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Determinants of Private Capital Flows in the 1970s and 1990s: Is There Evidence of Contagion?

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Determinants of Private Capital Flows in the 1970s and 1990s: Is There Evidence of Contagion?

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Abstract

This paper studies the determinants of private capital flows to developing countries during the last two episodes of large inflows, the late 1970s-early 1980s and the 1990s. The paper also tests for contagion effects in capital flows among recipient countries, and tries to identify specific channels through which such effects can occur. It tests for neighborhood effects, trade-related effects, and for contagion based on the countries having similar macroeconomic indicators. The results show strong evidence for the first two effects during the 1990s, and indicate that the third effect varies depending on the type of capital flow.

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I. INTRODUCTION

The Mexican crisis of December 1994, the Asian crises of 1997, and the crises in Russia and Brazil the following year, have led to a surge of empirical research on the issue of *contagion*. This literature has focused on the transmission of shocks from the country triggering the crisis to other economies.[1] The aim of this research has been to identify the channels through which shocks are transmitted, that is, whether contagion occurs because of real sector linkages,[2] financial sector linkages,[3] or other unidentified channels.[4] The conclusion that has emerged from this research is that contagion occurs mainly through trade and financial links, and that it is often limited to a specific region—in other words, contagion is more likely to occur among countries within the same geographical region than across different regions.[5]

The contagion hypothesis arose from the observation that currency crises are not evenly spread through time. Rather, they tend to come in clusters, like in 1982 in Latin America at the outset of the debt crisis, in 1992 in Europe during the ERS crisis, and in the second-half of 1997 during the Asia crisis. This observation is precisely what has led researches to focus on the possibility of *contagion*.

But clustering is not limited to currency crises; in fact, it was also observed in the early 1990s, when private capital flows returned to the developing countries in large amounts only a few years after the debt crisis. These flows were not evenly spread among developing countries or even regions; rather, they were directed mostly to the emerging market economies in East Asia and Latin America.

Surprisingly, although several authors attempted to explain the new surge in private capital flows in the early 1990s,[6] little attention was paid at that time to the fact that these flows were not evenly distributed (this fact was acknowledged but not formally investigated). Further, no attention was paid to the fact that a similar pattern had been observed in the prior episode of large private capital inflows in the late 1970s and early 1980s. In fact, only 18

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1 This is called the "ground zero country;" i.e., Mexico in 1994, Thailand in 1997, and Russia in mid-1998.

2 These refer to trade links; i.e., a country's currency is more likely to be attacked if the country's main trade partners depreciate their currencies, mainly because of loss of competitiveness.

3 These refer to direct cross border investments, competition for funds in world capital markets, or financial markets institutional practices. In the latter case, for instance, a drop in asset prices in one emerging market economy may induce investors to sell other countries assets, because of their need to raise liquidity to cover expected redemptions. For more details on how these contagion channels operate see Hernández and Valdés (2001) and Dornbusch et.al. (1999).

4 Unidentified channels of contagion are observationally equivalent to common unobservable shocks.

5 The strong regional link can be due to unknown real or financial links that occur within a region, which have not been properly controlled for in empirical studies.

6 This research, which started with the seminal paper by Calvo, Leiderman and Reinhart (1993), is known as "*pull and push*", since the factors that explain the flows can be grouped into those that relate to developments in the recipient countries (*pull*) and those related to developments in the investor countries (*push*).

countries accounted for about 85 percent of the total inflows in both episodes, and 10 of the 16 largest recipients were the same in both periods.

The clustering of flows in the two most recent episodes of large private capital flows toward developing countries suggests that some form of contagion—for instance, because of herd behavior on the part of foreign investors—could have occurred. However, the clustering of flows remains to a large extent unexplored.[7]

This paper investigates the existence of contagion during capital inflow episodes, using the same methodology that has been developed to analyze contagion during crisis periods. For this reason we test whether there is co-movement in capital flows among countries, above and beyond the direct effect that macro-fundamentals and other variables may have on capital flows (i.e., after controlling for *pull* and *push* factors). To the best of our knowledge this paper is the first attempt to disentangle the nature of contagion in capital inflows in a more systematic way.

The paper combines two lines of research, one focusing on the contagion of negative shocks during crisis periods, and the other on the timing of surges in inflows and the allocation of those flows among developing countries. This combination seems logical since the same underlying forces that explain contagion during difficult times may also operate in good times. For instance, when private capital starts flowing into a specific—ground zero—country, financing a larger current account deficit and a period of bonanza, agents could foresee a positive effect on neighboring and trade-related countries which will start exporting more to the ground zero economy. The latter effect will, in turn, improve the prospects of these other economies, making them more creditworthy and good candidates to start receiving inflows—this would be a case of positive contagion based on real linkages. Similarly, the fact that one particular country starts receiving inflows from a well informed investor (market leader) could induce others less informed (market followers) to think that other economies with similar *observable* characteristics are also good candidates to invest, leading them to allocate more capital to these economies—this would be a case of contagion based on herd behavior.

The structure of the paper is as follows. The next section briefly summarizes the relevant literature, while section three presents the model to be estimated and discusses the variables and data sources used in the empirical exercises. Section four presents and discusses the results with regards to the determinants of capital inflows (the *pull* and *push* factors) and with regards to contagion. The paper closes in section 5 with a brief summary and a discussion on related topics for future research.

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[7] Calvo and Reinhart (1996) is the only paper that we are aware of that studies the possibility of contagion during capital inflow episodes (see section II for more details).

II. A Brief Review of the Literature

A. Determinants of Private Capital Flows

The return of private capital in large amounts to developing countries, earlier than expected and only a few years after the end of the debt crisis, triggered renewed interest in explaining these capital flows. The question was why the flows started when some countries —specially those most affected by the debt crisis—were still facing serious macroeconomic imbalances and implementing important structural reforms.

The first paper on the subject, by Calvo, Leiderman, and Reinhart (1993), contended that this "positive" development had to be taken cautiously, mainly because the new surge in inflows to a large extent was a temporary phenomenon related to cyclical fluctuations in developed countries. Calvo et al. argued that the surge in private flows was mainly caused by poor investment opportunities in industrial countries, the latter being reflected in low yields and a slowdown in economic activity.[8] Therefore, the most likely scenario was that the flows would reverse in the future as economic conditions in the major industrial countries would improve. Despite some minor limitations,[9] Calvo et al.'s paper was highly influential and, most important, served as a warning to capital recipient countries of the potential risk that the surge in inflows could be followed by large outflows.

The paper by Calvo et al. was followed by a series of other research papers that attempted to fill in the gaps and improve upon their methodology. The main conclusion that emerges from these papers is that, in addition to the economic conditions in industrial countries (the so called *push* factors), macroeconomic fundamentals in the recipient countries (or the so called *pull* factors) also matter to explain the surge in private flows of the early 1990s and, in particular, the allocation of capital among emerging market economies. The importance of each kind of factor—*push* or *pull*—in explaining the inflows, nevertheless, varies depending on the type of flow (i.e., foreign investment versus short-term debt) and the horizon for which the analysis was carried out (whether the authors analyze the cyclical or the permanent component of capital inflows).

The methodologies and samples used vary across the different studies, nevertheless. Calvo et al. (1993) use principal components to explain total capital inflows to 10 Latin American countries during 1988–91, while Chuhan et al. (1998) use a panel regression to explain portfolio flows to 18 emerging market economies in both Latin America and East Asia during 1988–92. The latter authors conclude that domestic (*pull*) factors, among which they consider proxies for creditworthiness, are equally important to external (*push*) factors in explaining portfolio flows to Latin America, and three to four times more important in explaining portfolio flows to East Asia. In a similar study, Fernandez-Arias (1996) uses panel

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[8] This mainly refers to the 1991 recession in the US.

[9] For instance, in their sample, the authors included countries from only one region (LAC) and mainly large recipients, and used as a proxy for private capital flows the changes in international reserves. In addition, they did not control for other (*pull*) factors influencing inflows.

regressions to explain private capital flows[10] to 13 recipient countries during 1989–93. He concludes that when a country's creditworthiness is made dependent on the level of the international interest rate,[11] then external or *push* factors again become the dominant force underlying the surge in private inflows. All these studies use high frequency data and a short time period and, most important, do not control for macroeconomic fundamentals, something that may bias their results.[12]

In an attempt to overcome these problems, other researchers have used longer series of annual data and estimated models that try to explain the flow of private capital toward developing countries, while explicitly controlling for macroeconomic fundamentals (Hernández and Rudolph, 1997; Corbo and Hernández, 1999; Taylor, 1996). These studies use either a time series or a panel and regress the different flow variables against the external or *push* factors and a set of domestic variables. The main conclusion that emerges from this research is that in the medium and long term, flows are less sensitive to changes in cyclical external conditions. Instead, private flows respond positively to variables such as the country's investment and saving rates, GDP growth and terms of trade, and negatively to variables such as net foreign indebtedness and macroeconomic uncertainty (the latter proxied by the volatility of key macroeconomic variables).

In this paper we follow the same approach as in the last group of studies above. In other words, we run panel regressions of the same sort used by Corbo and Hernández (1999) and Hernández and Rudolph (1997), but also consider the possibility of contagion of flows among the recipient countries. The methodology used to study the latter effect draws on the studies summarized below.

B. Contagion, Spillover, and Herd Behavior[13]

The phenomenon of contagion has been studied mainly in the context of currency and balance of payments crises. In particular, the analysis has focused on the noticeable augment in the degree of co-movement (correlation) among countries' financial and foreign exchange markets that occurs in the wake of a crisis. For instance, several papers have documented that the stock return correlations across countries in Latin America increased significantly in the wake of the Mexican crisis of 1994. Similar exercises, with similar results, have been carried out for the European countries in the wake of the 1992 ERM crisis, and for a group of emerging market economies during the 1997 Thai crisis and the 1998 Russian crisis. The analyses have also documented a significant increase in the correlation of the countries' cost

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[10] Excluding FDI flows.

[11] The rationale for this result is straightforward. For a given stock of foreign debt, a country's creditworthiness decreases when the international interest rate rises because the latter has a negative effect on the country's debt service and current account.

[12] Most likely this is due to the lack of high frequency data for most macroeconomic variables that are relevant.

[13] This section summarizes the results of Ahluwalia (2000), Baig and Goldfajn (1998), Calvo and Reinhart (1996), De Gregorio and Valdés (1999), Eichengreen, Rose and Wyplosz (1996), Glick and Rose (1998), and Kaminsky and Reinhart (1998).

of borrowing during crisis periods, the latter being measured by the yield—or spread over Libor—of sovereign debt instruments (usually Brady bonds). The observed increase in the degree of market co-movement during crisis periods is attributed to contagion mainly because countries' fundamentals tend to change slowly, but also because they tend to differ significantly across countries. In other words, it is hard to explain the contemporaneous drop in asset prices across countries on the basis of a simultaneous deterioration in fundamentals.[14]

Since using simple market correlations constraints the analysis of contagion to two countries at a time, different studies look at this phenomenon within a larger set of countries by constructing indexes that measure the extent of the crisis in each country. The analysis consists of using these indexes to test whether the severity of the crisis in a particular country can be explained by the extent of the crises elsewhere. The analysis is carried out in two steps. First, crisis indicators are constructed which measure the pressure on the foreign exchange market.[15] This is done by taking a weighted average of the following.[16] (i) the rate of depreciation of the domestic currency, (ii) the increase in domestic interest rates, and (iii) the losses in international reserves.[17] Second, each country index is regressed against a set of macro variables—proxies for the country's fundamentals—and the index of *other* countries also affected by the crisis. The right-hand side variables in the regression can include only the index of the country that triggered the crisis—the *ground-zero* country—, or the crisis indexes of all the other countries in the sample. The latter can be weighted or not depending on the particular hypothesis that the authors are interested in testing. The typical estimated equation looks as follows:

$$Ci_{jt} = \alpha_j + \Psi_{j,t-1}\,\beta + \Omega_t\,\chi + M'_t\;\; Ci_{i,t}\,\gamma + \varepsilon_{j,t} \qquad (1)$$

where:

Ci_{jt}	is the crisis index indicator for country j at time t
$\Psi_{j,t-1}$	is a vector of predetermined domestic factors (fundamentals)
Ω_t	is a vector of exogenously determined external factors
Ci_{it}	is a vector containing the crisis indicators at time t for all countries $i \neq j$
M_t	is a vector of weights
α_j, γ	are constants
β, χ	are vectors of coefficients
ε_{jt}	is a random term

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[14] In a recent paper, Forbes and Rigobon (2000) argue that this type of analysis, that compares the correlation between two variables before and after a crisis, is likely to lead to the wrong conclusion that contagion occurred when in fact it didn't. This is caused by an heteroskedasticity problem that if left unchecked biases the t tests upwards.

[15] Some authors have used the same methodology, but instead measured the severity and extent of the crisis by taking the drop in stock prices (Sach, Tornell and Velasco, 1996).

[16] The weights are inversely proportional to the volatility of each series simply to avoid that one series dominates the behavior of the crisis index.

[17] Note that at least one of these three variables will adjust during a currency attack.

In the notation above γ is the parameter that indicates whether contagion occurs, while M is a vector used to test for specific channels of contagion. For instance, if interested in testing for regional contagion (or contagion from the ground-zero country only), then M assigns positive weights to those countries that are in the same region as country *j* (or to the ground-zero country) and zero otherwise. Similarly, if interested in testing the hypothesis that contagion is due to trade linkages, then M assigns weights according to the importance that each country *i* has on country *j*'s total trade.

There are several channels through which contagion can occur and each can be tested using a regression like (1) by constructing the appropriate vector of weights, M. For instance, trade linkages (either direct between countries or indirect through competition in a third market) can cause contagion because of the loss in competitiveness suffered by country *j* after a devaluation in country *i* occurs. Similarly, financial linkages (either direct because of cross border investments between countries, or indirect because of common creditors in third countries) can cause contagion because the losses suffered by investors in market *i* may lead to portfolio shifts and, therefore, sales in market *j*. All these causes of contagion, for which an economic linkage can be recognized, can be grouped under the concept of *spillover* effects. The main conclusions that have arisen from this line of research are that contagion occurs mainly through trade and financial linkages, but also within a specific region. However, the finding about regional contagion can be due to unidentified (or poorly proxied) links or common regional shocks.[18]

There is another type of contagion for which a direct economic link does not exist, however. This refers to investors reacting to a negative shock in country *j* by pulling out from country *i*, even though no identifiable link may exist to explain why the developments in the former country would affect—directly or indirectly—the fundamentals in the latter. This type of apparently irrational behavior is called *herd behavior*, and has been explained by arguing that for small investors it is not economically efficient to be well informed at all times about all the markets in which they invest. Instead, it is more efficient for them to imitate the behavior of large and well informed investors or, alternatively, revise their assessments of countries only sporadically while clustering them in groups based on their similarities. This implies that the market as a whole will react swiftly and disproportionately to the actual change in country *i*'s fundamentals when something—a shock in country *j*—warns investors that the economic environment has changed.[19] A way to test for this hypothesis in the context of equation (1) above is to look for observable similarities across countries. Thus, after a shock (i.e., a devaluation) in country *j*, investors will look for and pull out of countries that on the surface appear similar to *j*. This is the approach taken in a recent paper by Ahluwalia (2000), who reports a strong contagion effect based on countries' similarities during the Mexican, Asian and Russian crises. However, in testing for what he calls the *discriminating contagion* effect, Ahluwalia uses countries similarities directly instead of as a device to weight other countries' crisis indexes. In this paper we follow the latter approach.

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[18] See footnote 5.

[19] This irrational behavior has also been labeled the "wake up call" effect, since investors will react only after being awaken by the crisis in the first country.

In a different paper, S. Calvo and C. Reinhart (1996) investigate the possibility of contagion among countries that are receiving capital flows. Their paper is the exception to the rule in the sense of being the only one that does not study contagion during crisis periods. Calvo's and Reinhart's approach consists of regressing the inflows received by a group of countries against some exogenous (*push*) variables and the inflows received by other (large) recipients.[20] Their sample comprises 11 Latin American economies and covers the 1970–93 period, but they also study shorter periods. The main conclusion of the Calvo's and Reinhart's paper is that during 1970–93, there was positive contagion in flows from the large (Mexico) to the small recipients (Costa Rica, Dominican Republic, Ecuador, El Salvador and Uruguay), but not in the opposite direction. Further, the contagion effect was stronger during 1979–93 than in prior years. The main limitations of Calvo's and Reinhart's paper, nevertheless, are that they do not control for domestic or *pull* variables (something that may be biasing their results),[21] that their measure of inflows comprise official and private flows,[22] and that their conclusions refer to a small sample of Latin American countries.

In this paper we attempt to overcome these difficulties by using a model similar to the one depicted in equation (1), but incorporating private capital inflows instead of crisis indexes. Further, we use a larger sample of developing countries from several regions and control for other domestic (*pull*) factors. In this way we are actually measuring contagion after accounting for the direct effect of fundamentals on capital inflows. This methodology is explained further below.

III. Model, Sample, and Data

In this paper we test for the existence of contagion in private capital flows during the period 1977–97. This 21-year period includes the two most recent episodes in which large amounts of private capital flew into the developing countries, with the debt crisis occurring in between.

We are interested in the possibility of "pure" contagion; that is, a statistically significant co-movement in private flows across countries after controlling for changes in the other determinants of capital inflows (after taking into account *pull* and *push* variables). Further, we are interested in testing for contagion due to *herd behavior* in addition to the one caused by trade links. In other words, we are interested in testing the hypothesis that foreign investors may buy certain assets without a proper and thorough evaluation, just because it is fashionable to do so. In this regard they imitate what others are doing by looking for observable similarities among countries, and invest in the assets of those emerging market economies that look alike. The model used in testing all these hypotheses is the following:

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[20] In their regressions Calvo and Reinhart (1996) use principal components rather than the inflows directly.

[21] Note that the strong contagion effect found by Calvo and Reinhart may be due to co-movement in countries' fundamentals.

[22] Note that in the aftermath of the debt crisis and until the early 1990s, the Latin American region received mainly official flows from the multilateral financial institutions and other bilateral sources. This may be partly driving Calvo's and Reinhart's results.

$$Fi_{jt} = \alpha_j + \Psi_{j,t-1}\,\beta + \Omega_t\,\chi + M'_t\,Fi_{i,t}\,\gamma + \varepsilon_{j,t} \qquad (2)$$

where

Fi_{jt} : private flows of type i received by country j at time t
$\Psi_{j,t-1}$: vector of predetermined domestic (pull) factors
Ω_t : vector of exogenously determined external (push) factors
Fi_{it} : vector of flows (also of type i) received by all countries i ($i \neq j$) at time t
M_t : vector of weights
α_j, γ : coefficients to be estimated
β, χ : vectors of coefficients to be estimated
ε_{jt} : random term

In the notation above *Fi* stands for type-*i* flows, where *i* refers either to portfolio flows, foreign direct investment, medium and long-term debt, or total private capital flows. Following the standard *pull* and *push* literature, we include in the Ω vector the real interest rate in international capital markets measured by the dollar real ex-post 90-days LIBOR, the level of economic activity in industrial countries[23] measured by the GDP, and the total amount of private funds available to all developing countries. The latter variable is aimed at capturing institutional changes as well as technological innovations during the past decades, which have facilitated investment abroad (in emerging market economies) by institutional investors located in industrial countries. Also, the credit rationing hypothesis suggests that the price of credit—i.e., the interest rate—alone may not be sufficient to convey all the necessary information with regards to the equilibrium in international credit markets. These two interpretations aside, this variable can also be interpreted as evidence of contagion (see below).

Also following the standard literature, in the Ψ vector we include domestic variables (*pull factors*) that are easily observable by market participants and that could potentially explain capital flows. These comprise lags of the rate of economic growth, the balance of the public sector, the investment rate, the growth in banking sector credit, a measure of trade integration with the rest of the world, a measure of the country external indebtedness, and a measure of the degree of appreciation of the real exchange rate.[24] The precise variables and their expected signs are presented in Table 1.

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[23] This variable was not included in the final equations as preliminary estimations showed that it was never significant at standard levels and its inclusion increased the multi-collinearity among the different regressors. See footnote 29 below.

[24] Other variables were also included initially but later on disregarded because of multicollinearity. Among these were the inflation rate, the amount of international reserves held by the Central Bank, the stocks of total and short-term foreign debt, and the private savings rate. Other variables were considered but also disregarded because of poor data quality and/or missing values (terms of trade, and the level of the real domestic interest rates).

Table 1. Definition of Variables

	Definition	Expected Sign
External Variables		
REXT	Real ex-post international interest rate: US dollar 3-months Libor minus the US-CPI 3-months inflation	–
NPKF	Net private capital flows available to all developing countries, minus the flows received by country j, as a share of GDP of the major industrial countries	+
PIB_IND	Economic activity (GDP) in industrial countries	–
Domestic Variables		
GPIB	Real GDP growth	+
PSB	Public sector (central government) balance as a share of GDP	+
INV	Gross domestic investment as a share of GDP	+
TRADE	Total exports as a share of GDP	+
DEBTSS	Foreign debt service as a share of GDP	–
CRPR	Growth in banking sector nominal credit to the private sector	–
APPR	Real exchange rate appreciation (in percent) during the past year: $[RER_t - RER_{t-1}]/RER_{t-1}$	–

An increase in any of the first four domestic variables indicates stronger fundamentals and should *pull* more flows. In contrast, an increase in any of the last three variables is a sign of a weakening—more indebted and/or overheated—economy and should therefore reduce the amount of inflows. The *APPR* variable was used instead of expected depreciation because of the difficulties associated with estimating market expectations, which entails estimating the long-run equilibrium RER for each country. In the above formulation we are simply assuming that an appreciating real exchange rate is a sign of a less competitive economy, though it could also serve as a proxy for expected depreciation; in both cases it should lead to smaller inflows. Similarly, the *CRPR* variable was used because fast growing bank credit to the private sector can be the cause of either a deterioration in the quality of banks' portfolios, or overheating in the form of higher inflation, both signals of a weakening economy.[25, 26, 27]

Vectors M in equation (2) above are constructed to capture specific contagion channels. For instance, in the case of discriminating contagion the weights in M measure similarities among countries in observable macro-financial variables such as the fiscal surplus, inflation rate, etc. (the specific variables used are discussed in the empirical part of the paper). This is done by taking the difference between X_{it} and X_{jt} ($\forall$t), where X is a

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[25] Rapidly growing bank credit has been found to increase the likelihood and severity of crises. See Sachs, Tornell, and Velasco (1996), and The World Bank (1997).

[26] Note that because of the fixed-effects estimation we do not need to subtract the steady-state growth in nominal bank credit (this is captured in the different constants estimated for each country). This contrasts with the approach used in Sachs, Tornell, and Velasco (1996), which is justified because of their using a cross-section instead of a panel.

[27] It is worth noting that when replacing the *CRPR* variable for both the real growth in credit and the rate of inflation, the results remain qualitatively the same, except because the two variables attain statistical significance levels of 10 percent (or less) less often.

relevant variable that has first been standardized to make the comparison meaningful.[28] Similarly, in the case of contagion due to trade links, the weights reflect the importance or share of country i in country's j total trade. All data is taken either from the World Bank's *World Development Indicators* database, or from the IMF's *International Financial Statistics* and *World Economic Outlook* databases.

Finally, for the empirical analysis the sample period was broken into two. The first capital inflow episode (sample 1) comprises 1977–84, and therefore includes the debt crisis years, while the second episode (sample 4) comprises 1987–97 and includes both the Mexican and the Asian crises. The two intervening years, 1985–86, were excluded in order to abstract from all the structural changes brought by the debt crisis at both the domestic and international levels. The second episode 1987–97, was broken further into shorter periods to analyze the potential effects on capital flows of the Mexican and Asian crises—one sub-sample stops before the Mexican crisis (sample 2), while the other includes the latter but not the Asian crisis (sample 3). The countries included in each sample are listed in Annex 1.

IV. Empirical Results

A. Determinants of Capital Inflows

We begin by explaining capital flows toward developing countries without trying yet to disentangle the nature of contagion. This is done by estimating a simpler version of equation (2), one that includes in the right-hand side only the variables listed in the Ψ and Ω vectors. The following are the most important conclusions that emerge from this exercise—the results discussed below are presented in Tables 2–5.[29]

First, the real interest rate prevailing in international capital markets did not play a significant role in attracting (i.e., *pushing*) private flows toward emerging market economies in any of the capital inflow episodes –i.e., *rex*t turns out significant and with the correct sign (negative) only in one regression in Tables 2–5. This result contrasts with those reported earlier by Calvo et.al. (1993), Calvo and Reinhart (1996), Chuan et al. (1998) and Fernandez-Arias (1996). A possible explanation for this contrasting difference however, is the use in this paper of low-frequency data,[30] a different (larger) sample of countries, and the fact that we are controlling of other *domestic* factors. In fact, the same difference is obtained in prior studies

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[28] The standardization is done by subtracting and dividing each country-i's observation by the sample mean and standard deviation, respectively. The last two are computed separately for each year using all the countries in the sample.

[29] The results reported in Tables 2–5 show that some explanatory variables were excluded in the final regression. This was done after checking that these variables were never statistically significant and that their exclusion did not change the value of other coefficient. The main purpose of eliminating some insignificant variables was to reduce the existing multi-collinearity. Finally, the results in Tables 2–5 include some dummies introduced to control for some unexplained changes in some of the flow series (see footnotes in Tables 2–5).

[30] Low frequency data do not show intra-year variations in flows that may be due to changes in international interest rates. This does not apply to Calvo and Reinhart (1996), however, who use annual data but principal components instead of a standard regression. In this case the two other explanations may also apply.

using low frequency data, that estimate an equation like (2) that controls for country fundamentals (Corbo and Hernández, 1999, and Hernández and Rudolph, 1997).

Second, past year debt service capacity (*ldebtss*) and the investment rate (*linv*) are both important determinants of debt flows (first column in Tables 2–5). Thus, an increase in foreign debt service of 1 percent of GDP *reduces* private debt flows by about ¼ or more of one percent of GDP, while a similar rise in the investment rate increases debt flows by about $^1/_5$ of one percentage point of GDP (less during the late 1970s-early 1980s). Portfolio flows also respond to changes in past investment rate during the 1990s, but their sensitivity is somewhat smaller –a $^1/_{10}$ or less (third column in Tables 2–5). Also, foreign direct investment flows respond positively to changes in the past rate of economic growth (*lgpib*).

Third, foreign investors were more concerned about real exchange rate appreciation (or loss of international competitiveness) in the late 1970s and early 1980s than during the 1990s (i.e., *lappr* attains statistical significance only in Table 2).[31] However, foreign investors seem to learn from past experiences; i.e., it appears as if the easy lending of the 1970s, and the losses incurred after the debt crisis, prompted foreign investors to worry about, and be more sensitive to, the growth in banking sector credit (i.e., *lcrpr* is statistically significant only in samples 2 thru 4).[32] Similarly, foreign investors became marginally more selective in allocating FDI flows after the Mexican crisis (i.e., FDI flows appear more sensitive to changes in fundamentals in samples 3 and 4).

Fourth, contrary to what was expected, the public sector balance (*lpsb*) does not seem to play, in general, the role of a *fundamental* in the sense of affecting private flows because of its relationship with a country's solvency. Instead, sometimes it helps to forecast private capital flows because it determines the financial needs of the country's government (i.e., the coefficient for *lpsb* is negative in most FDI regressions and in the regression for debt flows in sample 1). This interpretation is fully consistent with the fact that during the 1970s many governments in developing countries borrowed abroad to finance largely ambitious investment programs, and that some highly indebted governments in developing countries launched large privatization programs in the late 1990s, thereby boosting FDI—i.e., Mexico, Brazil, etc. In sum, it appears that on average in our sample the government was never indebted enough to constraint the country's access to private sources of finance. However, during the 1990s private debt flows were sensitive to changes in government's solvency, a result consistent with the argument raised above about investors (foreign banks) being more selective and having learnt from the bad experience of the late 1970s–early 1980s (i.e., the coefficient for *lpsb* is positive and significant in the first column of Tables 3–5).

Finally, and most important for our purposes, in almost all the regressions *NPKF* is statistically significant and with the correct expected sign, showing that the availability of funds to all developing countries was an important determinant of the flows received by each

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[31] This result could be because the degree of real exchange appreciation in capital recipient countries was milder during the 1990s than in the previous inflows episode, when several countries in Latin America used the exchange rate as a nominal anchor to rapidly reduce inflation.

[32] See footnote 25

of the almost 30 recipients included in our sample in both episodes.[33] This result confirms that countries receive more inflows just because others do, and, therefore, provides evidence that is consistent with the contagion hypothesis; i.e., capital starts flowing into the emerging market economies because it is fashionable. This finding, however, may also be the result of a common unidentified shock which, in turn, is correlated with the amount of funds available to all developing countries. Note that this common shock cannot be a drop in international interest rates, since this is controlled for in all the regressions reported in Tables 2–5. Nevertheless, as argued earlier, this common shock can be the removal of institutional restrictions limiting the investment in emerging market economies by industrial countries' institutional investors. Under a proportional portfolio allocation model, the lifting of such restrictions would predict a similar increase in the inflows to all recipient countries.

B. The Role of Capital Controls

Next, we investigate the role of capital controls in determining—deterring—capital inflows. For this we repeat the regressions above, but include among the explanatory variables an index measuring the difficulty that agents encounter when trying to move capital to and from abroad. Similar to previous studies, the index is constructed by combining—adding—two dummy variables, one indicating the presence of restrictions on payments for capital transactions, and the second the presence of surrender or repatriation requirements on export proceeds. Both dummies are built based on the IMF's *Exchange Arrangements and Exchange Restrictions*. The index fluctuates between zero and two, a higher value indicating a more restrictive environment. Data availability only allows investigating the role of capital controls during the 1990s and for a slightly smaller sample.

The results reported in Table 6 show that a more restrictive environment for the movement of capital across borders was not a deterrent to capital inflows. There is evidence indicating that, other things being equal, a more restrictive environment led to smaller portfolio flows during 1987–94, but this effect weakened in later years. This result is fully consistent with previous findings that capital controls are effective in changing the composition but not the total amount of flows.[34] With regards to the other determinants of capital flows, the results (not reported in the table)[35] remain qualitatively identical to those reported in Tables 2–5.

C. Is There Evidence of Contagion in Capital Flows?

Finally, we test for the possibility of contagion in capital flows and try to disentangle the strong effect that total flows toward all developing countries—NPKF in the above regressions—have on the flows received by each particular country. For this we repeat the

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[33] Note that the NPKF variable comprises private flows to all developing countries except the one on the left-hand side of the equation being estimated. See Table 1 for definition of variables.

[34] See Gallego, Hernández and Schmidt-Hebbel (1999).

[35] There are two regressions where the significance of one regressor changes. In one of them (total flows, sample 3) lappr turns out significant at 10 percent, while in other (m&lt debt, sample 2) lpsb turns out insignificant. The results are available from the authors upon request.

regressions reported in Tables 2–5, but including as explanatory variables the vectors M that capture different contagion channels (see equation 2 above).Using the importance of each country i in country's j total trade, we first analyze the possibility of contagion occurring because of trade links among capital recipient countries. Next, using macroeconomic similarities among countries, we test whether contagion occurs because of herd behavior. For this we consider several macroeconomic indicators, one at a time, namely, the annual inflation rate, the current account balance, the stock of international reserves, the stock of foreign debt, the rate of economic growth, and total exports. The different macro variables are measured either in percentage points or as a share of another relevant economic variable (GDP, exports, or imports). In addition, we consider the possibility of regional contagion by constructing a similarity index based of countries belonging to the same region. Several conclusions emerge from this exercise (the results are presented in Table 8).

- Overall, there is strong evidence of contagion in foreign direct investment and portfolio flows due to direct trade among capital recipient countries, although this channel is present only during the 1990s (first column, Table 8). This result can be explained because of the stronger economic links through trade that resulted from the developing countries increasingly lifting barriers and removing trade distortions since the mid-1980s, which makes countries' fundamentals dependant of their trade partners fortunes—i.e., a capital recipient country, by importing more, improves the CAD of its trade partners, making them more creditworthy and therefore susceptible to receive inflows. Alternatively, FDI or portfolio flows can be re-exported from one recipient country to its trade partners to finance investment in the export sector of the latter.
- There is robust evidence of contagion in capital flows based on macroeconomic similarities—i.e., there is a great deal of co-movement in flows across countries that look alike—, but the degree of contagion varies across flow types. In particular, during the 1970s and 1990s, all types of flows were subject to contagion from the inflows and outflows occurring in countries with current account deficits of similar sizes, but only debt flows—medium and long term—were subject to contagion from those countries experiencing similar economic growth. This result can reflect both markets high sensitivity to current account developments, and that during the 1970s and early 1980s the bulk of the inflows was in the form of debt.[36]
- There is evidence that contagion increased during the 1990s, probably as a result of the growing financial integration and investors worldwide being more sensitive to market developments and closely monitoring emerging market economies. For

[36] It is possible that the contagion based on similar CAD is a spurious result caused because countries showing large CAD are usually also experiencing large capital inflows. To check for this possibility we repeated the same regressions but using similarity in inflow size (as a share of GDP) instead of CAD. (Note that similarity in inflow size is the most spurious case possible.) The results show that similar CAD is a plausible channel for contagion to occur. In fact using the alternative specification we find no evidence of contagion in 10 out of 15 cases, while in two other the resulting coefficient is *lower* than the one using similar CAD (i.e., only in 3 out of 15 cases we cannot rule out the possibility of having a spurious result). Further, we looked at the correlation between different inflows and the CAD which turned out to be relatively low—they fluctuate between -0.10 and -0.33.

instance, during the 1990s, all flows were subject to contagion from countries experiencing similar inflation rates, though only debt flows were subject to contagion from countries holding similar stocks of international reserves, and only FDI flows were subject to contagion from countries with a similar degree of trade openness (measured by exports/GDP). The result regarding debt flows may be explained because lenders see international reserves as an indicator of liquidity, which, in turn, is less important in the case of other flows—FDI and portfolio—that are subject to devaluation risk. The result regarding FDI is consistent with the fact that a large share of these flows is directed to the export sector.

- There is strong evidence of regional contagion during the 1990s, particularly so in the case of foreign direct investment and portfolio flows (it is slightly less so in the case of medium- and long-term debt). This result perhaps reflects the way multinational corporations develop and grow; that is, economies of scale require geographical proximity, hence leading to clustering of investment into regions.[37]
- In general, the positive influence of total flows toward all developing countries—NPKF—on the inflows received by each country remains, although it becomes less significant possibly because of the increased collinearity among regressors. This is so even in those cases where contagion based on macroeconomic similarities occurs. This is not true, however, in the case of regional contagion, implying that the flows toward its own region are more important for a specific country than the flows toward all developing countries.
- With respect to the other right-hand side variables, the majority of the results reported in Tables 2–5 remain qualitatively the same. There are a few changes (reported in Table 7) that do not change the broad picture, however—it can still be argued that *pull* factors are the main force underlying the surge in private capital flows to the developing countries in the 1970s and 1990s. The most unstable equation is the one for FDI in sample 2 (1987–94), where some variables become statistically insignificant while others turn out statistically significant.[38]

It is worth noting that despite some methodological differences, the strong regional contagion effect reported in Table 8 is consistent with Calvo's and Reinhart's (1996) result with regards to contagion in capital flows. These authors report that contagion occurred during 1979–93 from Mexico to several small economies in Latin America.

V. Conclusions and Future Research Agenda

This paper analyses the determinants of private capital flows toward the developing countries in the 1970s and 1990s, and tests for the possibility of contagion based on trade linkages and country macroeconomic similarities. Consistent with prior findings, our results show that private capital flows were determined mainly by a country's own characteristics (the so called *fundamentals*), increasingly so during the 1990s, and that external or *push*

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[37] This effect could reflect unobservable regional shocks and/or unidentified economic links within a region.

[38] These results are not reported in the paper but are available from the authors upon request.

factors were not significant in explaining the inflows in any of the two episodes. More interesting, we find strong evidence of contagion based on trade linkages for both FDI and portfolio flows, and some evidence of contagion in private capital flows based on country macroeconomic similarities, but the latter depends on the flow type. Overall, the size of the current account deficit appears as the most critical variable that international investors look at to compare countries when deciding where to invest—or where to withdraw their funds from in case of a negative shock in one particular country.[39] Also, contagion appears to be more important during the 1990s than in prior episodes, probably because of increasing financial integration in recent decades. In addition, we find strong evidence of contagion in capital flows for countries in the same geographical region, especially for foreign direct investment and portfolio flows. Finally, we find that a more restrictive capital account does not lead to smaller inflows of capital. There is not sufficient evidence in favor of using capital controls to address inflow-related problems (except perhaps for prudential reasons).

Based on these findings, two—albeit very general—policy recommendations can be advanced at this stage for countries seeking to reduce the possibility of contagion. First, greater trade diversification, to reduce the degree of contagion from a negative shock in a large trade partner, is called for—i.e., greater trade diversification in Argentina would have likely reduced the cost for that country of Brazil's devaluation of the real in late 1998. Second, informational campaigns allowing investors to clearly differentiate among countries based on their economic fundamentals are also called for. To the extent that investors treat all countries in the same region as equal, such campaigns would reduce the degree of regional contagion. Similarly, these campaigns would help to reduce the contagion occurring because countries look alike based on a few macroeconomic indicators. Initiatives to disseminate standardized and reliable country data more often, such as the Fund's GDDS and SDDS, are an important move in that direction.

Several hypotheses remain to be analyzed in future research, however. For instance, we did not test for the possibility of contagion in capital flows occurring on the basis of financial linkages. These linkages refer to both direct cross-border financial investments, and competition for funds in third markets (the contagion in these cases is expected to have different signs). Similarly, we considered country similarities on the basis of only six macroeconomic variables, but many other are suitable candidates (i.e., exchange rate regimes, fiscal position, financial development, volatility of some key macroeconomic variables, etc.). These should be the focus of future research.

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[39] See footnote 36.

REFERENCES

Ahluwalia, P. (2000), "Discriminating Contagion: An Alternative Explanation of Contagious Currency Crises in Emerging Markets," IMF Working Paper 00/14 (Washington: International Monetary Fund).

Baig and Goldfajn (1998), "Financial Markets Contagion in the Asian Crisis," *Staff Papers*, International Monetary Fund, Vol. 46, pp.167–95.

Calvo, G., L. Leiderman, and C. Reinhart (1993), "Capital Inflows and The Real Exchange Rate Appreciation in Latin America: The Role of External Factors," *Staff Papers*, International Monetary Fund, Vol. 40 (March).

Calvo, S. and C. Reinhart (1996), "Capital Flows to Latin America: Is there evidence of Contagion Effects?" in *Private Capital Flows to Emerging Markets After the Mexican Crisis,* ed. by G. Calvo, M. Goldstein, and E. Hochreiter, Institute for International Economics, Washington D.C., USA,. and Austrian National Bank, Vienna, Austria (September).

Chuhan, P., S. Claessens, and N. Mamingi (1998), "Equity and Bond Flows to Latin America and Asia: the Role of Global and Country Factors," *Journal of Development Economics*, Vol. 55, pp. 439–63.

Corbo, V. and L. Hernández, (1999), "Private Capital Inflows and the Role of Economic Fundamentals" in *Capital Flows, Capital Controls, and Currency Crisis: Latin America in the 1990s*, ed. by F. Larraín, Michigan University Press.

De Gregorio, J. and R. O. Valdés (1999), "Crisis Transmission: Evidence from the Debt, Tequila and Asian Flu Crises." Mimeo, CEA, University of Chile, Santiago (October).

Dooley, M., E. Fernandez-Arias, and K. Kletzer (1994), "Is the Debt Crisis History?", World Bank, Working Paper 1327, Washington, D.C.

Dornbusch, R., S. Claessens, and Y-C Park (1999), "Contagion: How It Spreads and How it can be Stopped? Mimeo, The World Bank.

Eichengreen, B., A. K. Rose, and C. Wyplosz (2000), "Contagious Currency Crises." *Scandinavian Economic Review* (forthcoming). Also available as CEPR Discussion Paper N°1453, August 1996, and at http://haas.berkeley.edu/\~arose.

Fernandez-Arias, E. (1996), "The New Wave of Private Capital Inflows: Push or Pull?", *Journal of Development Economics*, Vol. 48 (2), pp. 389–418, April.

Fernandez-Arias, E. and P. Montiel (1995), "The Surge in Capital Inflows to Developing Countries: Prospects and Policy Response," World Bank, Working Paper 1473, Washington, D.C.

Forbes, K. and R. Rigobón (1999), "Measuring Contagion: Conceptual and Empirical Issues." Mimeo, Sloan School of Management, MIT (December).

Gallego, F., L. Hernández and K. Schmidt-Hebbel (1999), "Capital Controls in Chile: Effective? Efficient?". Central Bank of Chile, Working Paper Series 59 (December).

Glick, R. and A. K. Rose (1999), "Contagion and Trade: Why are Currency Crises Regional?" *Journal of International Money and Finance* 18(3): 603–17.

Hernández, L. and R. Valdés (2001), "What Drives Contagion? Trade, Neighborhood, and Financial Links." IMF Working Paper 01/29, (Washington: International Monetary Fund).

Hernández, L. and H. Rudolph, (1997) "Sustainability of Private Capital Flows to Developing Countries: Is a Generalized Reversal Likely?". *Cuadernos de Economia*, 102, pp. 237–266.

Kaminsky, G. L. and C. M. Reinhart (1998), "On Crises, Contagion, and Confusion." Mimeo, University of Maryland, November.

Montiel, P. and C. Reinhart (1997), "The Dynamics of Capital Movements to Emerging Economies During the 1990s." Mimeo, July.

Sachs, J., A. Tornell, and A. Velasco (1996), "Financial Crises in Emerging Markets: The Lessons from 1995." *Brookings Papers on Economic Activity* 1.

Taylor, M. (1996) "Capital Flows to Asia and Latin America.". Mimeo.

The World Bank (1997), *Private Capital Inflows to Developing Countries, The Road to Financial Integration.* Oxford University Press.

Table 2. Determinants of Capital Inflows
Sample 1: 1977–84

	m&lt debt	fdi	portfolio	tot. flows
lgpib	n/a	0.021		--
lpsb	-0.139	-0.024		--
linv	0.129	n/a		0.176
ldebtss	-0.369	-0.026		-0.355
lcrpr	--	--		n/a
lappr	-0.027	-0.004		-0.017
rext	n/a	n/a		n/a
npkf	1.336	0.644		1.234*
N	111	111		111
R-sq	0.358	0.230		0.349
F test	6.890	4.670		6.730
Prob>F	0.000	0.000		0.000

Table 3. Determinants of Capital Inflows
Sample 2: 1987–94

	m&lt debt	fdi	Portfolio	tot. flows
lgpib	n/a	--	n/a	--
lpsb	0.111*	--	n/a	--
linv	0.233	--	0.077*	0.253
ldebtss	-0.181	--	n/a	-0.132
lcrpr	--	-0.004	-0.002	-0.008
lappr	--	--	--	--
rext	n/a	--	n/a	--
npkf	--	2.418	0.992	3.152
N	194	194	194	194
R-sq	0.179	0.197	0.128	0.285
F test	5.550	5.750	4.780	6.180
Prob>F	0.000	0.000	0.001	0.000

Notes for tables 2 and 3

(1) unless indicated with an asterisk, the table reports those coefficients with a mg. sig. level of 10 percent or less. An asterisk indicates a marginal significance level equal to 11 percent.

(2) n/a indicates that the variable was not included in the final regression because preliminary results showed that it was not statistically significant, and its exclusion reduced the collinearity among regressors without significantly changing any of the estimated coefficients.

(3) All estimations use a fix-effects panel with robust standard errors to correct for potential heteroskedasticity problems.

(4) The dummy variable differs across regressions. In the regressions for foreign direct investment and total flows, it takes the value of one starting in 1994 and zero otherwise, for all the countries where fdi increases in that year by more than the sample mean. In contrast, in the regression for medium- and long-term debt (sample 4) the dummy variable takes the value of one in 1997 only and for all the sample countries.

Table 4. Determinants of Capital Inflows
Sample 3: 1987–96

	m&lt debt	fdi	Portfolio	tot. flows
lgpib	n/a	0.039	n/a	n/a
lpsb	0.116	-0.044	n/a	n/a
linv	0.207	--	0.074	0.184
ldebtss	-0.221	n/a	--	-0.122
lcrpr	--	-0.004	-0.002	-0.004
lappr	--	--	--	--
rext	--	--	--	-0.337
npkf	2.094	1.471	1.334	--
dummy	n/a	1.286	n/a	2.983
N	236	236	236	236
R-sq	0.202	0.371	0.167	0.442
F test	6.750	13.260	6.470	20.750
Prob>F	0.000	0.000	0.000	0.000

Table 5. Determinants of Capital Inflows
Sample 4: 1987–97

	m&lt debt	fdi	portfolio	tot. flows
lgpib	n/a	0.036	n/a	0.074
lpsb	0.113*	-0.050	n/a	--
linv	0.204	--	0.057	0.151
ldebtss	-0.241	--	--	-0.136
lcrpr	--	-0.004	-0.002	n/a
lappr	--	--	--	n/a
rext	--	--	--	n/a
npkf	1.858	1.569	0.904	3.009
dummy	1.432	1.316	n/a	2.643
N	253	253	253	253
R-sq	0.222	0.380	0.129	0.439
F test	6.350	14.460	5.670	28.690
Prob>F	0.000	0.000	0.000	0.000

Notes for tables 4 and 5

(1) unless indicated with an asterisk, the table reports those coefficients with a mg. sig. level of 10 percent or less. An asterisk indicates a marginal significance level equal to 11 percent.
(2) n/a indicates that the variable was not included in the final regression because preliminary results showed that it was not statistically significant, and its exclusion reduced the collinearity among regressors without significantly changing any of the estimated coefficients.
(3) All estimations use a fix-effects panel with robust standard errors to correct for potential heteroskedasticity problems.
(4) The dummy variable differs across regressions. In the regressions for foreign direct investment and total flows, it takes the value of one starting in 1994 and zero otherwise, for all the countries where fdi increases in that year by more than the sample mean. In contrast, in the regression for medium- and long-term debt (sample 4) the dummy variable takes the value of one in 1997 only and for all the sample countries.

Table 6: Capital Controls (1990s; 27 countries)

	Coef.	Std. Err	t	P>|t|
	Sample 4: 1987–97			
m&lt debt	0.229	0.364	0.630	0.529
tot. flows	-0.183	0.308	-0.594	0.553
fdi	0.008	0.211	0.037	0.970
portfolio	-0.245	0.162	-1.512	0.132
	Sample 3: 1987–96			
	Coef.	**Std. Err**	**t**	**P>|t|**
m&lt debt	0.157	0.399	0.394	0.694
tot. flows	0.092	0.367	0.250	0.803
fdi	0.091	0.232	0.391	0.696
portfolio	-0.190	0.166	-1.147	0.253
	Sample 2: 1987–94			
	Coef.	**Std. Err**	**t**	**P>|t|**
m&lt debt	0.299	0.617	0.485	0.628
tot. flows	-0.544	0.673	-0.809	0.420
fdi	-0.087	0.348	-0.249	0.804
portfolio	-0.513	0.255	-2.014	0.045

Table 7: Determinants of Capital Inflows when Introducing Similarity Indices

A. Sample 1: 1977–84

Regression

Explanatory variable	Total flows	Foreign Direct Investment
Public sector balance (lpsb)	Becomes significant (with negative sign) in all equations	Becomes insignificant in some equations (attains marginal significance level of around 15 percent)
Nominal appreciation (lappr)	Loses significance in all equations (attains marginal significance level of around 15-20 percent)	

B. Sample 2: 1987–94

Regression

Explanatory variable	Foreign Direct Investment	Portfolio flows
GDP growth (lgpib)	Becomes significant in all equations	
Investment rate (linv)	Becomes significant in all equations	Loses significance (attains mg. sig. levels in the range of 13-20 percent)
Private credit (lcrpr)	Becomes statistically insignificant	
Nominal appreciation (lappr)	Becomes significant with incorrect sign in 5 equations	

C. Sample 3: 1987–96

Regression

Explanatory variable	Medium and long-term debt	Total Flows	Foreign Direct Investment
Private credit (lcrpr)	Becomes significant at std. sig. levels in 6 out of 8 equations.		Becomes insignificant
Real ex-post int'l. Int. rate	Becomes insignificant		

D. Sample 4: 1987–97

Regression

Explanatory variable	Foreign Direct Investment	Portfolio flows
Investment rate (linv)		Reduces its marginal significance
Private credit (lcrpr)	Becomes insignificant in all regressions	

Table 8: Determinants of Contagion

SAMPLE 1 1977–84								
M&LT Debt	(Direct) Trade links	Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	1.5982	--	1.7079	--	--	--	1.9363	--
Contagion	--	--	0.0164	--	--	0.0091	--	--
Total Capital Flows		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	--	1.5005	--	--	--	--	--
Contagion	--	--	0.0168	--	--	--	--	--
FDI		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	0.57485	0.6034	0.7414	0.5640	0.5897	0.6018	0.6896	0.7527
Contagion	--	--	0.0188	--	--	--	--	--
SAMPLE 2 1987–94								
M&LT Debt	(Direct) Trade links	Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	--	--	--	--	--	--	--
Contagion	--	0.0225	0.0444	0.0317	--	0.0325	--	0.0291
Total Capital Flows		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	--	3.8300	3.1732	--	3.1851	--	--
Contagion	0.01654	0.0115	0.0162	--	~~-0.0460~~	--	--	0.0581
FDI		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	--	1.9722	1.8855	--	1.8566	2.1079	--
Contagion	--	0.0095	0.0099	--	~~-0.0204~~	--	0.0185	0.0416
Portf. Flows		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	0.61074	0.7677	0.8714	1.0632	1.0027	0.9929	0.9917	--
Contagion	0.01853	0.0161	0.0402	--	--	--	--	0.0906

Note: The table reports all coefficients with a statistical significance less or equal to 10 percent. Strikethrough numbers reflect opposite signs, hence evidence of no contagion.
* stands for a mg. significance level of about 15-13%.

TABLE 8: Determinants of Contagion (concluded)

SAMPLE 3: 1987–96								
M&LT Debt	(Direct) Trade links	Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	2.1158	2.1910	1.9531	2.2587	1.9424	--	--
Contagion	--	--	0.0278	0.0194	--	0.0175	~~-0.0211~~	--
Total Capital Flows		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	--	--	--	--	--	--	--
Contagion	0.007*	--	0.0133	--	~~-0.0210~~	--	--	--
FDI		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	--	--	--	--	--	--	--
Contagion	0.01383	0.0041	0.0102	--	--	--	0.0137	0.0359
Portf. Flows		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	0.98106	1.1969	1.2403	1.1502	1.0174	1.0823	1.0534	--
Contagion	0.0093*	0.0130	0.0329	--	--	0.0195	--	0.0763
SAMPLE 4 1987–97								
M&LT Debt	(Direct) Trade links	Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	--	1.8777	--	--	--	--	--
Contagion	--	--	0.0276	0.0199	--	0.0230	~~-0.0233~~	--
Total Capital Flows		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	1.9572	1.9985	1.9855	1.4792	2.1302	1.9761	--
Contagion	0.01215	--	0.0124	--	~~-0.0216~~	0.0066	--	0.0339
FDI		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	1.2105	1.0706	0.9683	--	--	0.9285	--
Contagion	0.01239	0.0042	0.0078	--	--	--	0.0169	0.0453
Portf. Flows		Inflation	CAD (% GDP)	Int'l Reserves (months of imports)	Foreign debt/Exports	GDP Growth	Exports/GDP	Region
Tot. Flows (npkf)	--	0.7716	0.7821	0.6993	--	0.6146	0.6077	--
Contagion	0.01407	0.0141	0.0334	--	--	0.0197	--	0.0854

Country List

1977–84	1987–97
Sample 1	Samples 2 - 4
Argentina	Argentina
Brazil	Bolivia
Central African Republic	Brazil
Chile	Chile
Cote d'Ivoire	China
Colombia	Cote d'Ivoire
Costa Rica	Colombia
Ecuador	Costa Rica
Ghana	Ecuador
Hungary	Ghana
Indonesia	Hungary
India	Indonesia
Iran, Islamic Rep.	India
Korea, Rep.	Iran, Islamic Rep.
Mexico	Korea, Rep.
Malaysia	Mexico
Nicaragua	Malaysia
Nigeria	Nigeria
Pakistan	Nicaragua
Peru	Pakistan
Philippines	Peru
Paraguay	Philippines
Thailand	Poland
Turkey	Paraguay
Uganda	Thailand
Uruguay	Turkey
	Uganda
	Uruguay