"Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors

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The Role of External Factors

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Capital Inflows and Real Exchange Rate Appreciation in Latin America

The Role of External Factors

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The characteristics of recent capital inflows into Latin America are discussed. It is argued that these inflows are partly explained by conditions outside the region, like the recession in the United States and lower international interest rates. The importance of external factors suggests that a reversal of those conditions may lead to a future capital outflow, increasing the macroeconomic vulnerability of Latin American economies. Policy options, it is argued, are limited. [JEL G1, F41]

THE REVIVAL of substantial international capital inflows to Latin America is perhaps the most visible economic change in the region during the past two years. Capital flows to Latin America, which averaged about $8 billion a year in the second half of the 1980s, surged to $24 billion in 1990 and $40 billion in 1991. Of the latter amount, 45 percent went to Mexico, and most of the remainder went to Argentina, Brazil, Chile, Colombia, and Venezuela. Interestingly, capital is returning to most Latin American countries despite wide differences in macroeco-

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nomic policies and economic performance across the region. In most countries, the capital inflows have been accompanied by an appreciation in the real exchange rate, booming stock and real estate markets, faster economic growth, an accumulation of international reserves, and a strong recovery of secondary-market prices for foreign loans.

Without a doubt, an important part of this phenomenon is explained by the fundamental economic and political reforms that have recently taken place in these countries, including the restructuring of their external debts. Indeed, it would have been difficult to attract the amount of foreign capital mentioned above without these reforms. Nevertheless, although domestic reform is a necessary ingredient for reviving capital flows, it only partially explains Latin America's forceful reentry into international capital markets. Domestic reforms alone cannot explain why capital sometimes flowed to countries that did not undertake reforms and conversely why it sometimes did not flow, except until recently, to countries where reforms were introduced well before 1990. For domestic reforms alone to explain the co-movement of capital inflows across countries in the region, one would have to posit the existence of strong reputational externalities (or "contagion" effects): reforms in some countries give rise to expectations of future reforms in others.[1]

This paper maintains that some of the renewal of capital flows to Latin America results from external factors and can be considered an *external shock* common to the region. We argue that falling interest rates, a continuing recession, and balance of payments developments in the United States have encouraged investors to shift resources to Latin America to take advantage of renewed investment opportunities and the region's increased solvency;[2] economic developments outside the region help to explain the universality of these flows. The present episode may well represent an additional case of financial shocks in the center affecting the periphery—an idea stressed by Diaz-Alejandro.[3]

International capital inflows affect the Latin American economies in at least four ways.[4] First, they increase the availability of capital in the

[1] For a theoretical framework that would accommodate this expectations hypothesis and that finds broad empirical support in developing countries, see Ghosh and Ostry (1992).

[2] Latin America is not the only region to experience increased capital inflows in 1991. Similar developments occurred in Asia and the Middle East. At the same time, there was a marked rise in capital outflows from the United States and Japan.

[3] See Diaz-Alejandro (1983, 1984).

[4] For a recent study of the effects of capital movements, see International Monetary Fund (1991). On the role of reforms and capital account liberalization, see Mathieson and Rojas-Suarez (1992).

individual economies and allow domestic agents to smooth out their consumption over time and investors to react to expected changes in profitability. Second, capital inflows have been associated with a marked appreciation of the real exchange rate in most of the countries. The larger transfer from abroad has to be accompanied by an increase in domestic absorption. If part of the increase in spending falls on nontraded goods, their relative price will increase—the real exchange rate appreciates. Third, capital inflows have an impact on domestic policymaking. The desire by some central banks to attenuate the real exchange rate appreciation in the short run frequently leads them to intervene, purchasing from the private sector part of the inward flow of foreign exchange. Moreover, the attempt to avoid domestic monetization of these purchases has often led the monetary authorities to sterilize some of the inflows, a step that tends to perpetuate a high domestic-foreign interest rate differential and that gives rise to increased fiscal burdens. The extent to which the inflows are sustainable also concerns the authorities. The history of Latin America gives reason for such concern: the major episodes of capital inflows, during the 1920s and 1978–81, were followed by major economic crises and capital outflows, such as in the 1930s and the debt crisis in the mid-1980s.[5] Fourth, capital inflows can provide important—though ambiguous—signals to participants in world financial markets. An increase in capital inflows can be interpreted as reflecting more favorable medium- and long-term investment opportunities in the receiving country. But capital may also pour in for purely short-term speculative purposes, when lack of credibility in a government's policies leads to high nominal returns on domestic financial assets. In fact, several such episodes have occurred in Latin America, where lack of credibility and a short-term financial bubble have been associated with large inflows of "hot money" from abroad. Although it remains to be seen which one of these two scenarios best fits the present picture, the strong recovery in secondary-market prices of bank claims on most of these countries (Figure 1) and various other indicators of country risk provide some support for the first, more favorable, scenario.[6]

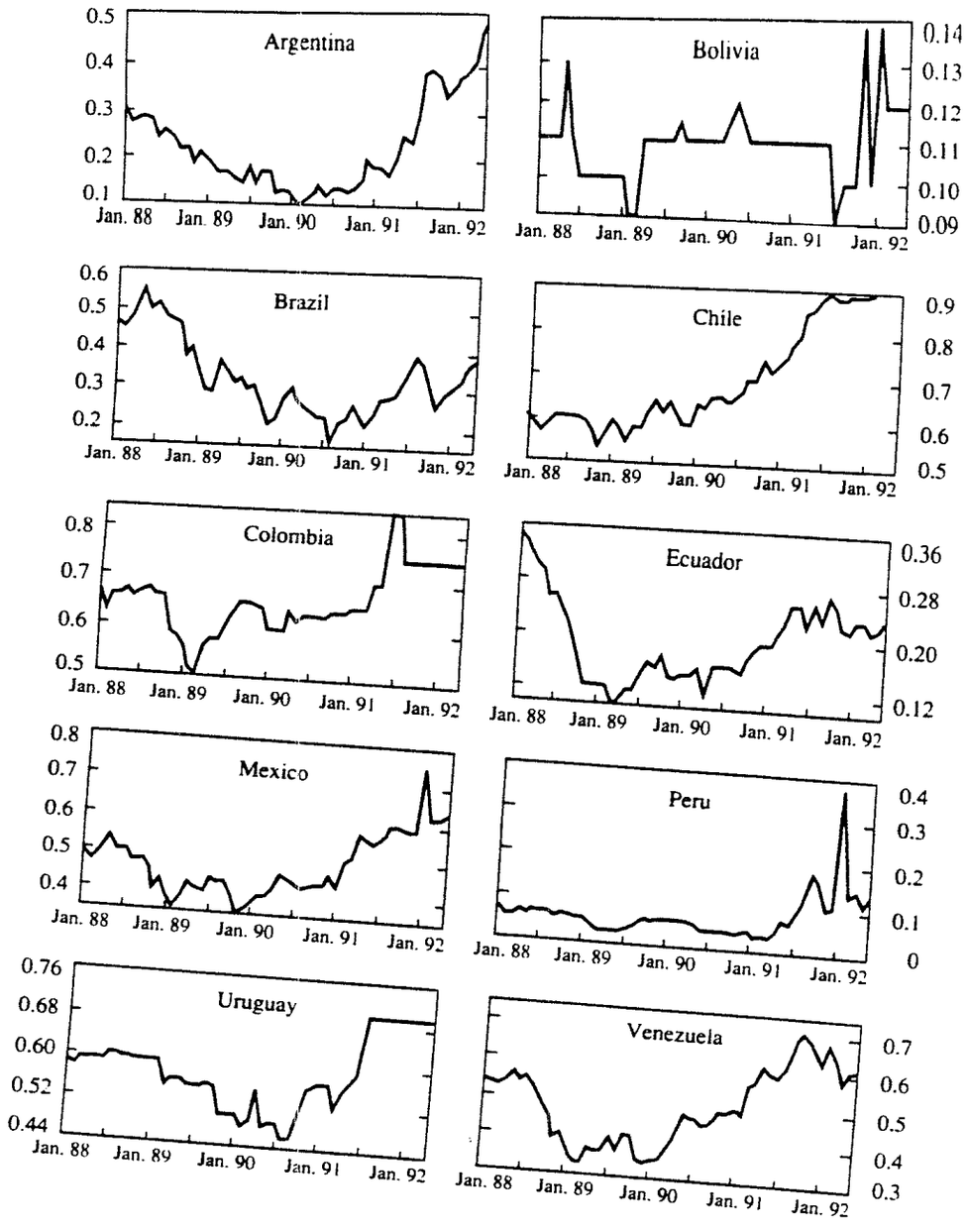
In sum, this paper has three main objectives, which are developed from data for ten Latin American countries.[7] The first is to document the current episode of capital inflows to Latin America. The second is to

[5] For a comparison of the current episode with the late 1970s, see Calvo, Leiderman, and Reinhart (1992).

[6] For the evolution of individual country ratings, see *LDC Debt Report* by Salomon Brothers.

[7] The countries included in our sample are Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay, and Venezuela.

Figure 1. *Secondary-Market Prices for Loans, January 1988–June 1992*
(In percent of face value)



Source: Salomon Brothers, *LDC Debt Report* (various issues).

assess the role of external factors in accounting for the observed capital inflows and the real exchange rate appreciation. The third is to elaborate on the implications of capital inflows for economic policy. In this paper, the first section deals with basic concepts about capital flows and the relationship between capital inflows, the accumulation of reserves, and the gap between national saving and investment. The stylized facts about capital inflows to the region are documented in the second section. A third section provides a quantitative assessment of the role of external factors on the accumulation of reserves and on real exchange rate appreciation in the ten countries considered. The implications of capital inflows for domestic economic policy are discussed in a concluding section.

I. Accounting of Capital Flows

International capital flows are recorded in the nonreserve capital account of the balance of payments (BOP). This account includes all international transactions involving assets other than official reserves, such as transactions in money, stocks, government bonds, land, and factories. When a national agent sells an asset to someone abroad, the transaction enters the agent's country's balance of payments as a credit on the capital account and is regarded as a capital inflow. Accordingly, net borrowing abroad by domestic agents or a purchase of domestic stocks by foreigners are considered capital inflows, representing debt and equity finance respectively.

The simple rules of double-entry accounting ensure that, excluding statistical discrepancies, the capital account surplus, or net capital inflow (denoted by KA), is related to the current account surplus (denoted by CA) and to the official reserves account (denoted by RA) of the BOP through the identity:[8]

$$CA + KA + RA \equiv 0.$$

A property of the current account is that it measures the change in an economy's net foreign wealth. A country that runs a current account deficit must finance this deficit either by a private capital inflow or by a reduction in its official reserves. In both cases, the country runs down its net foreign wealth. Another characteristic of the current account is that national income accounting implies that its surplus equals the difference between national savings and national investment ($CA \equiv S - I$). Ac-

[8]Notice that $RA < 0$ implies the accumulation of reserves by the monetary authority.

cordingly, an increase in the current account deficit can be traced to either an increase in national investment, a decline in national savings, or any combination of these variables that results in an increased investment-savings gap. Finally, the official reserves account records purchases and sales of official reserve assets by central banks. Thus, the account measures the extent of official foreign exchange intervention by the authorities and is often referred to as the official settlements balance or the overall balance of payments.

The foregoing discussion indicates two polar cases of how a central bank might respond to increased capital inflows. If a central bank chooses not to intervene in response to a capital inflow, the increased net exports of assets in the capital account finances an increase in net imports of goods and services in the current account—capital inflows would *not* be associated with changes in the central bank's holdings of official reserves. At the other extreme, if the domestic authorities actively intervene and purchase the foreign exchange brought in by the capital inflow, the increase in KA is perfectly matched by an increase in official reserves. In this case, the gap between national savings and national investment does not change, nor does the net foreign wealth of the economy. The capital inflow would be perfectly correlated with changes in reserves.

In reality, foreign exchange market intervention does not occur on a scale that would produce a one-to-one relationship between RA and KA. The observed increase in capital inflows to Latin America has been partly matched by an increase in the region's current account deficit and partly by an increase in the central banks' official reserves.

II. Stylized Facts

In this section, we quantify some key aspects of the current episode of capital flows to Latin America and related underlying macroeconomic developments.[9] To document the regional aspects of this phenomenon, we aggregate annual data and focus on Latin America as a whole.[10] Monthly data for individual countries are used to provide greater detail. We also elaborate on the role of external developments, especially those in the United States.

[9] See also *Financial Times* (1992), Kuczynski (1992), and Salomon Brothers (1992).

[10] For the purposes of the present section, Latin America includes the same set of countries included under western hemisphere in the IMF's *World Economic Outlook* and *International Financial Statistics*.

Table 1. *Latin America: Balance of Payments, 1973–91*

Year	Balance on goods, services, and private transfers[a]		Balance on capital account[a]		Balance on capital account plus net errors and omissions[a]		Overall balance[b]	
	Billions of dollars (1)	Percent of GDP (2)	Billions of dollars (3)	Percent of GDP (4)	Billions of dollars (5)	Percent of GDP (6)	Billions of dollars (7)	Percent of GDP (8)
1973	−4.7	−2.4	—	—	8.5	4.4	3.8	2.0
1974	−13.5	−5.3	—	—	13.3	5.2	−0.2	−0.1
1975	−16.3	−6.1	—	—	14.7	5.5	−1.6	−0.6
1976	−11.8	−3.8	—	—	16.9	5.4	5.1	1.6
1977	−11.6	−2.7	19.8	4.6	16.4	3.8	4.8	1.1
1978	−19.4	−4.0	30.5	6.2	27.4	5.6	8.0	1.6
1979	−21.7	−3.8	35.0	6.2	32.9	5.8	11.2	2.0
1980	−30.3	−4.3	47.0	6.7	34.0	4.9	3.7	0.5
1981	−43.5	−5.5	59.4	7.4	41.9	5.3	−1.6	−0.2
1982	−42.2	−5.5	45.1	5.9	23.0	3.0	−19.2	−2.5
1983	−11.6	−1.7	22.4	3.2	13.6	1.9	2.0	0.3
1984	−3.2	−0.5	15.5	2.3	12.5	1.8	9.3	1.4
1985	−4.4	−0.6	6.7	0.9	5.5	0.8	1.1	0.2
1986	−18.9	−2.6	14.2	1.9	12.3	1.7	−6.6	−1.0
1987	−12.0	−1.6	14.5	1.9	15.3	2.0	3.3	0.4
1988	−12.4	−1.5	8.2	1.0	4.7	0.6	−7.7	−0.9
1989	−10.0	−1.1	15.7	1.7	12.1	1.3	2.1	0.2
1990	−8.8	−0.8	24.1	2.3	23.9	2.3	15.1	1.4
1991	−22.3	−2.1	38.1	3.8	39.8	3.9	17.5	1.7

Source: IMF, *World Economic Outlook* (various issues).

[a] A minus sign indicates a deficit in the pertinent account. Balance on goods, services, and private transfers is equal to the current account balance less official transfers. The latter are treated in this table as external financing and are included in the capital account.

[b] Column (7) equals the sum of columns (1) and (5). A positive entry in column (7) indicates the accumulation of international reserves by the monetary authorities.

Anatomy of Capital Inflows

Table 1 presents a breakdown of Latin America's balance of payments into three main accounts. The capital inflows appear as surpluses in the capital account: about $24 billion in 1990 and about $40 billion in 1991. A substantial fraction of the flows has been channelled to reserves, which increased by about $33 billion in 1990–91. About 63 percent of the inflow in 1990 was matched by an increase in official reserves, leaving the rest of the inflow to finance the deficit in the current account. Yet, the latter increased markedly in 1991, accounting for 59 percent of the capital inflow. Considering the 1990–91 period as a whole, the net capital inflow was divided equally between a widening current account deficit and higher official reserves. The former suggests that capital inflows have been associated with an increase in the gap between national investment and national savings. In countries like Chile and Mexico, an important part of the inflows has financed increases in private investment; yet, in countries like Argentina and Brazil, there has been a marked rise in private consumption.[11] The increase in official reserves, in turn, indicates that the various monetary authorities met the capital inflow with a heavy degree of foreign exchange market intervention.

Part of the increased capital inflows represents repatriation of previous flight capital, but Latin America is also attracting new investors.[12] As Table 2 reports, an increase in net external borrowing accounts for about 70 percent of the capital inflow in 1990–91. The increase is primarily due to borrowing by the private sector from foreign private banks.[13] Increased external borrowing reflects the restoration of access to voluntary capital market financing after the debt crisis.[14] Portfolio investment and foreign direct investment also increased. The latter amounted to about $12 billion, $4 billion of which resulted from privatizations.[15]

Since there has been a substantial degree of central bank intervention in the face of capital inflows, there is an important degree of co-

[11] These figures, which are available from the authors, express investment and consumption as shares of GDP and rely on preliminary national income accounts data for 1991.

[12] On the role of various policy measures to reverse capital flight—such as amnesties, capital account liberalization, and introduction of foreign-currency-denominated domestic instruments—see Collyns and others (1992) and Mathieson and Rojas-Suarez (1992).

[13] Some of this increased borrowing may represent hidden repatriation of flight capital.

[14] See, for instance, El-Erian (1992) and Collyns and others (1992, chapter III).

[15] For a comprehensive discussion of the composition of the inflows in the recent episode and how it compares to that of the inflows of the late 1970s, see Collyns and others (1992).

Table 2. *Latin America: Items in the Capital Account, 1973–91*
(In billions of U.S. dollars)

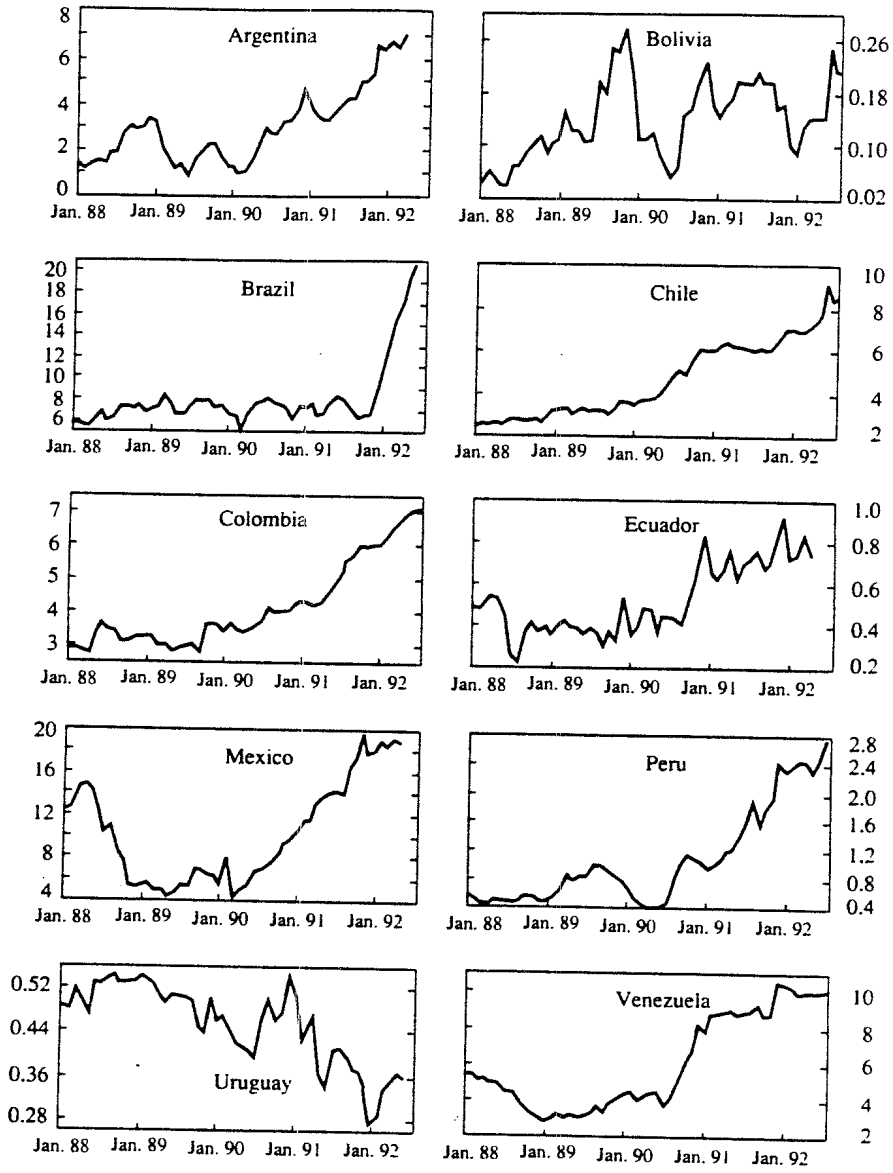
Year	Net external borrowing	Non-debt-creating flows	Asset transactions (net)[a]	Errors and omissions[a]	Total
1973	6.0	2.5	—	—	8.5
1974	11.1	2.2	—	—	13.3
1975	11.4	3.3	—	—	14.7
1976	14.2	2.7	—	—	16.9
1977	19.4	2.8	−2.5	−3.4	16.4
1978	28.0	4.9	−2.5	−3.1	27.4
1979	30.2	7.2	−2.4	−2.1	32.9
1980	43.1	6.8	−3.0	−13.0	34.0
1981	61.0	8.2	−8.9	−17.5	41.9
1982	45.7	7.2	−7.7	−22.1	23.0
1983	18.7	4.6	−0.9	−8.8	13.6
1984	14.1	4.5	−3.1	−3.0	12.5
1985	6.2	6.1	−5.4	−1.4	5.5
1986	11.3	4.3	−1.3	−1.9	12.3
1987	10.0	6.0	−1.2	0.5	15.3
1988	3.8	8.8	−4.3	−3.5	4.7
1989	10.9	6.9	−2.1	−3.6	12.1
1990	28.0	8.6	−12.5	−0.2	23.9
1991	17.3	14.1	6.7	1.7	39.8

Source: Data for western hemisphere from IMF's *World Economic Outlook* (various issues).
[a] These two categories are included in net external borrowing and non-debt-creating flows for the 1973–76 period.

movement between official reserves and capital inflows. In fact, if one is interested in monthly developments, for which direct data on capital inflows are not available, changes in reserves are a reasonable proxy for these inflows. Figure 2, which depicts monthly data on official international reserves for the countries in our sample, shows a pronounced upward trend in the stock of official reserves starting from about the first half of 1990. In 1991, the year with the highest capital inflows to the region, the accumulation of reserves accelerated as the monetary authorities reacted to the inflows by actively increasing their purchases of foreign assets constituting international reserves.[16]

[16] Uruguay is an exception to this pattern: capital inflows were not accompanied by an increase in reserves.

Figure 2. *Total Reserves Minus Gold, January 1988–July 1992*
(Billions of U.S. dollars)



Source: IMF, *International Financial Statistics* (various issues).

Real Exchange Rate Appreciation

Figure 3 provides evidence on the behavior of real effective exchange rates.[17] At least two regularities emerge from the figure. First, with the exception of Brazil, all countries have been experiencing a real exchange rate appreciation since January 1991. In half of the cases, the appreciation began before January 1991. Second, even within a small sample of monthly observations, considerable evidence points to the cyclical behavior of real exchange rates. Leading examples of this phenomenon are Brazil, Chile, and Uruguay. Although some of these cycles can be attributed to fluctuations in capital inflows, they are also the result of other shocks, such as changes in the terms of trade and in domestic monetary, fiscal, and exchange rate policies. Combining the evidence from Figures 2 and 3 indicates an important degree of co-movement in these variables across countries, despite their wide differences in policies and institutions.

Rates of Return Differentials

Expected rates of return on available assets play a key role in investors' decisions about whether or not to move capital internationally. Since data for expected returns are not readily available, and depend on how one models expectations, we first look at actual returns. As shown in Figure 4, there was a large increase in the U.S. dollar stock prices on major Latin American markets in 1991.[18] Argentina's market exhibits the biggest single annual return of almost 400 percent, while Chile's and Mexico's register returns of about 100 percent each.[19] The marked increases in stock market prices have resulted in similar rises in the prices of country and regional market funds traded in the United States and elsewhere. According to the investment bank Salomon Brothers, $850 billion of foreign investment entered Brazil's stock market in the last four months of 1991 and about $600 million entered the Argentine market in 1991.[20] However, as the numbers indicate and Figure 4 confirms, the

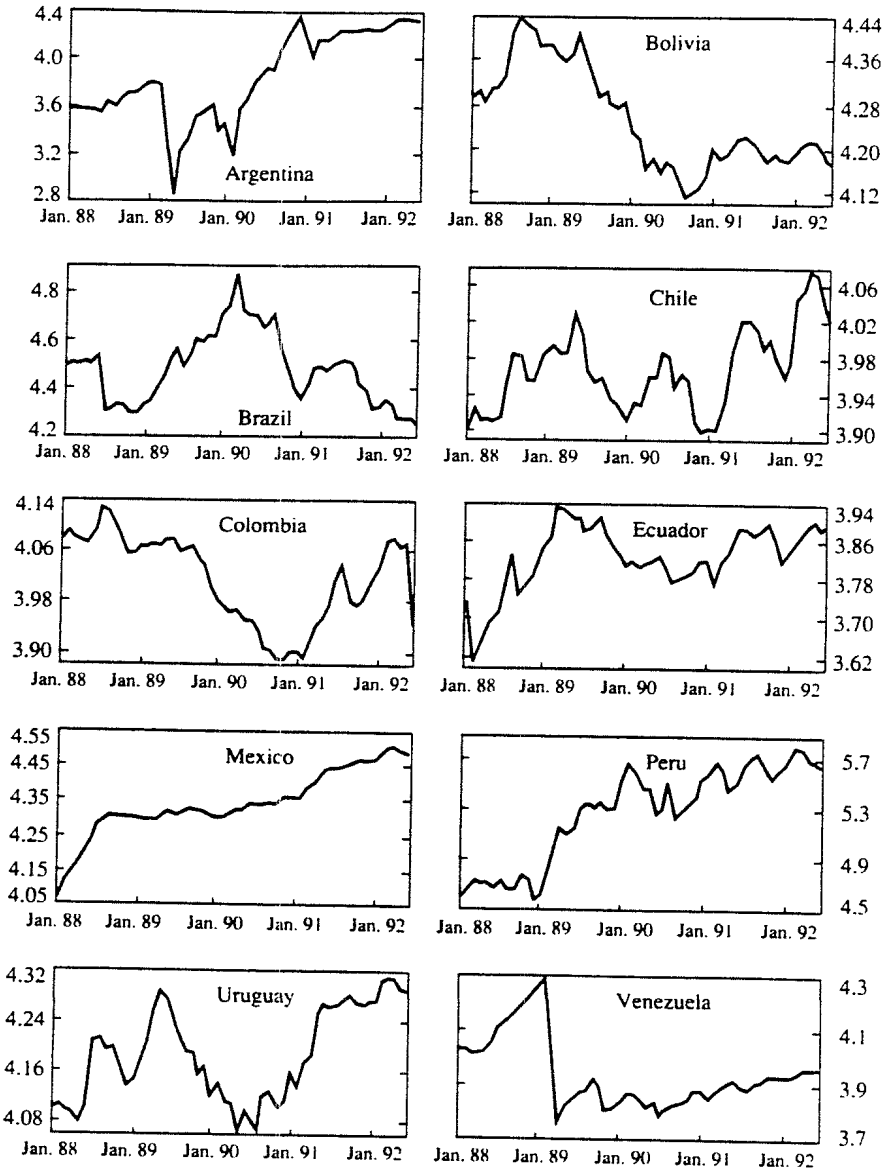
[17] The IMF indices of the real effective exchange rate are used; hence, an appreciation is represented by an increase in the index.

[18] The surge in stock prices during 1991 was followed by a moderate decline in 1992.

[19] The price-earnings ratio in Argentina increased from 3.1 in 1990:IV to 38.9 in 1991:IV; in Chile it increased from 8.9 in 1990:IV to 17.4 in 1991:IV; and in Mexico it moved from 13.2 in 1990:IV to 14.6 in 1991:IV. These figures are from Emerging Markets Data Base, International Finance Corporation.

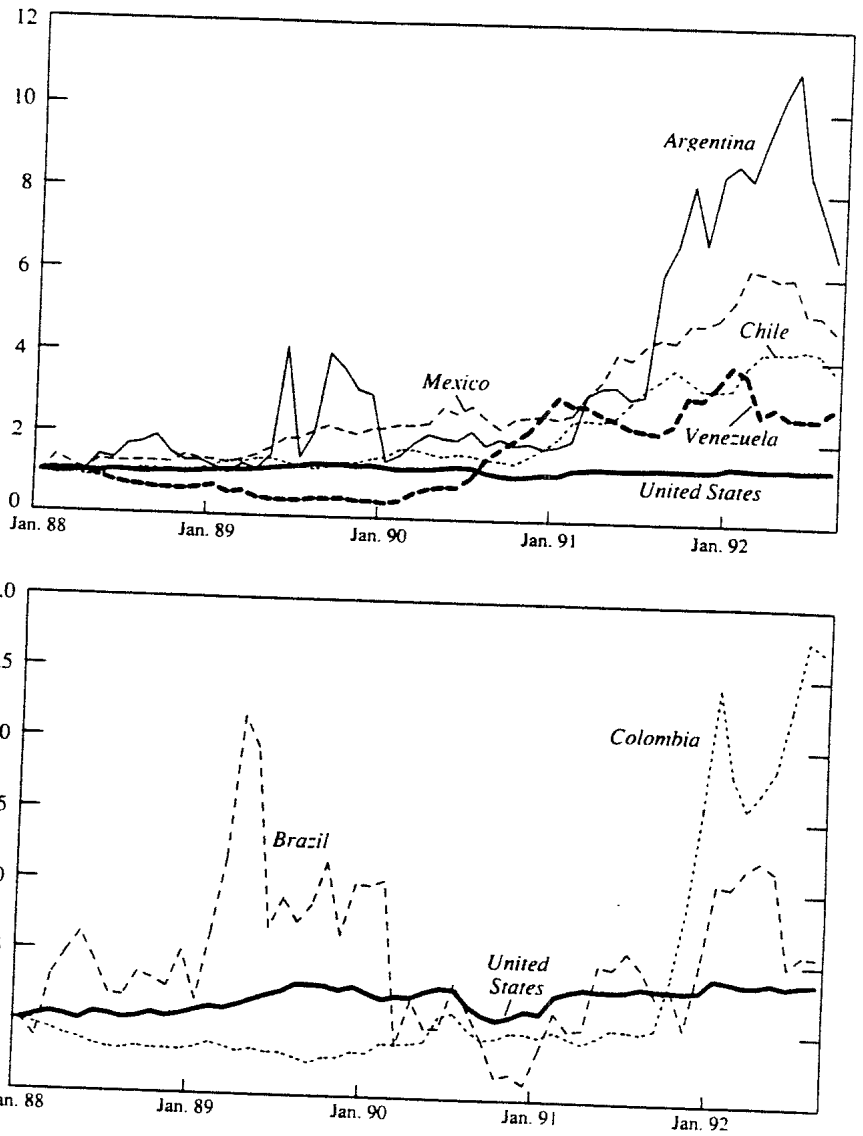
[20] See Salomon Brothers (1992).

Figure 3. *Real Effective Exchange Rates, January 1988–July 1992*



Source: IMF, Information Notice System (data base).
Note: An increase in the index denotes real exchange rate appreciation.

Figure 4. *Stock Market Performance, January 1988–August 1992*
(Stock price indices in U.S. dollars, January 1988 = 100)



Sources: Standard & Poor's (S&P) *Analyst Handbook* and International Finance Corporation, *Quarterly Review of Emerging Stock Markets*.
Note: The S&P 500 index was used for the United States.

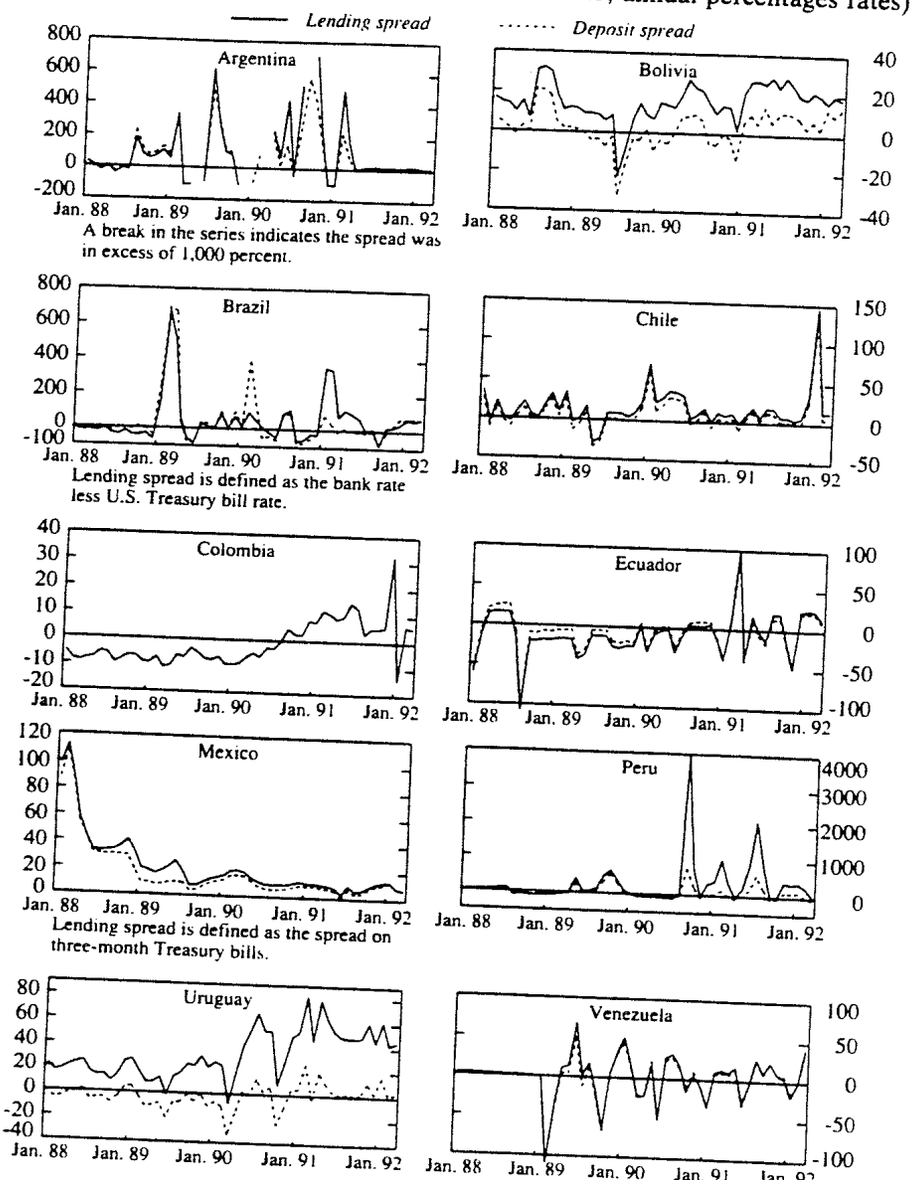
stock market booms and the attendant high returns materialized *after* capital had begun to flow into the region. It would thus be difficult to argue that high differentials on stock market returns were responsible for attracting the first wave of capital.

Figure 5 provides evidence on the lending and deposit interest rate spreads between U.S.-dollar-equivalent domestic interest rates in Latin American countries and interest rates in the United States. Since in some countries interest rates are regulated, and since capital mobility is imperfect, spreads across the various countries cannot be compared in a straightforward manner. In addition, as Figure 5 highlights, the variability in domestic interest rates differs markedly across countries; as such, the scales in the figure vary from country to country, with Argentina and Peru having the broadest ranges and Bolivia and Colombia the narrowest. With these caveats in mind, the dominant impression from Figure 5 is that of relatively high interest rate differentials in Latin America in the 1990–91 period. It is also evident from the figure that the pattern of spreads varies considerably across countries, an unsurprising result since the monetary authorities in these countries have not reacted uniformly to the capital inflows and since the timing of regulatory changes has also varied considerably across the sample countries. Although the relatively high differential rate of return on Latin American assets has been associated with a marked rise in capital inflows to the region, the inflows have not arbitraged away the large differentials. In some countries, such as Argentina, the interest rate differential decreased sharply as capital poured in; in others, such as Chile, interest rate differentials displayed a less pronounced response to the inflows (see Figure 5). As argued later in this paper, these different patterns may reflect cross-country differences in the authorities' use of sterilized versus nonsterilized intervention.

In sum, three main stylized facts emerge with regard to interest rate differentials. First, there is little co-movement in domestic interest rates, and hence in spreads, across the countries in our sample. Second, the "noise-to-signal ratio" of the domestic dollar rates varies substantially across countries. As Figure 6 illustrates, countries offering the highest returns also had the greatest volatility of returns.[21] Third, despite sizable capital inflows, the positive differentials have not been fully arbitraged away. The persistence and size of this wedge between domestic and foreign rates also appear to vary markedly across countries.

[21] An implication of this discussion is that from the investor's perspective the information content of a drop in U.S. interest rates is different from that of an equal rise in the domestic interest rate—although in both cases the interest rate differential would change by the same amount.

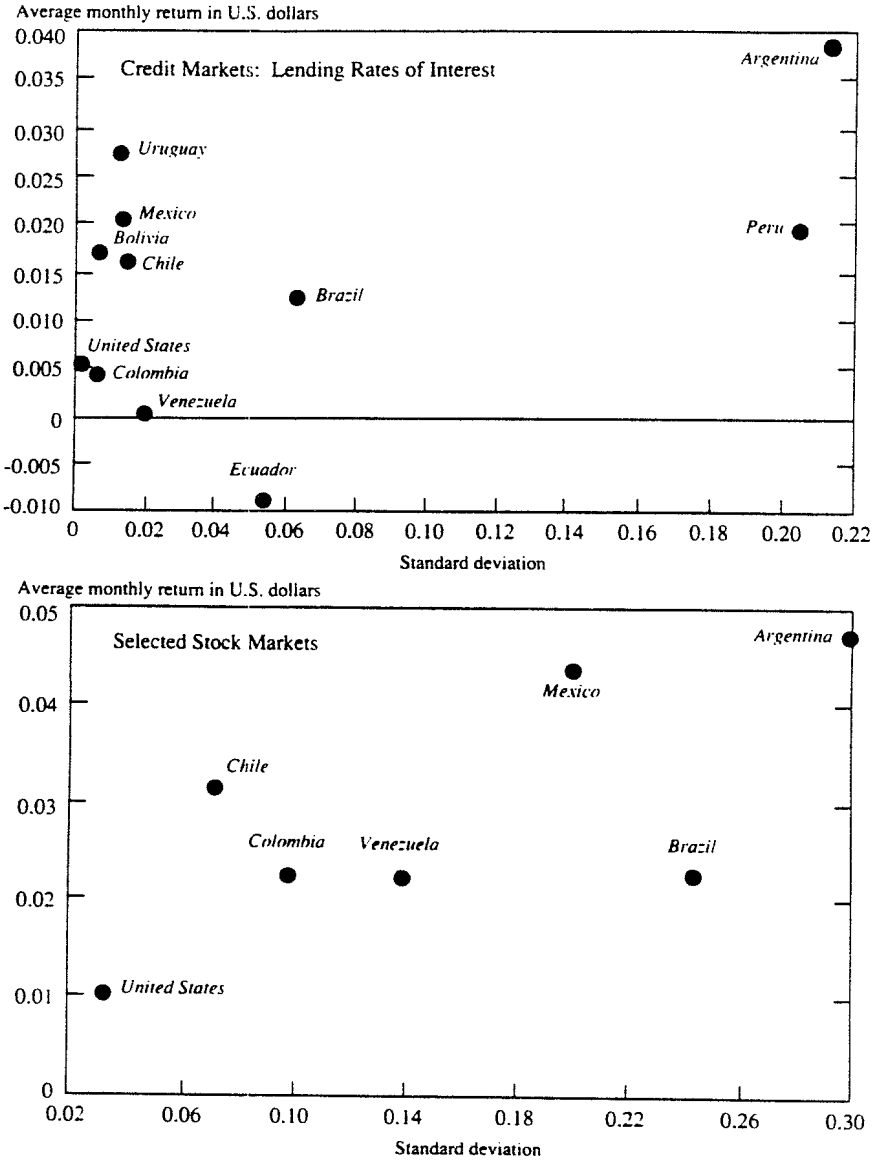
Figure 5. *Interest Rate Spreads, January 1988–March 1992*
(Dollar equivalent of domestic rate less U.S. rate, annual percentages rates)



Sources: IMF, *International Financial Statistics*, and various central bank bulletins.

Notes: Deposit spreads are based on interest rates on certificates of deposit; lending spreads are based on loan rates charged by banks less the interest rate on U.S. commercial paper.

Figure 6. *Risk and Returns*



Sources: IMF, *International Financial Statistics*; various central bank bulletins; International Finance Corporation, *Quarterly Review of Emerging Stock Markets*; and Standard & Poor's *Analyst Handbook*.

Table 3. *Latin America: Macroeconomic Indicators, 1973–91*

Year	Growth of of real GDP (percent change)	Gross capital formation (percent of GDP)	Consumption* (percent of GDP)	Inflation (percent)	Central govt. fiscal balance (percent of GDP)	Commodity prices (percent change)	Terms of trade (percent change)	External debt (billions of dollars)	External debt to exports (ratio)	Debt service (ratio)	Reserves (billions of dollars)	Reserves to imports (ratio)
1973	8.4	29.3	74.5	32.1	—	47.4	6.5	44.4	176.2	29.3	12.0	35.1
1974	6.9	24.4	75.8	37.5	—	20.9	−7.0	58.2	163.4	27.9	11.9	21.7
1975	3.1	24.7	77.7	52.0	—	−12.5	−7.5	68.6	195.8	32.2	10.0	17.5
1976	5.5	23.5	79.6	66.1	—	23.0	12.2	82.0	204.1	31.4	15.2	25.8
1977	5.3	25.1	79.0	49.9	−2.2	27.9	8.0	124.6	192.6	28.2	28.5	28.5
1978	4.1	24.8	78.6	41.9	−2.0	−12.6	−9.4	154.9	215.7	37.1	35.5	35.5
1979	6.1	23.2	79.6	46.5	−0.7	14.0	5.0	187.2	196.8	38.8	42.7	42.7
1980	5.3	23.7	79.7	53.7	−0.6	11.8	7.9	229.4	181.8	33.0	40.3	40.3
1981	1.0	23.0	79.7	58.2	−3.0	−15.3	−5.2	285.6	207.7	40.6	39.6	39.6
1982	−0.9	20.9	80.1	64.6	−4.0	−11.0	−5.0	325.5	264.7	50.4	28.1	28.1
1983	−3.2	17.9	81.2	98.6	−3.7	6.8	−2.7	340.2	288.0	40.7	29.3	29.3
1984	3.6	17.2	79.0	124.2	−4.1	−0.8	4.2	360.3	275.1	40.5	40.5	30.2
1985	3.4	18.4	76.2	128.2	−4.0	−8.3	−5.4	368.2	293.7	42.1	41.2	31.7
1986	4.3	18.2	78.9	79.4	−5.2	5.5	−10.2	381.9	347.9	46.1	33.3	25.6
1987	2.2	19.9	75.1	117.8	−7.0	−6.8	−5.4	419.1	341.4	38.5	38.0	27.7
1988	0.4	20.9	72.7	243.2	−5.8	21.2	−0.6	409.3	294.7	42.7	30.8	20.0
1989	1.0	19.6	72.6	434.2	−6.3	−2.3	0.2	408.9	262.2	30.2	33.0	19.4
1990	−0.1	19.6	77.0	647.8	−0.3	−7.2	−0.1	422.1	251.6	26.9	47.8	26.3
1991	2.9	20.7	—	162.5	−1.0	−5.6	−4.9	440.7	264.8	32.8	65.3	33.5

Sources: Data for western hemisphere from IMF's *World Economic Outlook* and *International Financial Statistics* (various issues).
*This column includes private and government consumption.

Other Macroeconomic Developments

Selected macroeconomic indicators are reported in Table 3. Consider how developments in 1991, the year when capital inflows grew to about $40 billion, differ from those in earlier years. First, economic growth revived. After three years of stagnation, real GDP increased by almost 3 percent in 1991. However, gross capital formation as a percent of GDP remained at about the same level as in the second half of the 1980s, suggesting a more efficient utilization of resources. At the same time, the rate of inflation dropped markedly (though it nevertheless remained at a three-digit level for the region), and central government fiscal deficits came down significantly.

The changing economic conditions in Latin America are also reflected in the region's debt and solvency indicators. At $441 billion, the region's external debt amounts to 2.6 times its exports of goods and services. Although still high, this ratio has decreased markedly from the 3.5 figure in 1986. Since most of Latin America's external debt to commercial banks is still in terms of floating rates, the drop in short-term U.S. interest rates and the drop in the debt-to-export ratio have translated into a rapid decline in the external debt service ratio over the past two years. In fact, the level of the debt service ratio in 1991 (32.8 percent) is about the same as the levels that were observed before the capital inflow episode of the late 1970s.

These developments represent only part of the changing environment in Latin America in the early 1990s. In addition, the move toward privatization and deregulation, the introduction of financial reforms, and the restructuring of existing external debt have all contributed to returning Latin America to the list of viable investment locations in world financial markets.

External Factors

It is difficult to point to a single dominant external factor that would account for the recent capital inflows to Latin America, as several external developments have converged to stimulate such flows. First, there has been the sharp drop in U.S. short-term interest rates to about half their level two years ago, their lowest levels since the early 1960s. By reducing the external debt service on floating-rate obligations, this decline in U.S. interest rates has improved the solvency of Latin American debtors. For a given level of interest rates in Latin America, these developments provide incentives for the repatriation of capital held in the United States and for increases in borrowing by Latin American agents from capital

markets in the United States. Beyond short-term interest rates, returns from other investments in the United States have decreased as well, such as in the real estate market.[22]

Second, several external factors probably contributed to the increase in Latin America's current account deficit and to the need to finance this deficit by increased capital inflows. Two such factors are the continuing recession in the United States and in other industrialized countries and the continued decline in Latin America's terms of trade throughout the past decade—which mainly reflects a decrease in the prices of petroleum and other commodities. In principle, a decline in a country's terms of trade can be expected to result in a larger current account deficit (the Harberger-Laursen-Metzler effect) and, in the absence of major intervention by the national authorities, in a larger capital inflow to finance this deficit. However, the changes in the terms of trade in 1990–91 are too small to account for the sharp increase in capital inflows: Latin America's terms of trade only decreased by 1.2 percent in 1990 and by 5.2 percent in 1991. This pattern contrasts with earlier episodes in which terms of trade changes were probably the main shocks explaining fluctuations in the capital account; Diaz Alejandro (1983) documents that between 1928/29 and 1932/33, there was an average decline of about 48 percent in the terms of trade of five Latin American countries.[23] In short, autonomous shocks to international capital flows seem to play a larger role than terms of trade shocks in accounting for the most recent capital inflows.

Third, during both of the most recent episodes of capital inflows to Latin America—1978–82 and 1990–91—there were sharp swings in the private capital account of the U.S. balance of payments in the form of increased outflows and reduced inflows (Table 4). In fact, the years 1990 and, even more so, 1991 register the first net capital outflows from the United States after eight consecutive years of net inflows![24] That this

[22] Also, there was a 4 percent decrease in U.S. corporate profits, while corporate profits in other regions (including Latin America) increased by 10 percent in dollar terms.

[23] The countries are Argentina, Brazil, Colombia, Cuba, and Mexico.

[24] Some examples of this development follow. First, there has been an increase in the amount of investments in foreign securities by mutual funds in the United States. As of May 1992, the assets of stock funds that invest largely outside the United States stood at $41.8 billion, more than twice the level at the end of 1988, and assets of global funds have soared to $28.5 billion from just $3 billion in 1988. Second, in 1991, the sale of foreign shares in public and private deals doubled, to a record $9.8 billion. Bond deals rose 48 percent to $55.3 billion. Third, new foreign investment in U.S. companies and real estate plummeted 66 percent in 1991. See *The New York Times* (July 5, 1992).

As indicated earlier, private capital outflows from Japan also increased sharply in 1991, by $36 billion.

Table 4. *United States: Balance of Payments, 1973–91*
(In billions of U.S. dollars)

Year	Current account	Capital account	Capital account plus net errors and omissions	Overall balance
1973	7.07	−9.71	−12.30	−5.23
1974	1.94	−9.25	−10.75	−8.81
1975	18.06	−28.67	−22.71	−4.65
1976	4.18	−25.24	−14.68	−10.50
1977	−14.49	−18.46	−20.55	−35.04
1978	−15.40	−30.63	−18.08	−33.48
1979	0.20	−14.53	9.75	9.95
1980	1.20	−35.91	−10.26	−9.06
1981	7.26	−28.07	−8.50	−1.24
1982	−5.86	28.79	7.89	2.03
1983	−40.18	24.72	36.13	−4.05
1984	−98.99	72.52	99.71	0.75
1985	−122.25	108.18	128.05	5.80
1986	−145.42	95.78	111.64	−33.78
1987	−162.22	98.68	105.36	−56.86
1988	−128.99	101.05	92.72	−36.27
1989	−106.41	104.91	123.34	16.93
1990	−92.16	−4.60	58.90	−33.26
1991	−8.66	−18.20	−21.30	−29.96

Sources: IMF, *International Financial Statistics* and U.S. Department of Commerce, *Survey of Current Business* (various issues).

change is associated with changes in the capital account of Latin America is clear from Table 5, where it is shown that about 60 percent of the increased capital inflows in 1991 are directly associated with increased private capital outflows from the United States to Latin America, as recorded in the U.S. BOP accounts. Similarly, the relatively large capital inflow of 1978–81 to Latin America was matched by increased private capital outflows from the United States, and the U.S. capital inflow episode of 1983–89 was matched by increased capital outflows from Latin America.[25] In other words, the data appear to support the notion that swings in private capital outflows from the United States play a key

[25] It is useful to recall how sizable these inflows to the United States were in the mid-1980s (Table 4). From net capital outflows of about $20 billion a year in the late 1970s, the private capital account turned into surpluses (capital inflows) that peaked at $128 billion in 1985. These inflows, which mainly took the form of increased borrowing from abroad, were mostly used to finance high and increasing current account deficits, which rose well above $100 billion in the second half of the 1980s.

Table 5. *Changes in Capital Accounts*
(In billions of U.S. dollars)

Periods compared	Private capital account of western hemisphere (1)	Private capital account of United States with western hemisphere (2)
1978–81 against 1976–77	17.4	−9.9
1983–89 against 1978–81	−24.4	30.1
1991 against 1983–89	30.1	−17.5

Note: Positive entries in column (1) indicate an increase in net private capital flowing into the western hemisphere. A negative entry in column (2) indicates an increase in the net private capital outflow from the United States to the western hemisphere.

role as external impulses affecting the size of capital inflows into Latin America.

A fourth external factor was the important regulatory changes to occur in the capital markets of industrial countries in 1990, changes that reduced the transactions costs for agents accessing international capital markets from Latin America and other developing countries.[26] Perhaps, the most salient changes were the approval of "Regulation S" and "Rule 144A" in the United States, which reduced transaction and liquidity costs faced by developing countries in approaching capital markets there.

III. Role of External Factors: Econometric Analysis

In this section, monthly data for ten Latin American countries covering the period January 1988 to December 1991 are used to analyze key features of the recent capital inflows. The analysis begins by establishing the extent of co-movement of official reserves and real exchange rates among these countries since they proxy for capital flows. We then develop and estimate a model designed to assess the relative importance of external shocks in the reserves accumulation and real exchange rate appreciation.

Co-Movement of Reserves and the Real Exchange Rate

Given the lack of monthly data (and, for a number of countries in the sample, quarterly data) on capital inflows, we examine the joint behavior of international reserves and the real exchange rate, two variables that

[26] Our discussion here draws heavily on El-Erian (1992).

have been closely associated with the recent inflows. The previous section revealed an important degree of co-movement in reserves and real exchange rates across countries, which could be interpreted as reflecting the effects of a common external shock to Latin American countries (Figures 2 and 3). Accordingly, a first task in this section is to examine this issue quantitatively by using principal components analysis. Principal components analysis can describe the co-movement in data series.[27] We begin with ten time series, recording reserves for each country, and then construct a smaller set of series, the principal components, to explain as much of the variance of the original series as possible.[28] The higher the degree of co-movement existing among the original ten series, the fewer is the number of principal components needed to explain a large portion of the variance of the original series. If the ten series are identical (perfectly collinear), the first principal component will explain 100 percent of the variation of the original series. Alternatively, if all ten series are perfectly uncorrelated, it will take ten principal components to explain all of the variance in the original series; no advantage would be gained by looking at common factors, since none exists.

The procedure begins by standardizing the variables, so that each series has a zero mean and a unit standard deviation. This standardization ensures that all series receive uniform treatment and that the construction of the principal components indices is not influenced disproportionately by the series exhibiting the largest variation.

We construct the principal components indices for the period from January 1988 to December 1991. In addition, for comparative purposes, two subperiods are considered: 1988–89 and the capital inflow episode of 1990–91. As Figure 2 has shown and Table 6 confirms, the extent of co-movement in reserves during the capital inflow period of 1990–91 is considerable, higher than in the preceding two years. The first principal component explains 67 percent of the variation in reserves, and the second principal component explains an additional 13 percent of the variation. Accordingly, 80 percent of the variance in the ten reserves series is captured by two indices, indicating a sizable degree of co-movement. More formally, we tested the null hypothesis that the ten reserves series are linearly independent and found that this hypothesis could be rejected at standard significance levels.[29]

[27] For an exposition of principal components analysis, see Dhrymes (1970). Swoboda (1983), in an application that is close to ours in spirit, used this approach to examine economic interdependence across different exchange rate regimes for six of the Group of Seven countries.

[28] The analysis that follows uses the logs of reserves and logs of the real exchange rate.

[29] The test statistics, which are distributed as a χ^2 with 45 degrees of freedom, and the attendant probability values are presented at the bottom of Table 6.

Table 6. *Establishing the Co-Movement in Macroeconomic Series*

	1988:1 to 1991:12	1988:1 to 1989:12	1990:1 to 1991:12
Real exchange rate			
Cumulative R^2 for:			
First principal component	0.44	0.41	0.58
Second principal component	0.73	0.78	0.79
χ^2 (45 df)	...	302.01	286.31
Probability value	...	(0.00)	(0.00)
Reserves			
Cumulative R^2 for:			
First principal component	0.61	0.48	0.67
Second principal component	0.77	0.69	0.80
χ^2 (45 df)	...	204.97	297.23
Probability value	...	(0.00)	(0.00)
Domestic inflation rate (12-month percent change)			
Cumulative R^2 for:			
First principal component	0.37	0.60	0.45
Second principal component	0.57	0.88	0.64
χ^2 (45 df)	...	475.94	306.40
Probability value	...	(0.00)	(0.00)

Note: The cumulative R^2 gives the percentage of the variance of the original series explained by the indicated principal components.

Applying the same procedure to ten data series describing the real exchange rate indicates that the degree of co-movement across countries in the region has also increased in the recent capital inflow episode. The fraction of real exchange rate variance explained by the first principal component during 1990–91, 58 percent, is substantial, although somewhat lower than for reserves. The first two principal components explain a sizable 79 percent of the variance of the real effective exchange rate. A number of factors, such as cross-country differences in exchange rate regimes and in the degrees of wage and price flexibility, are likely to account for the lower degree of co-movement observed in the real exchange rate when compared with reserves.

As for the increased covariation of reserves and the real exchange rate in the recent period, it may well reflect the effects of an external shock common to the region in the past two years. Interestingly, when we examined the principal components of the domestic inflation rate, a variable less obviously linked to external factors, we found that the extent of co-

variation among the inflation rates of these ten countries had diminished rather than increased in the recent period.[30]

The correlations between the first principal component of reserves and the individual country reserves series tend to confirm the evidence in Figure 2. The regional index does quite well in accounting for reserve fluctuations in eight of the ten countries. For the real exchange rate, the results are anticipated in Figure 3.[31]

The first principal components (plotted in Figure 7) could be interpreted as regional exchange rate and reserves indices. Purged of country-specific idiosyncracies, they could reflect the influence of unobservable external factors common to the region as well as any coordinated internal developments in the region. To explore the possible role of external factors, Table 7 shows the correlation between the first principal components for the reserves series and the real exchange rate series and a set of variables from the United States. The latter includes the nominal rates of return on real estate, stock and bond markets, short-term deposit and lending rates of interest, and detrended real disposable income.

As discussed earlier, it seems plausible to hypothesize that a fall in U.S. interest rates, stock market returns, real estate returns, and economic activity would be associated with an increase in the flow of capital to Latin America, which would at least be partly reflected in an increase in the regional indices for reserves and the real exchange rate (the latter indicating a real exchange rate appreciation). Indeed, most of the evidence on simple pairwise correlation coefficients is in this direction (Table 7). Notice that the correlations of the U.S. variables with the real exchange rate index are lower than those of the reserves index, although they are still substantial.

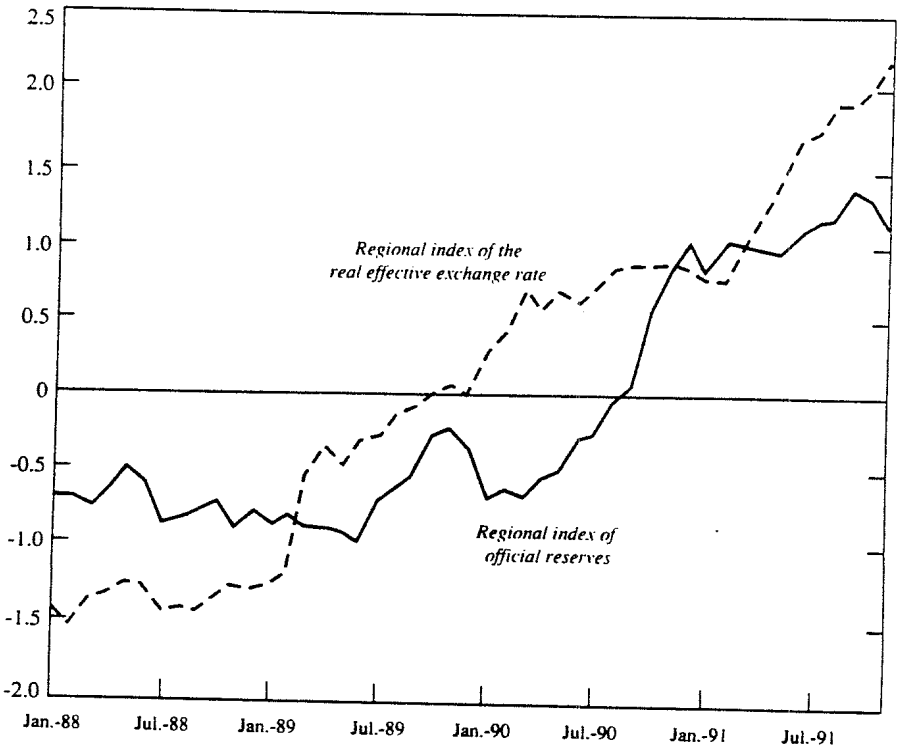
Having assessed the degree of cross-country co-movement in reserves and the real exchange rate, we next examine the dynamic interaction between these two variables in each country. Combining Figures 2 and 3 indicates a pattern of co-movement in which the increase in reserves precedes the real appreciation in the exchange rate.[32] This temporal pattern differs from what would have emerged had there been a shock

[30] Applying a different methodology, Engle and Issler (1992) find significant co-movement in the per capita GDP of several Latin American countries, as these countries share common trends and common cycles.

[31] Notice that, as shown in Figure 3, Brazil's real exchange rate depreciated through most of the sample period and its upturn came fairly late. Thus, it is not surprising to find that the regional exchange rate index, the first principal component, does poorly in capturing its fluctuations. In effect, the correlation is negative. These details are available upon request.

[32] Morande (1988) noted this pattern of interaction for the case of Chile in the previous capital inflow episode of 1977–82.

Figure 7. *First Principal Components, January 1988–December 1991*



Notes: An increase in the real effective exchange rate index denotes an appreciation. Principal components indices are constructed to have a zero mean and unit variance.

to the external terms of trade, or to the real exchange rate, followed by accommodating reserve accumulation. In order to investigate this issue more formally, we performed Granger causality tests for each of the ten countries using monthly data from January 1988 to November 1991.[33] On balance, the results characterize the recent episode as one in which the reserve accumulation preceded the real exchange rate appreciation.[34]

[33] The tests are performed on the logarithms of the levels of the variables, and each equation includes a constant and a time trend.

[34] These results are not reported but are available upon request. The contemporaneous relationship between reserves and the real exchange rate, about which Granger causality tests are silent, is explored in the next section.

Table 7. *Contemporaneous Correlations of the Regional Variables with Selected U.S. Indicators, 1988–91*

U.S. variables	First principal component of reserves	First principal component of the real exchange rate
Treasury bill rate	−0.922	−0.603
Certificate of deposit	−0.928	−0.694
Commercial paper	−0.926	−0.691
Treasury long bond	−0.696	−0.668
One-month capital gain in S&P 500	0.001	−0.107
12-month capital gain in S&P 500	−0.086	0.136
One-month capital gain in real estate[a]	−0.095	−0.041
12-month capital gain in real estate[a]	−0.445	−0.707
Deviations from trend in real disposable income	−0.939	−0.730

Sources: IMF, *International Financial Statistics*, and data from Data Resources Incorporated.

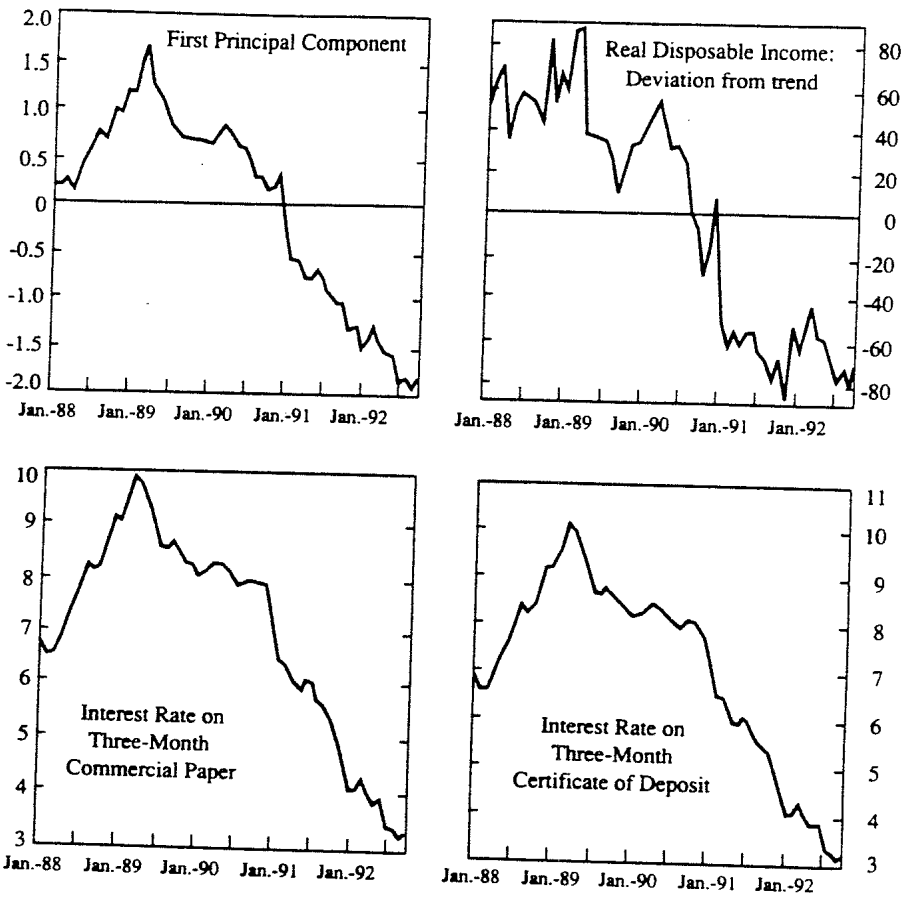
[a] Measured using prices of existing homes.

Quantifying the Role of External Factors

In this section, the analysis proceeds in two stages. First, we construct indices of the unobserved external factors (or impulses), which are then incorporated into a structural vector autoregression (VAR). Second, we perform tests of exclusion restrictions on the foreign factors to determine their statistical significance, and we compute variance decompositions to quantify their relative importance in accounting for forecast error variance of reserves and real exchange rates. Impulse response functions show how reserves and real exchange rates react to an external shock.

In modeling the external impulses, one could consider a whole vector of variables that could affect Latin American economies. Here we opt for an unobserved index model, where the constructed index is correlated with the observed time series for the United States, which appear in Table 7. Specifically, we construct and use the first and second principal components of these series. Figure 8 illustrates how closely the first principal component captures the joint movement of the various interest rates and economic activity in the United States. The second principal

Figure 8. *External Variables, January 1988–October 1992*



Sources: Board of Governors of the Federal Reserve System, U.S. Department of Commerce, and the authors.

Note: Principal components indices are constructed to have a zero mean and unit variance.

component captures swings in returns on the equity and real estate markets. Having a measure of external impulses, we then embed them in a structural VAR. Defining $PC1_t$ and $PC2_t$ as the first and second principal components of the U.S. variables and denoting the logs of reserves and the real exchange rate by RES_t and REX_t, respectively, the reduced form of the system is given by

$$
\begin{aligned}
PC1_t &= \alpha_1 + \gamma_1 t + \sum_{i=1}^{n} \beta_{1i} PC1_{t-i} + \sum_{i=1}^{n} \beta'_{1i} PC2_{t-i} + u_t^{PC1},\\
PC2_t &= \alpha_2 + \gamma_2 t + \sum_{i=1}^{n} \beta_{2i} PC1_{t-i} + \sum_{i=1}^{n} \beta'_{2i} PC2_{t-i} + u_t^{PC2},\\
RES_t &= \alpha_3 + \gamma_3 t + \sum_{i=1}^{n} \beta_{3i} PC1_{t-i} + \sum_{i=1}^{n} \beta'_{3i} PC2_{t-i}\\
&\quad + \sum_{i=1}^{n} \delta_{3i} RES_{t-i} + \sum_{i=1}^{n} \delta'_{3i} REX_{t-i} + u_t^{RES},\\
REX_t &= \alpha_4 + \gamma_4 t + \sum_{i=1}^{n} \beta_{4i} PC1_{t-i} + \sum_{i=1}^{n} \beta'_{4i} PC2_{t-i}\\
&\quad + \sum_{i=1}^{n} \delta_{4i} RES_{t-i} + \sum_{i=1}^{n} \delta'_{4i} REX_{t-i} + u_t^{REX}. \qquad (1)
\end{aligned}
$$

As equation (1) illustrates, we allow for dynamic interaction between the foreign factors but impose temporal exogeneity on them by not including lagged values of the endogenous variables (reserves and the real exchange rate) in their respective equations ($\delta_{1i} = \delta_{2i} = \delta'_{1i} = \delta'_{2i} = 0$). Hence, we impose structure on the temporal relationships between these variables.[35] Each equation in the system includes a constant and a time trend. Since the number of lags included in the right hand side of each equation could affect the tests, and given that we had no strong priors on this issue, we used the Akaike and Schwarz criteria to select among one-, three-, six-, nine-, and 12-month lag profiles.[36] These criteria, unless otherwise noted, yielded three lags as optimal.

The reduced-form residuals, the u_t, depend on the structural errors, denoted e_t, and the contemporaneous relationships among the endogenous variables, specifically $u_t = e_t \mathbf{A}$. So next, we consider the structure of the matrix $\mathbf{A}$, which describes the contemporaneous relationships among the variables. In the general case, a causal ordering amounts to assuming that the endogenous variables enter the system in a triangular form, with the first equation containing one endogenous variable, the second two variables, and so on, giving a specific form to the $\mathbf{A}$ matrix.

[35] Our procedure is similar to the DYMIMIC models associated with Watson and Engle (1983) and Stock and Watson (1989). One key difference in the approaches is that here we adopt a two-step procedure by first constructing the unobserved factor index (indices) and then incorporating that factor(s) in a dynamic model.

[36] For simulation evidence on the efficacy of these criteria, see Lütkepohl (1985).

Instead, we follow the methodology of Bernanke (1986) and Blanchard (1989): *a priori* (structural) restrictions are imposed on the identifying matrix. Specifically, since the foreign factors are presumed exogenous, we do not allow for feedback from the shocks to the domestic variables to the reduced-form error of the first and second principal components of the foreign variables. In addition, we impose the restriction that the principal components indices are orthogonal by construction, so that they depend on their own shocks, as in equations (2) and (3),

$$PC1_t = e_t^{PC1}, \tag{2}$$

$$PC2_t = e_t^{PC2}, \tag{3}$$

while reserves are affected by the structural shocks to the foreign variables and by a shock to reserves themselves,

$$RES_t = a_{31}\,PC1_t + a_{32}\,PC2_t + e_t^{RES}, \tag{4}$$

$$REX_t = a_{41}\,PC1_t + a_{42}\,PC2_t + a_{43}\,RES_t + e_t^{REX}. \tag{5}$$

The real exchange rate is allowed to respond to all of the shocks.[37]

After the system is estimated using monthly data from January 1988 to November 1991, we test for the significance of the foreign factors. Table 8 summarizes the results of the tests for exclusion restrictions, tests that involve the temporal relationships. The null hypothesis being tested is that the foreign variables do not affect reserves and the real exchange rate. The high χ^2 statistics and low probability values indicate that in eight of the ten countries, one can reject the null hypothesis at a 75 percent level of confidence or higher.[38] Only in half of the sample countries is there any evidence of a significant contemporaneous relationship between the foreign factors and reserves or the real exchange rate.

Although Table 8 provides evidence on only the statistical significance of the relationships among the variables, it is also useful to assess the relative importance of the foreign impulses. For this purpose, we examine variance decompositions and the impulse responses of the real exchange rate and official reserves. Two observations are worth noting from the results of the variance decompositions of real exchange rate forecast errors presented in Table 9. First, for most countries, foreign factors account for a sizable fraction (about 50 percent) of the monthly forecast

[37] Alternative orderings are explored. One alternative imposes that there be no contemporaneous relationship between reserves and the real exchange rate, while another treats reserves as the most "endogenous" variable in the system. The results do not differ appreciably from those presented here.

[38] Evidence suggesting the importance of U.S. economic developments on the Latin American business cycle is presented in Engle and Issler (1992).

Table 8. *Tests for the Significance of Foreign Factors, 1988–91*

Country	Test for exclusion restrictions: Chi-squared statistic	Contemporaneous relationships: a_{31}	a_{32}	a_{41}	a_{42}
Argentina	14.981	0.091	−0.451	−0.225	−0.140
	(0.242)	(0.243)	...	(0.405)	...
Bolivia	16.167	−0.092	−0.533	−0.011	−0.041
	(0.184)	(0.170)	(0.045)	(0.030)	...
Brazil	23.224	−0.045	0.481	0.043	0.323
	(0.026)	(0.011)	...	(0.327)	...
Chile	29.527	−0.031	−0.246	−0.018	0.545
	(0.003)	(0.041)	(0.026)	(0.152)	...
Colombia*	31.548	−0.014	−0.048	0.009	0.024
	(0.002)	(0.157)	...	(0.176)	...
Ecuador	17.285	−0.230	0.668	−0.070	1.359
	(0.139)	(0.139)	(0.082)	(0.376)	...
Mexico	23.203	−0.136	−0.324	−0.056	−0.063
	(0.026)	(0.216)	...	...	(0.627)
Peru	25.058	0.121	0.150	0.022	0.203
	(0.015)	(0.061)	(0.017)	(0.128)	...
Uruguay	11.275	−0.042	0.197	−0.050	0.076
	(0.505)	(0.042)	(0.012)	(0.153)	...
Venezuela	9.342	−0.045	−0.280	0.003	0.743
	(0.673)	(0.266)	...	(0.054)	...

* According to the Akaike and Schwarz criteria, the optimal lag length was six months.

error variance in the real exchange rate. Second, a pattern appears among the countries considered. Foreign factors explain the greatest share of the variance of the real exchange rate in countries that experienced no major changes in domestic policies in the period under consideration, 1988–91: Bolivia, Colombia, Chile, and Ecuador implemented their stabilization programs well before our sample started.[39] Foreign factors explain the least for Argentina, Brazil, Mexico, and Venezuela, all countries where significant changes in domestic policy took place during the sample period.[40]

Foreign factors also account for a sizable fraction of the forecast error variance in monthly reserves in most of the countries considered, as is clear from the variance decompositions presented in Table 10. It turns out

[39] Bolivia's program began in August 1985; Colombia had programs in 1985–86; Chile's stabilization dates to the Tablita program of 1978.

[40] Argentina has had three stabilization plans during the period considered; Brazil has had four. The Mexican plan began in December 1987 and has continued throughout the period. Venezuela floated its exchange rate in January 1989.

Table 9. *Decomposition of Variance: Real Exchange Rate*

Country	Months	Standard error	Foreign factor	Reserves	Real exchange rate
Argentina	1	0.706	36.331	3.096	60.573
	6	0.917	28.141	12.881	58.978
	12	0.949	30.350	12.772	56.878
	24	0.974	33.668	12.185	54.146
Bolivia	1	0.059	50.275	0.012	49.713
	6	0.128	57.185	2.245	40.570
	12	0.134	57.732	2.126	40.142
	24	0.139	61.239	1.958	36.803
Brazil	1	0.629	50.796	0.000	49.204
	6	1.253	48.370	0.529	51.101
	12	1.414	48.600	0.546	50.855
	24	1.477	49.166	0.547	50.288
Chile	1	0.292	51.208	0.024	48.768
	6	0.461	53.343	0.022	46.635
	12	0.468	53.395	0.027	46.578
	24	0.468	53.400	0.028	46.572
Colombia	1	0.344	51.697	0.013	48.290
	6	0.715	53.234	0.064	46.703
	12	0.797	53.250	0.052	46.697
	24	0.827	53.495	0.048	46.456
Ecuador	1	0.728	50.747	0.006	49.247
	6	1.125	50.861	0.013	49.126
	12	1.131	50.952	0.013	49.035
	24	1.133	51.093	0.013	48.894
Mexico	1	0.609	47.346	0.142	52.512
	6	1.163	46.439	0.231	53.330
	12	1.242	46.342	0.249	53.409
	24	1.252	46.442	0.250	53.308
Peru	1	0.224	45.589	0.512	53.898
	6	0.302	42.408	3.065	54.527
	12	0.339	47.796	3.694	48.510
	24	0.373	55.599	3.313	41.088
Uruguay	1	0.293	50.547	0.008	49.445
	6	0.563	51.202	0.059	48.739
	12	0.578	51.074	0.099	48.827
	24	0.581	51.229	0.100	48.671
Venezuela	1	0.246	49.910	0.006	50.083
	6	0.347	47.950	1.730	50.320
	12	0.372	48.748	2.503	48.749
	24	0.383	49.985	2.922	47.092

Table 10. *Decomposition of Variance: Official Reserves*

Country	Months	Standard error	Foreign factor	Reserves	Real exchange rate
Argentina	1	0.457	46.939	53.061	0.000
	6	0.917	28.141	12.881	58.978
	12	0.965	23.908	48.220	27.873
	24	1.005	29.242	44.649	26.109
Bolivia	1	0.235	3.583	96.417	0.000
	6	0.513	38.860	37.467	23.673
	12	0.569	45.647	30.533	23.820
	24	0.570	45.794	30.393	23.813
Brazil	1	0.219	50.421	49.579	0.000
	6	0.504	51.428	11.183	37.389
	12	0.508	51.806	11.053	37.140
	24	0.511	52.482	10.893	36.625
Chile	1	0.064	26.316	73.684	0.000
	6	0.317	52.475	6.984	40.541
	12	0.514	54.327	2.780	42.893
	24	0.559	54.621	2.353	43.026
Colombia	1	0.300	49.594	50.406	0.000
	6	0.399	48.426	34.939	16.635
	12	0.433	51.639	29.657	18.704
	24	0.464	56.270	25.818	17.912
Ecuador	1	0.214	21.531	78.469	0.000
	6	0.577	53.184	13.929	32.886
	12	0.643	54.415	11.242	34.343
	24	0.668	57.760	10.413	31.827
Mexico	1	0.416	43.950	56.050	0.000
	6	1.753	43.856	4.498	51.646
	12	2.176	46.022	3.041	50.936
	24	2.264	48.266	2.822	48.912
Peru	1	0.090	15.758	84.242	0.000
	6	0.447	43.682	13.199	43.119
	12	0.539	49.176	10.681	40.143
	24	0.620	58.030	8.645	33.325
Uruguay	1	0.066	24.936	75.064	0.000
	6	0.222	51.478	10.499	38.023
	12	0.287	52.592	6.304	41.104
	24	0.303	54.672	5.688	39.640
Venezuela	1	0.092	21.038	78.962	0.000
	6	0.267	31.511	24.542	43.947
	12	0.301	29.796	25.532	44.672
	24	0.323	30.139	25.209	44.652

that the explanatory power of the foreign factors is least for Argentina and Venezuela and most for Chile, Colombia, and Ecuador.

Last, we turn to impulse response functions. Figures 9 and 10 depict for the ten countries in our sample the response of reserves and the real exchange rate to a one-standard-deviation shock to the first principal component of the foreign variables. As indicated earlier, and as illustrated by Figure 8, a positive shock to the first principal component of foreign variables could be interpreted as an increase in short-term U.S. interest rates. If this shock is associated with a decreased capital outflow from the United States, then it could be associated with a permanent decrease in reserves and a real exchange rate depreciation in Latin America.[41] For most countries, evidence in the figures supports this hypothesized pattern. There are exceptions, however. In particular, reserves rise in Brazil and Uruguay in response to the shock, and Ecuador experiences a sustained real appreciation.

Furthermore, the response pattern most common in Figure 9 (for Argentina, Colombia, Ecuador, Mexico, and Peru) is one in which reserves decline as capital flows out. When capital ceases to leave, reserves stabilize at a lower level. In Figure 10, the most common response of the real exchange rate to a positive shock to the first foreign principal component (for Argentina, Bolivia, Chile, Colombia, Mexico, Uruguay, and Venezuela) is a permanent real depreciation.[42] This finding confirms that, in most of the cases considered, an increase in interest rates abroad induces a capital outflow from these countries. Reversing the exercise to fit recent developments, the evidence from the impulse responses indicates that a decline in U.S. interest rates would, all else being equal, generate an accumulation of official reserves and an appreciation of the real exchange rate in most of the countries, although puzzling exceptions remain.

IV. Policy Implications

The foregoing empirical analysis suggests that external factors have played a role in recent developments in Latin America. These capital flows, in turn, have contributed to the accumulation of foreign reserves

[41] Had we considered, instead of levels, the change in reserves (a flow) and the rate of change of the exchange rate, the impact of the shock would be expected to die out.

[42] The depreciation is sometimes followed by a short-lived appreciation, as in the cases of Argentina, Bolivia, Chile, Mexico, and Uruguay.

Figure 9. *Response of Official Reserves to a One-Standard-Deviation Shock in the First Foreign Factor*

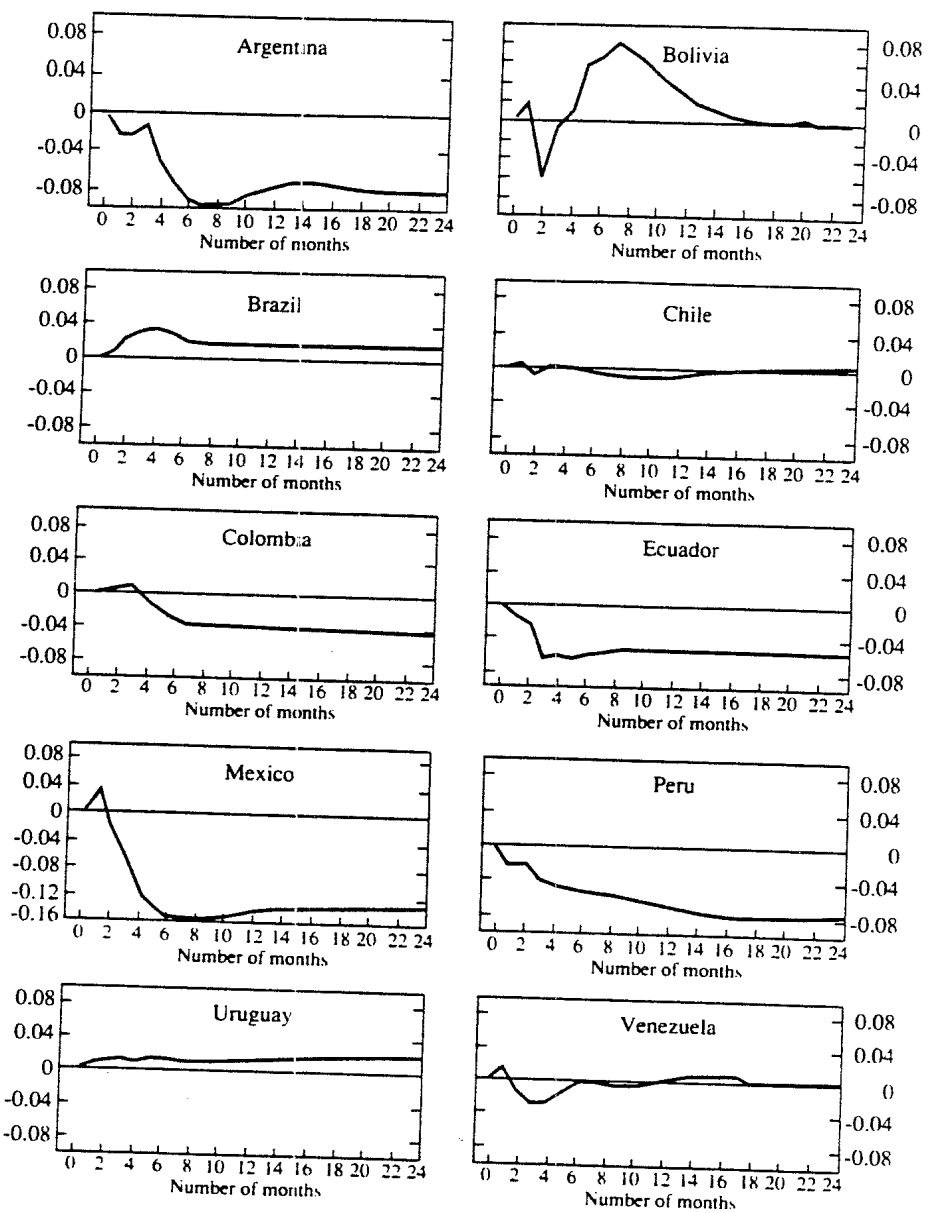
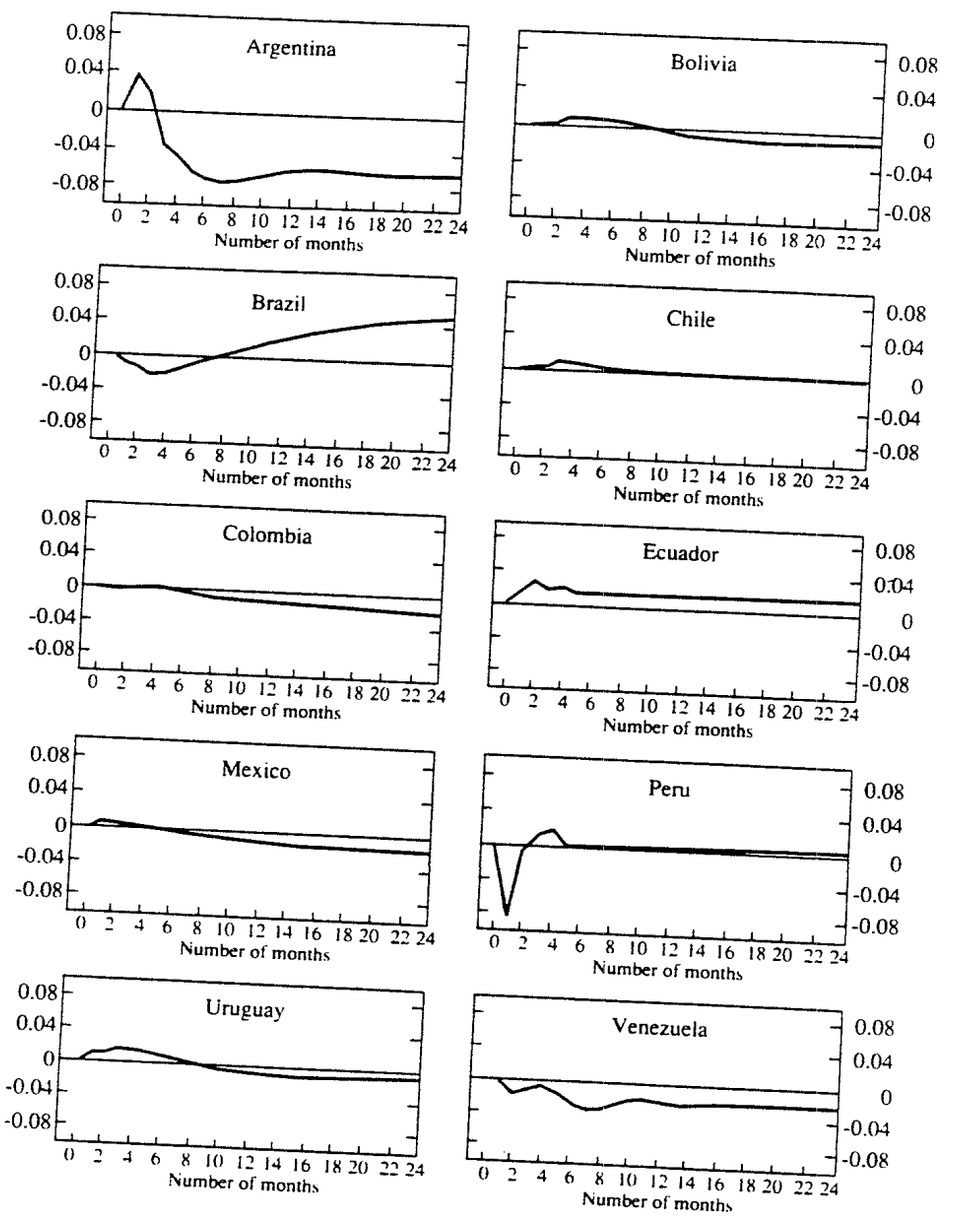


Figure 10. *Response of the Real Exchange Rate to a One-Standard-Deviation in the First Foreign Factor*



and the appreciation of real exchange rates.[43] Using these observations as background and taking into account the possibility that external factors could reverse their course and result in capital outflows from Latin America, we turn to the next relevant set of issues, concerning the form and timing of appropriate policy responses to capital flows.

Given that the 1980s were a period of capital shortage for Latin America, it follows that the first question when discussing policy is how should policymakers respond to the recent inflows. Several countries in the region are concluding successful negotiations with their creditors and effectively coming to grips with their fiscal imbalances. Thus, at what point do capital flows—into countries like Chile and Mexico, which have financed increases in private investment—become undesirable?

There are three types of concerns that policymakers tend to voice about capital inflows: (1) since capital inflows are typically associated with real exchange rate appreciation and with increased exchange rate volatility, they may adversely affect the export sector; (2) capital inflows—particularly when massive—may not be properly intermediated and may therefore lead to a misallocation of resources; and (3) capital inflows—especially the "hot money" variety—may be reversed on short notice, possibly leading to a domestic financial crisis. These concerns are not new. Indeed, the depth of the debt crisis in the 1980s certainly contributed to the magnitude and sudden reversal of international capital flows. The remainder of this section examines the foundations of these concerns and their policy implications.[44]

Evidently the development of the export sector has laid the foundations for technological advancement and economic growth in most Latin American countries. Moreover, in highly indebted countries, the behavior of exports has been an important indicator of creditworthiness. Thus, changes in exports associated with capital inflows may have economywide effects, and hysteresis effects, that are not fully internalized by the private sector—thus providing a rationale for policy intervention.

In turn, improper intermediation could be the result of speculative "bubbles," improperly priced (explicit or implicit) government insurance, lack of policy credibility, market failure (such as externalities, economies of scale, and nominal wage or price rigidity), or some combi-

[43] In terms of economic agents in Latin America, it is also possible to interpret these developments as originating in a portfolio shift away from foreign (dollar-denominated) financial and physical assets toward domestic assets. For a model in which such a portfolio shift leads to a temporary appreciation of the real exchange rate and to the accumulation of reserves by the central bank, see Calvo (1983).

[44] For a discussion of these issues from the perspective of Chilean monetary and exchange rate policies, see Zahler (1992).

nation of the above. Although the bubbles hypothesis is a highly appealing one in policy circles,[45] it does not immediately follow that a bubbles equilibrium (leaving aside its empirical foundations) calls for government intervention. A clear case for intervention could be made if the government had better information than private agents and could thus prevent the creation of a speculative bubble. This proposition is doubtful, however. Hence, intervention could be ineffective and even counterproductive. Another case for intervention is when the speculative bubble is driven by the expectation that government will bail out speculators when the bubble bursts. Because these bubbles are associated with improperly priced insurance and a lack of policy credibility, they are not *pure* bubbles. Optimal policy to prevent this type of bubble could simply mean the setting up of appropriate mechanisms to prevent government from bailing out speculators. It may be optimal to make a credible commitment that *government will not intervene* if the bubble bursts.

In practice, however, governments may be unable to make such commitments credible, especially when they involve the possibility of bank failures. As recent experience in the United States and Latin America shows, it may not be possible to state credibly that bank deposits are not fully guaranteed by the government if banks run into financial difficulties. As a result, banks may end up receiving free deposit insurance.[46] Thus, a natural proposal is to require banks to join a mandatory deposit insurance scheme. Such a scheme, however, must be highly sophisticated—indeed, much more sophisticated than those prevailing in some industrialized countries. For example, such a scheme would have to take into account the probability of a massive withdrawal of funds if external conditions reverted. Consequently, in the short run it may be more practical simply to preclude banks from intermediating much of the new capital inflow by increasing required reserve ratios. Regulations could also make banks less vulnerable to speculative bubbles in other markets (like equity and real estate markets) that are the by-product of massive capital inflows. In particular, by limiting the investments of banks in these markets, the banking system would be better insulated when the bubble bursts.[47]

[45] Professional opinion is divided on this issue (see Stiglitz (1990)).

[46] Actually, unless banks are forced to pay for deposit insurance, free market forces may not generate a privately based deposit insurance scheme. This happens because the expectation of free insurance if banks run into financial difficulties may make any privately based deposit insurance scheme unprofitable.

[47] The above point about market failure will not be discussed here. An important example, however, is associated with the export sector, which, as shown before, is likely to produce externalities in the rest of the economy.

As pointed out above, a third rationale for policymakers' concerns about capital inflows is based on the fear of a quick reversal of the inflows. Such a reversal may exacerbate the negative effects of improper intermediation, or actually *give rise* to improper intermediation. In an environment characterized by asymmetric information, a sudden capital outflow may lead lenders to conclude that the country has suffered a negative supply shock, even when no shock has occurred. The sudden capital flight, in turn, may bring about the discontinuation of efficient investment projects. Thus, if start-up costs for these projects are significant (because of increasing returns to scale or market failure, using two examples), their discontinuation provokes a deadweight loss, which, from the lenders' point of view, may be observationally equivalent to an exogenous negative supply shock. Consequently, the expectations that gave rise to these detrimental capital outflows may *become* rational. Thus, this example of a self-fulfilling prophecy gives another reason for intervention. The example also shows that policy intervention may be called for even when the funds are channelled to investment projects.

Based on the foregoing discussion, we consider five interventionist policies: (1) a tax on capital imports; (2) trade policy; (3) fiscal tightening; (4) sterilized and nonsterilized intervention by the central bank; and (5) a rise in the marginal reserve requirements on bank deposits and more regulated bank investments in equity and real estate markets.

Taxes on short-term borrowing abroad have been used in some countries—Israel in 1978 and Chile in 1991. Although this policy is effective in the short run, experience suggests that the private sector is quick in finding ways to dodge these taxes, by over- and underinvoicing imports and exports and by increased reliance on parallel financial and foreign exchange markets.

Trade policy measures can help to insulate the export sector from real exchange rate appreciation. One possibility in this area is to pay higher export subsidies. However, this policy distorts resource allocation between exportable and importable goods, and the fiscal cost could be substantial. For example, to offset a 20 percent overvaluation of the real exchange rate through export subsidies would increase fiscal expenditures by about 4 percent of GDP, given that the average export-to-GDP ratio for Latin America hovers around 20 percent. Alternatively, the authorities could increase both export subsidies and import tariffs in the same proportion—to avoid creating further relative discrepancies between internal and external terms of trade—*and* announce that these subsidies and tariffs will be phased out in the future. Indeed, if the private sector perceives these measures as transitory, agents are likely to substitute future expenditure for present expenditure, thus cooling off the

economy and attenuating the real exchange rate appreciation. The fiscal cost of this package need not be large, particularly if the trade deficit is small. Furthermore, static distortions are not increased, since such trade policy does not change initial relative price distortions between exports and imports. However, this policy can be criticized on two grounds. First, its effectiveness depends on the private sector believing that those subsidies and tariffs will be phased out; otherwise, individuals will do little to lower present expenditure. Thus, the effectiveness of the policy depends very strongly on *credibility*—both the credibility of policy and the credibility of price forecasts. Second, this policy deviates from the present global trend toward commercial liberalization and free trade agreements.

Another policy reaction to greater capital inflows is to tighten fiscal policy through higher taxes or through lower government expenditure. This policy, although not likely to stop the capital inflow, may lower aggregate demand and curb the inflationary impact of capital inflows.[48] Toward this end, higher taxes may be less effective than lower government expenditure. Often when credit is widely available—as when the country is subject to massive capital inflows—individuals' expenditures can be largely independent of their tax liability. This is especially true if higher taxes are expected to be transitory—a somewhat plausible expectation since the higher taxes would be associated with the transitory capital inflows. By contrast, lower government expenditure—particularly when directed to the purchase of nontraded goods and services—has a direct impact on aggregate demand, which is unlikely to be offset by an expansion of private sector demand. However, a contraction of government expenditure is always a sensitive political issue. Overall, it is hard to find a strong case for adjusting fiscal policy—which is usually set on the basis of medium- or long-term considerations—in response to short-term fluctuations in international capital flows. However, if the authorities plan a tightening of the fiscal stance, the presence of capital inflows may call for earlier action in this respect.

Sterilized intervention has been the most popular policy response to the present episode of capital inflow in Latin America. Leading examples of this policy are provided by Chile in 1990–91 and Colombia in 1991. With capital inflows, this type of intervention amounts to the sale of government bonds by the central bank in exchange for foreign currencies and securities.[49] This policy does not necessarily stop private agents from engaging in international loan transactions, but, if successful, it does

[48] In addition, to the extent that it reduces the government's need to issue debt, a tighter fiscal stance is also likely to lower domestic interest rates.

[49] For a more detailed discussion of the role of central bank intervention (sterilized or nonsterilized), see Mussa (1988) and Obstfeld (1991).

insulate the stock of domestic money from variations associated with capital mobility. If effective, sterilization tends to increase domestic nominal and real interest rates, lower aggregate demand, and mitigate the appreciation of the real exchange rate.[50]

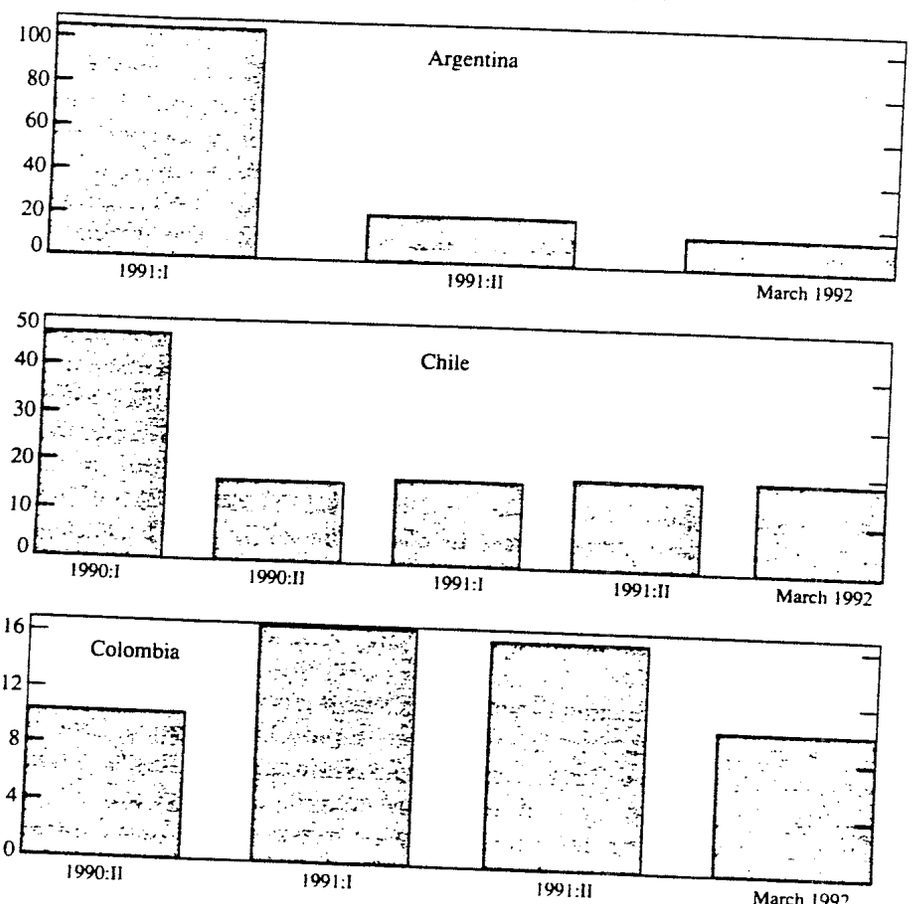
There are, however, two main difficulties with sterilized intervention. First, sterilization leads to an increase in the differential between the interest rate on domestic government debt and international reserves, thus creating a fiscal (or quasi-fiscal) deficit. Second, by preventing a fall in this differential, sterilization tends to perpetuate the capital inflow, thus exacerbating any problems caused by the inflow. The impact of sterilization on the interest differential can be seen in Figure 11, which compares cases of sterilization in Chile and Colombia against a case of nonsterilization in Argentina. It is seen that in the recent capital inflows episode, the domestic interest rate exhibits a much smaller decline (or an actual increase) in sterilizing versus nonsterilizing countries. The recent experience of Chile and Colombia indicates that sterilized intervention has not reduced capital inflows, yet the increase in the fiscal deficit may be quite substantial. For example, Rodriguez (1991) estimates the fiscal burden of sterilized intervention in Colombia during 1991 at about 0.5 percent of GDP. Consequently, serious doubts can be cast on the desirability of sterilized intervention when countries are still attempting to solve domestic debt difficulties and when public sector budgets require further trimming.[51]

Alternatively, the central bank could opt for nonsterilized intervention, whereby the central bank purchases the foreign exchange brought in by the capital inflow in exchange for domestic money—as under a fixed exchange rate. This policy can help avoid nominal exchange rate appreciation and is likely to narrow the domestic-foreign interest rate differential; however, it is likely to generate an increase in the domestic monetary base beyond the central bank's target. The latter development, in turn, could fuel inflationary pressures and contribute to real exchange rate appreciation. It is at this point that credibility regarding a fixed nominal

[50] A necessary condition for these outcomes, and for the effectiveness of sterilized intervention, is that domestic and foreign bonds are imperfect substitutes in agents' portfolios. Casual observation suggests that this is the case in Latin America. Cumby and Obstfeld (1983) produced econometric results for Mexico in the 1970s in support of imperfect substitutability between peso-denominated assets and foreign assets. For industrial countries, Obstfeld (1991) concludes that sterilized intervention is a weak instrument of exchange rate policy and that monetary and fiscal policies, and not intervention per se, have been the main policy determinants of exchange rates in recent years.

[51] See also Calvo (1991), who provides an example in which social welfare always declines with sterilization and in which the effectiveness of sterilization relies on its worsening the credibility of a stabilization program.

Figure 11. *Domestic Lending Rates in U.S. Dollars*
(Quarterly and monthly averages)



Sources: IMF, *International Financial Statistics*, and various central bank bulletins.

exchange rate comes into play. In this connection, floating exchange rates have an advantage, because the required real exchange rate appreciation does not necessarily mean that inflation must accelerate. Furthermore, floating rates allow the domestic central bank to operate as a "lender of last resort." By contrast, under fixed rates and fractional-reserve banking, preventing liquidity-type financial crises—particularly, when capital starts flowing out—may require the central bank to hold a large stock of international reserves, which is a costly if not unfeasible undertak-

ing.[52] The credibility-related considerations, therefore, give some support to a regime of floating exchange rates when the economy is subject to substantial capital flows.[53]

As discussed earlier, attempting to insulate the banking system from short-term capital inflows is an attractive goal when most of the flows take the form of increased short-term bank deposits. In these circumstances, a sudden reversal of capital inflows may quickly result in bank failures. Marginal reserve requirements could be sharply raised such that they become higher as the maturity of deposits shortens; in fact, a 100 percent required reserve ratio could be imposed on deposits with the shortest maturity. Although this scheme would impose a burden on the banking system and could result in some disintermediation of the capital inflows, it has the advantage of decreasing banks' exposure to the risks of capital flow reversals. In addition, regulation that limits the exposure of banks to volatility in equity and real estate markets would further insulate the banking system from the bubbles associated with sizable capital inflows.

To summarize, there are grounds to support a mix of policy intervention based on the imposition of a tax on short-term capital imports, on enhancing the flexibility of exchange rates, and on raising marginal reserve requirements on short-term bank deposits. Given the likely fiscal costs, it is hard to make a strong case in favor of sterilized intervention, unless countries exhibit a strong fiscal stance and capital inflows are expected to be short-lived. In any case, we believe that none of the above policies will drastically change the behavior of real exchange rates or interest rates. The choice of appropriate policies, however, could decidedly attenuate the detrimental effects of sudden and substantial future capital outflows.

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[52] The problem is exacerbated when, like in most Latin American countries, the liabilities of the banking system are heavily biased toward short-term deposits, enhancing the chances of a run against the domestic banking system.

[53] When the system is not subject to big swings in international capital flows, the opposite conclusion can be reached: fixed rates may dominate. See Calvo and Végh (1992).

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