence of a strong link between FDI and investment: an additional dollar of FDI is associated with a 73-cent increase in domestic investment. In contrast, each additional dollar of loans raises investment by approximately 62 cents, which compares to a figure of 59 cents for portfolio flows. For both loans and portfolio flows, the coefficients are not significant. While in some specifications, the relationship between domestic investment and foreign loans is significant, the relationship with portfolio flows is typically insignificant.

Some of the other determinants of investment are worth noting. We find that investment, as well as being pro-cyclical, is positively influenced by financial market development. Further, the evidence suggests a negative relationship between investment and the change in net barter terms of trade, which contrasts with the findings in Serven and Solimano (1993). Our findings do not suggest any evidence of a significant relationship between the real interest rate and investment. Note that in this specification, the policy variable is not significant and the financial integration index has a negative sign, implying that greater financial integration is associated with *less* investment. However, as we discuss below, there are important non-linearities in these effects.

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<sup>12</sup> A weighted two stage least squares estimator, which allowed for group-heteroscedasticity, yielded similar results to those reported in Table 5. A test of over-identifying restrictions was used to test the joint-exogeneity of our matrix of instruments. Using only the lagged values of capital flows as an instrument, we first estimated the errors in the capital flows-investment relationship; these errors were then regressed against our matrix of instruments and the uncentered R-squared from this regression was used to construct the appropriate chi-square test. These tests confirmed the validity of our instruments.

Table 5. Impact of Long-Term Flows on Domestic Investment, 1981–98

Dependent Variable: Domestic Investment; Method: Instrumental Variables				
Regression:	(1)	(2)	(3)	(4)
	LTC <sup>1</sup>	FDI	Loans	Portfolio Flows
Capital Flows <sup>2</sup>	0.9376 (2.94)	0.7272 (4.68)	0.6151 (1.37)	0.5947 (0.85)
All Other Long-Term Flows		0.789 (3.54)	0.941 (4.14)	0.8936 (3.03)
Average Growth rate, lagged	0.2904 (3.01)	0.2719 (3.79)	0.2534 (3.31)	0.2605 (3.39)
Change in terms of trade	-0.0004 (-1.28)	-0.0004 (-1.57)	-0.0005 (-1.67)	-0.0004 (-1.49)
Crisis	-0.0094 (-0.63)	0.0008 (0.06)	-0.0015 (-0.11)	-0.0004 (-0.03)
Real interest rate, lagged	-0.0000 (-0.04)	-0.0001 (-0.15)	-0.0002 (-0.23)	-0.0002 (-0.29)
M2/Y, lagged	0.0898 (2.27)	0.0667 (1.96)	0.0549 (1.59)	0.0711 (1.76)
Integration	-0.006 (-1.30)	-0.0059 (-1.91)	-0.0077 (-2.16)	-0.006 (-1.62)
Policy, lagged	0.0035 (0.81)	0.0035 (0.92)	0.0027 (0.66)	0.002 (0.41)
R-squared	0.84	0.84	0.82	0.82
Durbin-Watson statistic	1.78	1.62	1.67	1.63

<sup>1</sup>LTC stands for Long-Term Capital Inflow.

<sup>2</sup>The variable “capital flows” refers to long-term flows in regression (1), to FDI in regression (2), to bank loans in regression (3) and to portfolio flows in regression (4).

## B. Cross-Sectional and Over-Time Variation in the Impact of Capital Flows

To what extent does the capital flows-investment relationship vary across regions and over time? We begin by focusing on the cross-sectional heterogeneity. We estimate a separate regression for four regions covered in our sample. These include East Asia and the Pacific (EAP), Latin America and the Caribbean (LAC), South Asia (SA) and Sub-Saharan Africa (SSA). We also estimate a separate regression for a sample of countries that includes the SSA countries and countries from the Middle East and North Africa (MENA) region.<sup>13</sup> The results from these regressions are reported in columns (1) to (5) of Table 6.

<sup>13</sup> Due to the small number of cross-sections from the Middle East and North Africa (MENA) region, we combine the MENA countries, in our sample, with the Sub-Saharan African (SSA) nations.

The evidence of procyclicality of investment is strong for EAP, LAC, and SA, but not for SSA and MENA. As in the full sample, crises are not seen to be associated with a fall in investment rates (other than the fall already explained by the slowdown in growth), and neither are higher interest rates associated with lower investment, except in SA. Better policy can increase investment, though this relationship seems to be important only in the LAC region, which is also the region where the CPIA index shows the greatest variation over the sample period (Table 7).

Table 6. Capital Flows-Investment Relationship, Across Regions and Over Time

Dependent Variable: Investment; Method: Instrumental Variables							
Regression:	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)
	EAP	LAC	SA	SSA	SSA+MENA	1980-89	1990-98
Long-term capital flows	0.2399 (0.76)	0.3389 (1.86)	0.7601 (1.79)	0.929 (2.41)	1.119 (2.47)	1.1027 (6.34)	0.3035 (2.53)
Average growth rate, lagged	0.8457 (3.15)	0.3647 (3.36)	0.3333 (1.83)	0.084 (0.67)	0.1802 (1.46)	0.1783 (3.35)	0.2626 (6.24)
Change in terms of trade	-0.0039 (-1.82)	-0.0001 (-0.24)	-0.0003 (-0.68)	-0.0003 (-0.74)	-0.0005 (-1.17)	-0.0005 (-3.15)	0 (-0.17)
Crisis	-0.002 (-0.03)	0.0265 (1.55)	0.0348 (1.17)	-0.0059 (-0.26)	-0.0066 (-0.28)	0.0055 (0.66)	0.0234 (2.99)
Real interest rate, lagged	-0.1216 (-0.58)	0.0003 (0.52)	-0.1577 (-2.08)	0.0072 (0.21)	0.0095 (0.26)	-0.0003 (-0.47)	-0.0005 (-0.97)
M2/Y, lagged	0.1628 (2.05)	-0.0109 (-0.25)	0.1133 (1.18)	0.0445 (0.60)	0.085 (1.34)	0.0605 (2.24)	0.0548 (2.75)
Integration	-0.0041 (-0.29)	-0.0024 (-0.59)	0.0113 (1.86)	-0.0067 (-1.08)	-0.0079 (-1.29)	-0.006 (-2.46)	-0.0027 (-1.61)
Policy, lagged	0.0044 (0.22)	0.0103 (2.24)	-0.0008 (-0.09)	0.008 (1.13)	0.0009 (0.12)	0.0025 (1.33)	0.0124 (4.39)
R-squared	0.85	0.86	0.90	0.82	0.78	0.79	0.88
Durbin-Watson Statistic	2.25	1.70	1.57	1.72	1.81	1.60	1.51

There is evidence of significant heterogeneity across regions in the investment-capital flow relationship. The marginal impact of long-term flows on investment is seen to be strongest in the SA (column 3) and SSA (column 4) regions, as well as the SSA+MENA region (column 5). Capital flows have the weakest impact in the EAP region (column 1), where each additional dollar of capital raises investment by approximately 24 cents. The impact of flows going to the LAC region (column 2) is similarly weak.

These regional differences may reflect various influences. First, differences in the allocation of foreign capital to its various competing uses (investment, consumption, reserves accumulation, and outflows) are likely to have a strong bearing on the impact of flows. In the LAC region, where capital flows have often financed higher consumption, the marginal impact of flows on investment is likely to be smaller. Moreover, while both East Asia and Latin America have received the lion's share of capital flows to developing countries, this has come at the cost of increased volatility, necessitating the need for a larger cushion of reserves to cope with this added volatility. Thus, increasingly, capital flows have financed more reserves-accumulation in countries from these regions, which has in turn lowered the marginal impact on investment of additional flows. In addition,

capital outflows from these regions have also been large, particularly in recent years (see World Bank 2001, Table 2.1).<sup>14</sup>

The patterns in the use of capital flows also reflect, in part, the degree of financial integration. In countries that are weakly integrated, the correlation between domestic savings and investment is necessarily high. In such economies, capital inflows are strongly correlated with domestic investment, since an inflow of foreign capital mainly supplements domestic saving, which acts as a constraint on the level of investment. We can think of countries in Africa and/or South Asia as being credit constrained, where domestic investment is also accordingly constrained. In these regions, an additional dollar of flows goes not to increasing demand, but to fulfilling a pre-existing demand, which manifests itself as a strong correlation between capital flows and domestic investment. By contrast, in countries in East Asia (and Latin America at least in the 1990s), which are more integrated into world markets (Table 7), the correlation between domestic savings and investment is significantly weaker, and an increase in capital inflows may well be offset by an outflow of capital, such that the overall impact on investment is lower.<sup>15</sup>

Differences in the composition of flows across regions may also form part of an explanation for these regional differences. Sub-Saharan Africa, which has a high domestic investment to foreign capital coefficient, receives over 50 percent of gross private flows as direct investments, almost all of it as “greenfield” investments (Table 7). Only, East Asia draws in a comparable share of foreign investment in its aggregate inflows; however, a large share of East Asian flows has recently been in the form of “mergers and acquisitions” (Mody and Negishi 2001). Latin America, which has a low marginal impact of foreign capital inflows, receives about 60 percent of its flows in the form of loans and portfolio flows. But, clearly, the low coefficient in East Asia and Latin America is tied also to their alternative uses of funding (in reserves accumulation and consumption, and in net outflows). South Asia’s high coefficient, similarly, cannot be explained in terms of its capital inflow composition but rather in terms of how the funds are used.

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<sup>14</sup> Thus, for East Asia between 1990 and 1994, of the \$73 billion of inflows, \$19 billion went to augmenting reserves and \$39.5 billion were outflows (including errors and omissions); thus, almost 5 out of 6 dollars of inflows augmented reserves or left the countries rather than increasing domestic consumption or investment. Between, 1995 and 1998, capital inflows jumped to over \$120 billion but during that period, East Asia ran a current account surplus! For Latin America, just over half the inflows went into reserves or left as outflows.

<sup>15</sup> It is worth noting that the problem of reverse causality is a positive function of the degree of financial openness, since shocks to investment are more likely to affect capital flows when capital is more mobile. However, this reverse causality from investment to capital flows would tend to bias our estimates upward. That we observe a weaker relationship in regions which are more financial integrated then only strengthens our conclusion that the role of capital flows in boosting domestic investment is negatively related to the degree of financial integration.

Table 7. Regional Variation in Domestic Policies and Capital Market Openness

	EAP	LAC	MENA	SA	SSA
Financial Integration Index: 1977-98	2.36	1.45	0.73	1.04	1.25
Financial Integration Index, 1980s	2.35	0.98	0.57	0.80	1.11
Financial Integration Index, 1990s	2.45	1.90	0.97	1.35	1.41
CPIA Rating: 1977-98	3.71	3.05	2.85	3.08	2.94
CPIA Rating, 1980s	3.79	2.94	2.94	3.13	2.96
CPIA Rating, 1990s	3.58	3.26	2.69	3.19	2.97
<i>Share of:</i>					
	<i>Composition of Flows: 1977-1998</i>				
FDI	0.51	0.40	0.36	0.26	0.53
Loans	0.17	0.38	0.25	0.35	0.07
Portfolio	0.24	0.19	0.08	0.31	0.16
Other	0.08	0.03	0.31	0.08	0.24

While the impact of capital flows in Latin America and East Asia is likely to be lower because of their greater financial integration and/or a large share of non-FDI flows in their total inflows, better domestic policies may offset, to some extent, those influences and raise the extent to which capital inflows translate into domestic investment. On average, domestic policies are better in East Asia and (to a lesser extent) Latin America as compared to Africa (Table 7). Moreover, the level of human capital is often higher in countries from these regions, while the physical and financial infrastructure is typically also more developed. Consequently, the capacity of these countries to harness capital flows, i.e., is their “absorptive capacity,” is often greater.

We estimated also the impact of long-term flows on investment over two periods: 1980-89 and 1990-98. The results, which are reported in columns (6a) and (6b) of Table 6, suggest that the relationship between long-term capital flows and investment has weakened in the 1990s. This could reflect several factors. First the composition of flows has changed over time. The share of portfolio flows received by developing countries as a fraction of total flows has increased in the 1990s (Table 1). While the share of FDI has also increased over time, as noted above, an increasing proportion of foreign direct investment has included foreign acquisitions, which unlike greenfield investments, do not contribute directly to added investment and thus may have lowered the impact of FDI on domestic investment (see World Bank 2001, chapter 3). In addition to the changing composition of flows, in the 1990s there have been widespread attempts by developing countries to liberalize and open their financial sectors (Figure 1). This has been associated with an increase in capital outflows, and for reasons discussed above, has worked to weaken the capital flows-investment relationship. However, in recent years there have also been improvements in the policy environment especially in the LAC region (Table 7), this may have, at least to some extent counteracted these effects.

### C. An Augmented Model

The regional and time-period specific regressions are suggestive; however, they do not provide direct evidence on what factors are shaping the different responses to capital flows in different regions and at different times. Below we explicitly consider the importance of financial integration and domestic policies in conditioning the capital flows-investment relationship. Specifically, we estimate an augmented fixed effects regression, which allows the coefficient on long-term flows to vary as a function of country-policies and capital market openness. We do this by interacting the CPIA rating and financial integration index with capital flows (Table 8).

The results from columns (1) and (3) suggest some evidence that increases in financial integration have a negative impact on the capital flows-investment relationship, though the coefficients are only borderline significant. In contrast, from columns (2) and (3) we see that the interaction between policy and long-term flows is insignificant.

Disaggregating long-term flows into its three components, FDI, loans, and portfolio flows suggests stronger inter-relationships, which were masked in the aggregate. With loans as an exception, the results suggest that greater financial integration is associated with a decline in the marginal impact of capital flows. Specifically, a one-point increase in the financial integration index implies that, on the margin, the impact of a one percent increase in FDI will be 0.22 percent lower, and the impact of a one percent increase in portfolio flows will be 0.92 percent lower. Since a large component of capital flows going to Sub-Saharan Africa are direct investments, where capital controls are typically more stringent, this result offers a partial explanation for the stronger overall relationship between capital flows and investment that is observed of countries from that region. For the same reason, the importance of portfolio flows in East Asia, where countries are typically more integrated than developing countries from other regions, implies that we should expect a weaker association between capital flows and investment of countries from that region. The result also is consistent with a decline in the impact of FDI over time, as financial integration has increased.<sup>16</sup>

We also find that in the case of FDI, better policies will enhance the impact of each marginal dollar of inflows. Specifically, a one-point increase in the policy rating raises the effectiveness of an additional one percent of FDI, by 0.42 percent. Thus, the earlier finding that the average impact of long-term capital flows on investment in East Asia and Latin America is lower than in other regions reflects primarily the heavier concentration of loans and portfolio flows in these more sophisticated regions. In contrast, the impact of

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<sup>16</sup> This would be the case for reasons suggested by Feldstein (1994), namely, that increasing integration could lead to more offsetting flows. In addition, as noted, the nature of FDI has also evolved over time to incorporate less of “greenfield” investment projects and more “mergers and acquisitions” that do not imply immediate new investment. Of course, this transition in the form of FDI could be seen as a broader process of financial market integration that goes beyond opening borders and includes a deeper integration of asset markets.

loans (and to a lesser extent of portfolio flows) on investment seems to decline as policies improve, though the coefficients in neither case are significant.

Table 8. The Augmented Investment Model

Dependent Variable: Investment; Method: Instrumental Variables						
Regression:	(1)	(2)	(3)	(4)	(5)	(6)
	Long-Term Flows			FDI	Loans	Portfolio
Capital flows <sup>1</sup>	1.0934 (3.46)	0.6457 (1.17)	0.8665 (1.45)	-0.4308 (-1.43)	2.8406 (1.06)	4.3148 (1.18)
Average growth rate, lagged	0.3089 (3.97)	0.3091 (4.12)	0.3054 (3.92)	0.3513 (4.95)	0.361 (4.86)	0.345 (4.71)
Change in terms of trade	-0.0005 (-1.84)	-0.0005 (-1.73)	-0.0006 (-1.89)	-0.0007 (-2.39)	-0.0003 (-1.09)	-0.0007 (-2.26)
Crisis	0.0414 (1.89)	0.043 (2.01)	0.041 (1.85)	0.0237 (1.18)	0.0363 (1.75)	0.0328 (1.56)
Real interest rate, lagged	-0.000 (-0.04)	-0.0001 (-0.07)	-0.0001 (-0.07)	0.0001 (0.11)	0.0001 (0.14)	0.0001 (0.15)
M2/Y, lagged	0.0587 (1.85)	0.0616 (1.99)	0.0612 (1.90)	0.0374 (1.18)	0.0726 (2.18)	0.0065 (0.19)
Financial integration	0.0019 (0.34)	-0.0045 (-1.37)	0.0015 (0.27)	0.0026 (0.67)	0.0012 (0.41)	-0.0024 (-0.56)
CPIA, lagged	0.0069 (1.68)	0.0063 (1.54)	0.006 (1.41)	0.0022 (0.50)	0.0117 (2.48)	0.0099 (2.54)
Integration*capital flows <sup>1</sup>	-0.2211 (-1.50)	.	-0.2237 (-1.49)	-0.2195 (-2.16)	0.009 (0.02)	-0.9153 (-2.00)
CPIA, lagged*capital flows <sup>1</sup>	.	0.0142 (0.10)	0.0792 (0.52)	0.4213 (2.96)	-0.6028 (-0.76)	-0.1367 (-0.17)
R-squared	0.83	0.83	0.82	0.84	0.83	0.83
Durbin-Watson statistic	1.71	1.66	1.71	1.69	1.54	1.69

<sup>1</sup>The variable “capital flows” refers to long-term flows in regressions (1) to (3), to FDI in regression (4), to bank loans in regression (5) and to portfolio flows in regression (6).

To summarize, we find that the impact of capital flows is conditioned by the degree to which domestic asset markets are open to foreign competition, but also by the quality of domestic policies. Our results suggest that as financial integration increases, the impact of capital flows on investment weakens. This result is observable (somewhat weakly) in the aggregate and more clearly when capital flows are disaggregated by type. This helps explain, in part the observed regional differences in the impact of capital flows and also why the impact of capital flows on investment in recent years appears to have weakened. Additionally, we find that FDI has a stronger impact in countries with better policies.

## VI. SENSITIVITY ANALYSES AND ROBUSTNESS TESTS

In this section, we consider the robustness of our main findings to some sensitivity analyses. The main results presented in this paper apply instrumental variables techniques to estimate a static fixed effects regression using data averaged over 3-year windows. However, a variety of sensitivity analyses were also conducted. First, we used annual data in addition to the three-year data to estimate the capital flows-investment relationship. Second, we used a number of different methods of estimation, in light of various statistical considerations. Third, we restricted the sample from 1977–1995 to understand whether the break in the financial integration index post-1995 was influencing our results. Due to space considerations, we do not present our output from these sensitivity analyses. However, we do summarize the main conclusions.

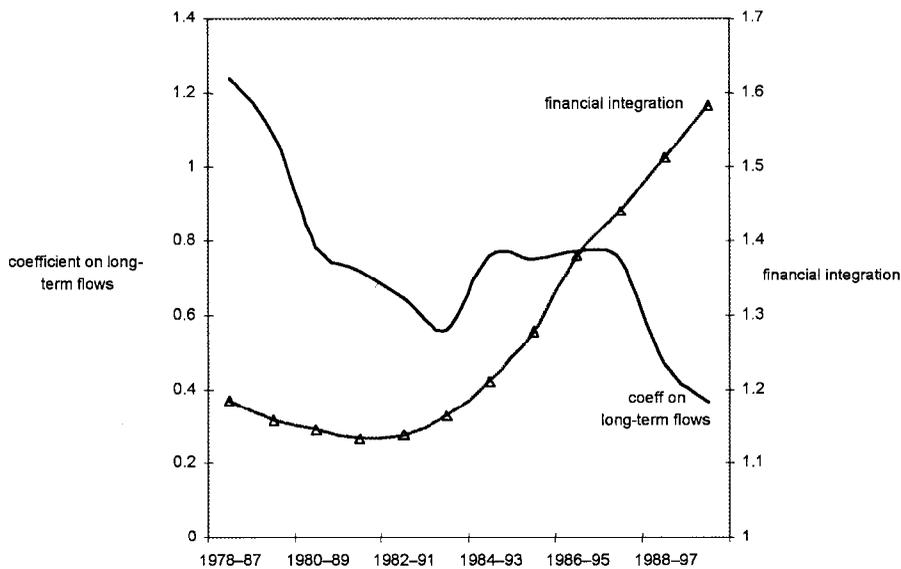
One advantage of using an annual series is that it places greater emphasis on the short-term time series variation in the data, which can in turn allow “sharper” instruments to be constructed. However, our preference for the three-year data was dictated by two considerations. First the three-year data probably highlight the medium- to long-term relationships more clearly than the annual data. Second, our choice also reflected the difficulty in addressing issues related to serial correlation that arise in higher frequency data.

Nevertheless our estimates based on annual data suggested a robust relationship between long-term flows and investment. We considered a number of specifications. First, we estimated a simple static model. Using the same set of instruments as we did for the three-year data, we obtained estimates that were very similar to those that we present in Table 5. Moreover, the interactions between financial integration (and policy) and long-term flows, especially FDI, suggested that greater financial integration (and better policies) negatively (positively) affects this relationship, which of course is exactly what we observe in the three-year data.

Second, we estimated a dynamic model, from which we were able to retrieve the long-run coefficients on capital flows. While our estimates of the capital flows-investment relationship were sometimes significant, they moved around as the sample was changed. As we have already noted, this may have to do with the correlation between the lagged dependent variable and our instruments.

Third, since the standard fixed effects estimator only permits heterogeneity across the groups in terms of their intercepts and not in terms of their slopes, we estimated the capital flows investment relationship using the mean-groups estimator—attributable to Pesaran and Smith (1995)—which unlike the random coefficients estimator (Swamy and Arora 1972), produces consistent estimates in the presence of slope heterogeneity, even when this heterogeneity is non-random and the regressors are serially correlated. Again our results suggest that both long-term flows and FDI are robustly related to investment. Our regressions using the annual data also proved useful, in understanding the time-varying impact of long-term flows on investment. We estimated the relationship between long-term flows and investment over a ten-year window, which we rolled forward through time. The relationship between long-term flows and investment suggests an overall downward trend (Figure 3).

**Figure 3. Variation of the Capital Flows-Investment Relationship Over Time, 1978–98<sup>1</sup>**



<sup>1</sup>Coefficients on long-term flows obtained in instrumental variable regressions of investment against long terms flows, lagged growth, change in terms of trade, a lagged dummy for crises, M2 (lagged), financial integration, and CPIA (lagged), using annual data over 10-year windows. The financial integration index represents the average financial integration across a 60-country sample and 10-year window (see Section III for details on the construction of financial integration index).

Due to the concerns with the manner in which the financial integration index was defined, we conducted a number of regressions using data over the period 1977 to 1995. The results were similar to those using the full sample from 1977 to 1998. To summarize the results from these regressions; we found long-term flows to be positively related to investment, both in the annual data and in the 3-year data. Moreover, we found that the relationship between FDI and investment to be more robust than either the relationship between loans and investment or the relationship between portfolio flows and investment. Further, we found that greater financial integration tends to weaken the impact of FDI and portfolio flows on investment, while better policies seem to enhance this relationship, at least in the case of FDI.

## VII. CONCLUSIONS

We find, first, that FDI has had a large and statistically significant impact on domestic investment, though this impact has declined over time. In contrast, the impact of portfolio flows and loans on domestic investment has been more modest. Second, more financial integration through the opening of borders to inflows and outflows of capital, and additionally deeper integration through the ability of foreigners to purchase domestic assets, has implied a weaker impact of foreign capital on domestic investment. Third,

better policies not only bring in more capital but, especially for FDI, they tend to strengthen the foreign capital-domestic investment relationship.

In the 1990s, especially in the second half of the decade, international investors rushed into emerging markets and other developing countries motivated by the prospects of high returns and the goal of diversification. However, the additional funds that thus became available were not always directed to new investments or displaced domestic resources that then left the country in search of higher returns. The implication is that though a shortage of capital is often thought to characterize underdevelopment, the lack of development may also reflect inability to quickly absorb additional resources for investment.

In understanding the role that capital flows play in promoting development, the concern ultimately must be on the overall impact that capital flows have on the growth process. As countries develop—as they institute better policies and as they remove barriers to capital mobility—the role that capital flows play in developing countries may evolve from a direct impact on investment to a less direct influence, acting through such channels as greater risk sharing that allows the undertaking of riskier projects with higher returns or through more rapid dissemination of ideas that promote increases in efficiency and gains in productivity.

Some evidence suggests that the productivity benefits of private capital flows have increased over the past decades but that these have accrued to a relative narrow range of countries best prepared to absorb capital flows (World Bank, 2001 and Mishra and others, 2001). These shifts and the consequent implication that capital flows act as a force creating divergence in incomes across countries are topics worthy of future research.

## I. Data Sources

Variable	Source
Investment	<i>World Development Indicators , International Financial Statistics CD-ROM</i>
GDP at current market prices (\$US)	<i>World Development Indicators</i>
Real GDP	<i>World Development Indicators</i>
Change in terms of trade	<i>World Development Indicators , International Financial Statistics CD-ROM</i>
Crisis dummy	Gupta et. al. (2000).
Nominal interest rate	<i>World Development Indicators, International Financial Statistics CD-ROM</i>
Inflation	<i>World Development Indicators, International Financial Statistics CD-ROM</i>
M2	<i>World Development Indicators, International Financial Statistics CD-ROM</i>
Policy	World Bank. Country Policy Institutional Assessment Index
Financial integration	<i>Exchange Arrangements and Agreements</i>
Long-term flows	<i>Global Development Finance 2001</i>
FDI	<i>Global Development Finance 2001</i>
Loans	<i>Global Development Finance 2001</i>
Portfolio flows	<i>Global Development Finance 2001</i>

## II. Country List

South Asia	Middle East and North Africa
Bangladesh	Egypt/United Arab Republic
India	Jordan
Nepal	Syrian Arab Republic
Pakistan	Sub-Saharan Africa
Sri Lanka/Ceylon	Algeria
East Asia and Pacific	Benin/Dahomey
Indonesia	Burkina Faso/Upper Volta
Korea	Burundi
Malaysia	Cameroon
Papua New Guinea	Central African Republic/Empire
Philippines	Chad
Thailand	Côte d'Ivoire/Ivory Coast
Latin America and Caribbean	Gabon
Argentina	Gambia
Belize	Ghana
Bolivia	Kenya
Brazil	Lesotho
Chile	Malawi
Colombia	Mali
Costa Rica	Mauritania
Ecuador	Mauritius
Grenada	Morocco
Guatemala	Niger
Guyana	Nigeria
Jamaica	Rwanda
Mexico	Senegal
Peru	Sierra Leone
St. Vincent and the Grenadines	South Africa
Trinidad and Tobago	Swaziland
Uruguay	Togo
	Tunisia
	Zambia
	Zimbabwe

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