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Policy Responses to External Imbalances in Emerging Market Economies—Further Empirical Results

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Abstract

A bivariate vector-autoregression (VAR) model is used to test causal relations between the current account and the capital account in four emerging market economies. The results show that high capital mobility could be a major cause of current account instability. Therefore, macroeconomic policy to restore external balance must deal directly with capital inflows. The paper recommends making nominal exchange rate sufficiently flexible to avoid inconsistencies between short-run and long-run real exchange rates; complementing credit tightening by fiscal restraint to reduce interest rate differentials; and strengthening reforms and surveillance of the financial system to prevent banks from excessive risk taking.

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SUMMARY

This paper investigates causal relations between the current account and the capital account in the balance of payments. A bivariate vector-autoregression (VAR) model is applied, using data for four emerging market economies—Argentina, Mexico, Philippines, and Thailand. The results show that, from the beginning of the rapid globalization of capital markets in the late 1980s until mid 1990s, capital inflows have either caused or interacted with current account deficits. Under these circumstances, policies aiming to restore external balance must deal directly with capital inflows. Moreover, a policy package intended to reduce the current account deficit might have the opposite effect if it simultaneously stimulates capital inflows.

A capital account shock could create pressure in the foreign exchange market that would drive the real exchange rate away from its long-run equilibrium value, the direction of which would depend on the type of capital inflow and its use. In situations where it is difficult to predict the equilibrium real exchange rate, the paper recommends allowing sufficient flexibility in the nominal exchange rate for market forces to establish equilibrium. This would insulate the monetary base from changes in net foreign assets, prevent speculation, and reduce further capital inflows by letting foreign investors bear higher exchange risks than they would in a fixed exchange rate system.

Tight monetary policy designed to control inflation and reduce the current account deficit should be complemented by fiscal restraint to reduce the differential between domestic and foreign interest rates. Also of crucial importance is the strengthening of reforms and surveillance of the financial system to prevent financial institutions from excessive risk taking.

I. INTRODUCTION

In the wake of the Asian financial crisis, policymakers and academics alike are drawing lessons from the experience, focusing on a number of important issues, including: (1) how to strengthen the architecture of the international financial system to lessen the frequency and severity of future disturbances (IMF, 1998); (2) how to utilize vulnerability indicators and early warning signals to detect the symptoms of crises sufficiently in advance to allow governments to adopt preemptive measures (Kaminsky, Lizondo, and Reinhart, 1998); and (3) how to pursue an orderly process of capital account liberalization and, in particular, whether some kind of regulations or controls need to be imposed on short-term capital in the process to reduce the vulnerability of emerging markets to swings in investor sentiment.[2]

A general consensus that seems to have emerged is that in order to maximize the benefits from and minimize the risks of free capital movements, a country must have the following conditions:

- a sound macroeconomic policy framework consistent with the choice of exchange rate regime;
- a sound domestic financial system, with adequate supervision and prudential standards, credit allocation free from government intervention, and provisions ensuring prompt actions dealing with insolvent institutions;
- a strong and independent central bank; and
- greater transparency through disclosure of timely and accurate financial and economic information.

This paper investigates causal relations between the current account and the capital account in the balance of payments, which are essential to the development of a sound macroeconomic framework, particularly for emerging market economies. It complements what has become a standard policy package in dealing with large capital inflows, which had emerged from extensive discussions prior to the recent crises (e.g., Calvo, Leiderman, and Reinhart, 1993, 1994, 1996; Khan and Reinhart, 1995; Montiel, 1995, 1996; Montiel and Reinhart, 1997; and Schadler and others, 1993). This package consists of sterilized intervention, greater nominal exchange rate flexibility, fiscal contraction, and structural measures, including trade liberalization, market deregulation, and liberalization of capital outflows.

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[2]Another relevant issue is how to improve the risk management of sovereign assets and liabilities in a country, including the establishment and public disclosure of benchmark portfolios (Cassard and Folkerts-Landau, 1997).

The interrelations between the current account and the capital account in emerging market economies have changed dramatically since the beginning of the rapid globalization of capital markets in the late 1980s. Prior to globalization, when a country faced balance of payments difficulties, domestic macroeconomic and external sector policies generally focused on how to stabilize the current account. Access to international capital markets was regarded as a means of financing a country's current account deficits; hence capital movements followed the changes in the current account position. Since the early 1990s, it has become increasingly evident that, with the opening up of the capital account, capital movements themselves could be a major cause of current account instability, so that stabilizing the balance of payments has also come to include stabilizing the capital account.

Under these circumstances, several interrelated questions need to be addressed. For example, at what stage should the focus of macroeconomic policies be changed from one account to the other? What is the role of fiscal policy in dealing with the inflows problem that is largely monetary in nature? Is there a fundamental inconsistency between globalized capital markets and fixed exchange rates? In a pegged exchange rate system, when and how should the peg be changed in the face of an increasing capital account surplus and a deteriorating current account position? How far can sterilized intervention go to achieve both internal and external balance?

The next section discusses in some detail the interrelations between the current account and the capital account, focusing on the causality between large capital inflows and current account deficits, and possible inconsistencies between short-run and long-run real exchange rates caused by capital account shocks. Section III tests the causality between the current and capital accounts for four countries—Argentina, Mexico, Philippines, and Thailand. The final section explores further the appropriate policy responses to large capital inflows, based on the empirical results. It stresses that the appropriateness of policy responses to external imbalances depends, inter alia, on the direction of the causality and on the timing of policy implementation.

II. Interrelations between the current account and the capital account

A. General Observations

External account balances reflect agents' decisions on consumption, saving, investment, and production. A deficit in the external current account implies that residents have decided to use external savings, which in turn could be reflected in an accumulation of foreign liabilities or in a drawdown of international reserves. The deficit in the current account could, therefore, create a surplus in the capital account if it is financed by foreign borrowing.

If for some reason, residents are not allowed to have a negative financial position with the rest of the world, any imbalance in the current account will be reflected in the foreign

exchange market. If the exchange rate is flexible, it will have to depreciate, hence, weakening the interaction between the current and capital accounts.

If the exchange rate is fixed, the current account deficit could result in a decreasing stock of international reserves. If sterilized intervention is pursued and the residents anticipate a strong devaluation in view of the worsening reserve position, they may start to have an increasingly positive financial position with the rest of the world. In this case, deficits in the current account could create future deficits in the capital account. However, if the central bank does not expand its domestic assets to compensate for the loss in reserves, or if monetary policy is tightened, domestic interest rates will rise, attracting capital inflows (current account deficit creates capital account surplus), or if this is not possible (because of capital controls or high country risks), the contraction in domestic absorption will establish the current account equilibrium (little interaction between the two accounts).

These phenomena were commonly observed in many developing countries prior to the globalization of capital markets, especially in countries with fiscal dominance. However, in some countries, particularly the emerging market economies in the 1990s, evidence also shows that an increase in capital account surplus has caused a worsening of the current account position. A positive net capital inflow implies a higher stock of financial claims by the rest of the world against the residents and, hence, larger profit remittances and dividend and/or interest payments in the future. More important, under a flexible exchange rate regime, positive capital inflows could cause the nominal and real exchange rates to appreciate. The resulting change in relative prices would positively affect consumption of tradables relative to nontradables and production of nontradables relative to tradables, leading to current account deficits.

If the country has a fixed exchange rate regime, sterilized intervention would push up domestic interest rates, allowing capital inflows to continue. In this case, the interaction between the two accounts is, at least in the short run, weakened by the avoidance of changes in relative prices and in monetary aggregates. If sterilization is incomplete, however, the reduction in domestic interest rates may discourage foreign investors. The lower interest rates and the more rapid monetary growth may increase the level of domestic absorption and domestic prices, which in turn may create deficits in the current account.

B. Capital Account Shocks and Inconsistencies Between the Short-Run Exchange Rate and the Long-Run Exchange Rate

In a standard framework used to analyze the effects of external shocks, it is usually assumed that (1) the foreign exchange market reacts more quickly than other domestic markets to external shocks, and (2) the current account is more responsive to changes in the real exchange rate than to changes in real interest rates, whereas the capital account, for a given expected exchange rate, could be equally responsive to both. Within this framework, it is generally observed that when capital account shocks take place, the short-run real exchange rate could move away from the long-run equilibrium real exchange rate. The composition,

level, and use of capital inflows will determine whether, and to what extent, inconsistency exists between the short-run and the long-run real exchange rate.

To illustrate that the composition of capital inflows matters in determining the long-run equilibrium, two extreme cases are considered. First, assume that capital inflows are entirely in the form of foreign direct investment (FDI). The real exchange rate will tend to appreciate initially. Even though profit remittances abroad will increase subsequently, their negative effects on the current account could be more than compensated for by the likely positive effects of the increase in productivity and exports, resulting in a permanent *appreciation* of the long-run real exchange rate.

The second case is short-term capital inflows responding to a drop in interest rates in the rest of the world. As in the previous case, the real exchange rate will appreciate initially. When interest payments on the new borrowing are due, and assuming that the short-term capital has not contributed to an increase in productivity, the current account position will deteriorate, leading to a *depreciation* of the long-run equilibrium real exchange rate. At the same time, if sterilized intervention is not being pursued, domestic interest rates will tend to equalize with foreign interest rates.

Several observations can be made regarding the dynamics in the adjustment process emanating from an inflow of short-term capital. First, the long-run equilibrium real exchange rate will depend on agents' future actions; therefore, there is initially a high level of uncertainty about this variable. Second, if domestic interest rates are not fully flexible (because of noncompetitive behavior in the banking sector, for example), or if sterilized intervention is being pursued, in the short run there will be arbitrage opportunities for investors to exploit. This is true even when in the long run a more depreciated real exchange rate is expected because of the change in fundamentals. Third, unsustainable current account deficits would create pressure for nominal depreciation, which could affect investor confidence, leading to a reversal of capital flows. Finally, as shown in Montiel and Reinhart (1997), the policy response to the early wave of capital inflows will influence both the level and the composition of subsequent capital movements, with varying implications for domestic financial stability.

III. EMPIRICAL RESULTS

A. Causality Tests

To provide evidence on the dynamic interactions between the current account and the capital account, a vector-autoregression (VAR) model is estimated for four emerging market countries (Argentina, Mexico, Philippines, and Thailand). Theoretical aspects of the VAR technique, as well as the Granger causality test performed using this technique, are discussed in Appendix I. According to this test, the capital account balance is said to cause the current account balance, if the current account balance is significantly better predicted using the past values of both the current account balance and the capital account balance than using the past values of the current account balance alone.

All data used in this study are taken from the Fund's Economic Information System database. The period for the investigation is from the mid 1970s to the mid 1990s. During this period all four countries had large and volatile current account balances relative to GDP. All countries had been affected by the globalization of capital markets and, consequently, had received sizable capital inflows during the 1990s (see Tables A1 and A2 in Appendix II).

For each country, the study analyzes two independent samples, with the first quarter of 1989 being the breaking point in the time series,[3] which coincides with the structural change in the international capital markets. The time series used in the causality tests ends before the onset of the financial crisis, so the paper does not deal with crisis management. To make sure that the results of the causality tests are not spurious, a test for unit roots was performed. The results of this test are reported in Table A3 in Appendix II. By and large, the unit-root assumption regarding the time series for both the current account balance and the capital account balance for all countries for the periods under investigation can be rejected at conventional significance levels.

1. Argentina

During the 1970s and 1980s, Argentina faced an extremely difficult external position. In the 1970s, high fiscal deficits, combined with real exchange rate appreciation, caused a steady deterioration in the current account. In the 1980s, the economy suffered from an excessive accumulation of external debt and severe debt-servicing difficulties. The stabilization plans undertaken in the period 1984–89 sought to obtain a competitive real exchange rate through a series of nominal devaluations to generate trade surpluses to service the external debt. However, these steps were not accompanied by sufficient fiscal restraint. As a result, the economy experienced a vicious circle of devaluation-inflation.

This situation is reflected in the causality tests performed. A VAR model with five lags was estimated for the period 1977–88.[4] Even though this sample period includes a subperiod (post-debt crisis) in which Argentina had no access to the international capital markets, test

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[3]It is worth noting that the results are robust to changes in the breaking point.

[4]The appropriate lag length of each model was determined based on the Akaike information criterion (Akaike, 1973), according to which the optimal autoregressive order q is chosen such that

$$AIC(q) = min\{AIC(j) \mid j = 1,...N\}$$

where

$$AIC(j) = ln\sigma^2(j) + 2K/T$$

Here $\sigma^2(j)$ is the maximum likelihood estimate of the residual variance, K is the number of parameters, j is the lag number, and T is the number of observations. The results are reported in Table A4 in Appendix II.

results show that the current account balance causes the capital account balance (see Table 1).[5] For the period 1977–82, the statistical evidence of a causality running from the current account to the capital account is even stronger.[6] But for the 1977–88 period, the tests support the hypothesis that the capital account balance does not cause the current account balance.

Table 1. Argentina

	Sample: 77.2-88.4 (5 lags)	**Sample: 89.1-94.4 (2 lags)**
CA does not cause KA		
Wald test statistic	12.113	0.4248
Result	rejected (0.0333)	accepted (0.8086)
KA does not cause CA		
Wald test statistic	6.5222	16.143
Result	accepted (0.2587)	rejected (0.0003)

Note: CA is current account balance; KA is capital account balance.

In the 1990s, Argentina experienced large capital inflows, attributable to the structural reforms launched in the late 1980s and early 1990s—privatization of public enterprises, deregulation in capital and labor markets, trade liberalization, and restructuring of the public debt —and the new developments in the international capital markets. Because a currency board arrangement had been in place since March 1991, these capital inflows were reflected in the growth of the monetary base. At the same time, there were difficulties in controlling fiscal expenditures. The resulting increase in domestic demand and inflation produced an appreciation of the real exchange rate, further worsening current account deficits.

In Table 1, the Granger tests for the period 1989–94 provide strong evidence of a causality running from the capital account to the current account, but support the hypothesis that the current account balance does not cause the capital account balance.

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[5]The number in parenthesis represents the probability of type I error.

[6]A model with six lags was estimated. The hypothesis that the current account balance does not cause the capital account balance is rejected (probability of type I error 0.02), while the hypothesis that the capital account balance does not cause the current account balance is accepted (probability of type I error 0.17). However, it should be noted that the results of this and other tests for the restricted sample period are not very robust.

2. Mexico

During the late 1970s and early 1980s, the Mexican government decided to increase its expenditure to stimulate economic growth. The resulting large fiscal deficits were financed mainly by external borrowing. As a result, during the years 1978–82 the ratio of external debt to GDP rose from 26 percent to 59 percent.

In 1982, Mexico's external debt crisis was triggered by a combination of rising world interest rates and falling oil prices, as well as a recession in the United States. Because of its subsequent exclusion from the international capital markets, Mexico was unable to continue expanding government spending through external financing. Fiscal restraint was thus the only option left to the government. The fiscal austerity measures and the real exchange rate depreciation contributed to the improvement of the current account balance. Nevertheless, despite several reschedulings of the external debt, large trade surpluses were required for debt servicing and repayment (see Oks, 1992).

In December 1987, Mexico launched a stabilization program (the Pact of Economic Solidarity) to stop high inflation without causing a recession. The program consisted of a combination of fiscal and monetary tightening and wage-price control. Beginning in February 1988, the exchange rate was used as a nominal anchor. Although the program succeeded in lowering inflation, a substantial appreciation in the real exchange rate ensued.

The causality tests performed for the period 1979–88 show a lack of causal relations between the current account and the capital account. Both null hypotheses that the capital account balance does not cause the current account balance and that the current account balance does not cause the capital account balance are accepted (see Table 2).

Table 2. Mexico

	Sample: 79.4-88.4 (3 lags)	**Sample: 89.1-94.3 (2 lags)**
CA does not cause KA		
Wald test statistic	2.8168	1.0218
Result	accepted (0.4207)	accepted (0.6000)
KA does not cause CA		
Wald test statistic	1.5549	6.0804
Result	accepted (0.6697)	rejected (0.0478)

Note: CA is current account balance; KA is capital account balance.

By 1989, the renegotiation of Mexico's external commercial debt had reduced both the debt stock and the debt service, but more important, Mexico had regained access to the international capital markets. From 1990 to 1993, Mexico experienced increasingly large

capital inflows, particularly portfolio investment. The policy responses to the situation consisted of sterilized intervention; capital controls in the form of high liquidity requirements against and limits on banks' foreign currency liabilities; greater flexibility in the exchange rate through the introduction of the crawling exchange rate band; and structural reforms, including trade liberalization, market deregulation, and liberalization of capital outflows.

As a result of these measures, the real exchange rate strongly appreciated, causing large current account deficits. The higher foreign savings more than compensated for the reduction in domestic savings, explaining the increases in the ratios of both consumption and investment to GDP. During 1994, a series of internal and external factors caused the loss of confidence in the government's ability to maintain the nominal exchange rate, leading to a reversal of capital flows. On December 22, the exchange rate was allowed to float after several unsuccessful attempts to keep it within the band.[7]

In Table 2, the causality tests for the period 1989–94 reveal that the capital account balance causes the current account balance but that the current account balance does not cause the capital account balance.

3. Philippines

Like many other developing countries, the Philippines reacted to the terms-of-trade shocks in the 1970s by borrowing extensively on world capital markets. But by the early 1980s, it had become increasingly difficult to finance current account deficits through external borrowing and stabilization policies had to be implemented. The adjustment program that started in 1983 consisted of drastic cuts in fiscal expenditures and restrictive monetary policy. These policies effectively reduced domestic absorption, hence the reduction in external current account deficits.

As in the case of Mexico, the absence of foreign borrowing by the Philippines during the 1980s weakened the interaction between the current and capital accounts. Thus, the results of the causality tests for the period 1978–88 support the null hypothesis of no causality between the two accounts (Table 3). However, for the shorter period 1977–82, that is,

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[7]Several authors have discussed the Mexican crisis in detail, although with different interpretations (see, for example, Dornbush, Goldfajn, and Valdez, 1995; Calvo and Mendoza, 1996; Sachs, Tornell, and Velazco, 1996).

excluding the period during which there was no access to the international capital markets, there is evidence of a causality running from the current account to the capital account.[8]

Table 3. Philippines

	Sample: 78.1-88.4 (4 lags)	**Sample: 89.1-95.4 (4 lags)**
CA does not cause KA		
Wald test statistic	1.141	31.584
Result	accepted (0.8877)	rejected (0.0000)
KA does not cause CA		
Wald test statistic	2.2258	9.6022
Result	accepted (0.6943)	rejected (0.0477)

Note: CA is current account balance; KA is capital account balance.

Once capital inflows to the Philippines resumed during the early 1990s, the authorities responded by pursuing sterilized intervention and fiscal tightening, while allowing the nominal exchange rate to appreciate despite the intervention efforts. The reserve requirement for banks, however, was reduced, with the objective of lowering domestic interest rates. These stabilization measures were undertaken in tandem with relaxation of controls on capital outflows and tightening of controls on capital inflows. The latter included a reduction in banks' minimum oversold foreign exchange positions as a ratio of unimpaired capital and central bank approvals for all forward transactions in foreign exchange. The surpluses in the capital account, combined with the policy responses, caused further current account deficits. In turn, the widening of current account deficits induced the monetary authorities to maintain tight monetary conditions. This policy reaction, however, failed to eliminate arbitrage opportunities, resulting in further capital inflows. Such feedback between the current account and the capital account is captured in the causality tests reported in Table 3.

4. Thailand

As in the case of the other countries, Thailand's policy response to the external shocks of the 1970s was to finance the current account deficits by foreign borrowing. Both the fiscal policy stance and the real exchange rate remained fairly constant. However, because of the

[8]A VAR model with two lags shows that the current account balance causes the capital account balance (probability of type I error 0.04), while the capital account balance does not cause the current account balance (probability of type I error 0.11).

strong fundamentals of the Thai economy, reflected in high economic growth rates, strong export performance, and modest domestic inflation, investor confidence did not change significantly during the debt crisis of 1982. Consequently, Thailand continued to have some limited access to the international capital markets. However, during this period, Thailand's fiscal deficits were financed mostly by internal noninflationary sources. As a result, foreign borrowing as a ratio of GDP declined steadily during 1981–87 (see Table A2 in Appendix II).

A VAR model with five lags was estimated for the period 1977–88. The results support both the hypothesis that the current account balance does not cause the capital account balance and the hypothesis that the capital account balance does not cause the current account balance (see Table 4). The tests for the restricted sample period 1976–82 show a causality running from the current account to the capital account.[9]

Table 4. Thailand

	Sample: 77.2-88.4 (5 lags)	**Sample: 89.1-96.4 (6 lags)**
CA does not cause KA		
Wald test statistic	7.554	13.951
Result	accepted (0.1826)	rejected (0.0302)
KA does not cause CA		
Wald test statistic	3.9325	11.468
Result	accepted (0.5592)	rejected (0.0749)

Note: CA is current account balance; KA is capital account balance.

Beginning in the late 1980s, Thailand experienced a surge in capital inflows. The immediate response was to pursue sterilization and fiscal tightening, combined with structural reforms, including trade liberalization and liberalization of capital outflows. At the same time, banks' and finance companies' net foreign exchange positions limit as a ratio of capital was raised. Even though the pegged exchange rate system was maintained and the real exchange rate appreciated only moderately, the economy experienced increasingly large current account deficits. Credit restraint was insufficient to reduce the asset price bubble, and domestic demand continued to increase. Further tightening of credit encouraged more capital inflows, while the current account continued to deteriorate. In 1996, Thailand began to experience speculative attacks, which eventually led to the crisis of July 1997. The causality tests

[9]A VAR model with three lags shows that the current account balance causes the capital account balance (probability of type I error 0.08), but the capital account balance does not cause the current account balance (probability of type I error 0.36).

reported in Table 4 reveal strong feedback between large capital inflows and large current account deficits in Thailand for the period 1989–96.

B. Current Account Responses to Capital Inflows

If a causal relationship is running from the capital account to the current account, or if the causality is running in both directions (feedback), a policy package aimed at reducing the current account deficit might have the opposite effect if it simultaneously stimulates capital inflows. To have a better understanding of this relationship, the orthogonalized impulse-response function is used to analyze the current account responses to shocks in the capital account in the four countries during the post-globalization period.[10] Starting from a situation in which the current account is in equilibrium, it is found that in all cases a positive once-and-for-all shock by one standard deviation in the capital account balance is followed almost immediately by a deterioration of the current account balance, as shown in Chart 1, where the vertical axis measures the fluctuations in the current account balance (in number of standard deviations) and the horizontal axis measures time (in number of quarters).

In the case of Argentina, the current account worsens immediately after the shock in the capital account takes place, reaching maximum deterioration during the second quarter. On average, it takes about 20 quarters for the current account to stabilize after a capital account shock. The situation is somewhat similar in the case of Mexico. A positive capital account shock is followed, after one quarter, by current account imbalances for the next 25 quarters.

For the Philippines and Thailand, positive shocks in the capital account are followed, after one quarter, by a worsening of the current account balance, and the current account remains in deficit for six quarters in the case of Philippines and four quarters in the case of Thailand. Afterwards, the current account returns to its equilibrium, but with significant oscillations before stabilizing in the case of Thailand.

The differences in the current account responses between the two Latin American countries and the two Asian countries lie in the policies pursued. As discussed above, in Argentina and Mexico, the upsurge in capital inflows was followed almost immediately by large current account deficits owing to the drastic real exchange rate appreciation. By comparison, in the case of Thailand and, to a lesser extent, that of the Philippines, the appreciation of the real exchange rate was moderate. The current account was affected mostly by an expansion of domestic absorption stemming from loose liquidity conditions, a less direct channel than the change in relative prices.

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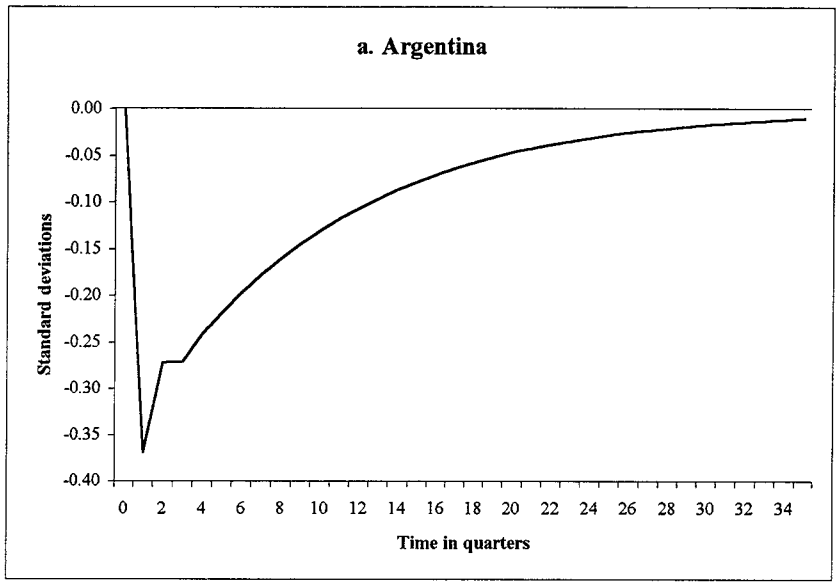
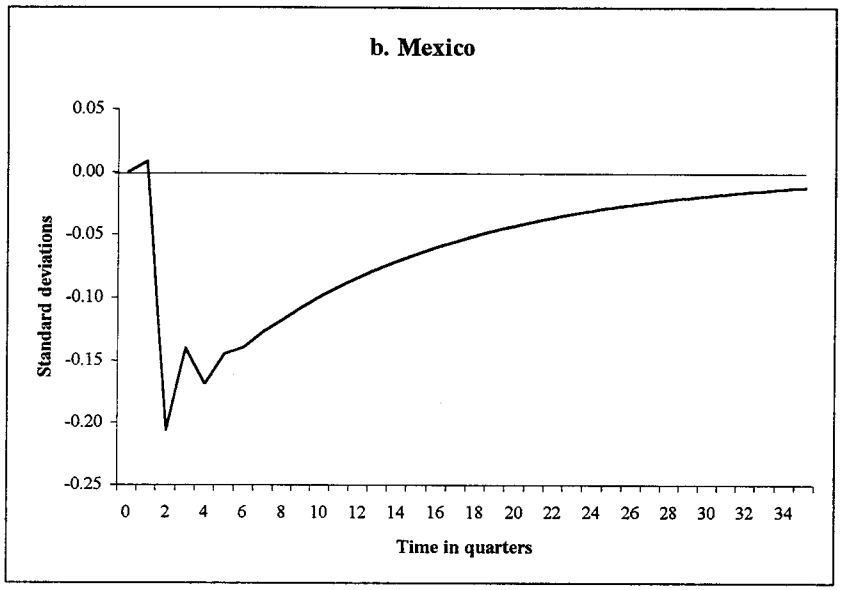
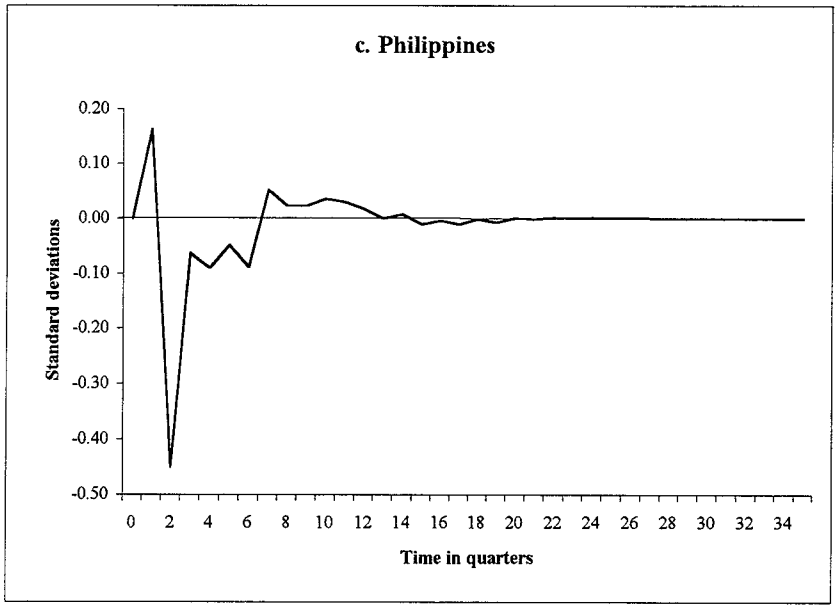
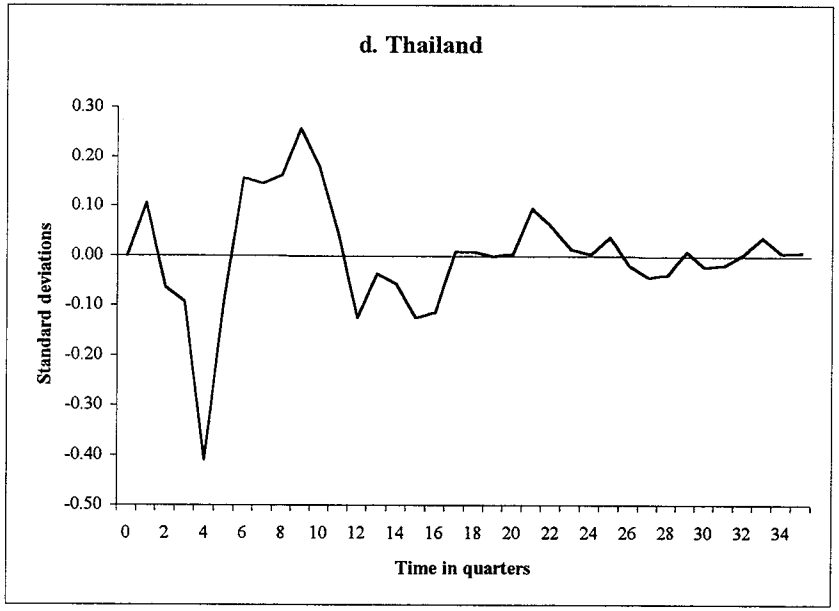
[10]A brief explanation of the derivation of the impulse-response function from a VAR model is provided in Appendix I.

Chart 1. Current Account Responses to Shocks in Capital Account









IV. Appropriate Policy Responses

This section reviews the standard policy package mentioned earlier and provides further thoughts on the appropriate responses to capital inflows based on the empirical results.

A. Standard Policy Package[11]

Large capital inflows to emerging market countries in recent years have generally helped economic growth, but they have also caused serious problems in macroeconomic management: accelerated inflation or a nominal appreciation seemed to be the trade-off faced by policymakers in the first instance.

When countries began to receive large capital inflows, most policymakers reacted with sterilized intervention, seeking to offset the effects of capital inflows on the monetary base. This policy was followed in all the countries analyzed in this paper but Argentina, since Argentina was operating a currency board arrangement. However, sterilized intervention generally resulted in a combination of real exchange rate and real interest rates that was inconsistent with the new external environment. Moreover, the higher the degree of capital mobility, the lower the effectiveness of sterilization and the higher the quasi-fiscal costs involved in this operation.

Exchange rate policy played a very important role in the four countries reviewed in this paper, although their exchange rate arrangements differed: Argentina and Thailand adhered to fixed exchange rates, Mexico moved from a crawling peg to a gradually widening crawling band, and the Philippines initially allowed the exchange rate to adjust within a flexible regime, but subsequently adopted a de facto peg. None of these countries changed to a floating regime until a crisis arose. Nevertheless, two countries (Mexico and Philippines) opted for nominal appreciation to reduce the pressure of capital inflows on the monetary base despite higher current account deficits. Notwithstanding the efforts of the four countries to maintain competitiveness, the real exchange rate appreciated, especially in Argentina and Mexico.

The other major component of the package was fiscal restraint. Both Asian countries pursued a tight fiscal policy in response to capital inflows. However, in the two Latin American countries, fiscal policy, which sought to control inflation, was not tightened further in response to the surge in capital inflows, as the appreciation of the real exchange rate began to produce disinflation (see Table A5 in Appendix II).

Controls on capital inflows in various forms were implemented in Mexico, Philippines, and Thailand. Empirical studies have shown, however, that capital controls could be effective in the very short run, but not in the long run, mainly because they do not affect the behavior of

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[11]A description of the standard package can be found in Montiel (1995) and Khan and Reinhart (1995), among others.

real exchange rates, and they can be circumvented.[12] Also, the welfare cost could be significant, especially in terms of resource allocation and income distribution.

In sum, the major standard policy responses to large capital inflows are sterilization, especially at the beginning, accompanied by measures to relieve the pressure on the monetary base, such as some degree of exchange rate flexibility (allowing nominal appreciation if necessary), tight fiscal policy, and some forms of capital controls.

This policy package, however, had unsatisfactory results. In 1994, the "honeymoon" of the market-globalization era ended. First Mexico and then Argentina experienced serious macroeconomic problems associated with the reversal of capital flows. Thailand and the Philippines also experienced currency crises in 1997, in some aspects similar to the Mexican crisis.[13]

B. Further Thoughts

In designing an appropriate policy to deal with external imbalances, it is important to identify the source of the imbalances to see if the imbalance in one account (current/capital) is causing the imbalance in the other account. This paper identifies four different possibilities in terms of causality: current account imbalance causing capital flows, capital account imbalance affecting the current account result, a two-way causality between the two accounts, and finally no causality between the two accounts.

The appropriate policy response in the case where the current account imbalance is affecting or is independent of the capital account has been extensively studied in the literature. The right mix often suggested is a combination of Keynesian-type fiscal and monetary policies and exchange rate policy. The proper application of the policy package usually achieves the final objectives of price stability and current account equilibrium.

What is striking is that in the case where capital flows cause the current account imbalance, or where there is feedback between the two accounts, the same policy package applicable in the previous two cases often fails to obtain macroeconomic stability. A possible reason seems to be that a capital account shock could create pressure in the foreign exchange market that would drive the real exchange rate away from its long-run equilibrium value.

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[12]See, for example, Dooley (1996) and Edwards (1998). This is an area in which much debate continues. An important issue in this context is whether hedge funds make financial markets more or less stable. See Eichengreen, Mathieson, and others (1998).

[13]Some authors have relied on the multiple equilibrium hypothesis to explain the sudden reversal of capital flows. See, for example, Calvo (1995) and Cole and Kehoe (1996).

1. What is wrong with the standard policy package?

After reviewing the four country cases and other emerging market economies in similar situations, several observations can be made. First, policymakers may fear that a flexible exchange rate regime would produce high volatility, and in the presence of large capital inflows, a drastic appreciation of the nominal exchange rate could have negative long-lasting effects on the export sector, especially on nontraditional exports. Many countries, therefore, have opted for a fixed exchange rate or limited exchange rate flexibility. It has been observed that consistent with the arguments made above, in many of these countries, the real exchange rate departed from the equilibrium rate because of capital inflows, while the current account deficit continued to worsen. Such situations provide arbitrage opportunities in the short run, even if investors know that the real exchange rate will depreciate in the long run. Moreover, when the short-run pressure for a nominal appreciation disappears, and the fundamentals call for a depreciation of the real exchange rate, monetary authorities may find it impossible to defend the currency if there is strong speculation for a depreciation of the nominal exchange rate. The recent experiences of Thailand and the Philippines clearly portray this situation.

Second, as was discussed above, in almost all cases, the first response to a surge in capital inflows was to sterilize it. Even though sterilization could be a plausible instrument, particularly when policymakers are dealing with temporary shocks, the policy should not be continued for long because it does not allow foreign investors to adjust their portfolios, hence it could induce even further capital inflows.

Third, the tight monetary policy recommended in this package (sterilization, high reserve requirements, and other instruments to mop up excess liquidity) is designed to control inflation and reduce current account deficits through a contraction in domestic absorption. However, this policy could perpetuate, or even increase, interest rate differentials. In the case where capital inflows cause current account deficits, tight monetary policy without sufficient complementary policies, particularly fiscal restraint, to reduce interest rate differentials, could worsen current account deficits because of an appreciation of the real exchange rate. This situation could get even worse if there is a two-way causality between the two accounts.

2. What are the alternatives?

As mentioned above, sterilized intervention and capital controls are only temporary measures. If capital inflows are permanent in nature, alternative measures must be found, particularly if capital inflows are causing current account imbalances or if there is feedback between the two accounts. The appropriate responses will then depend on the composition and use of capital inflows. Of crucial importance, in any case, are the flexibility of policy instruments and the soundness of the financial system. A discussion of the alternatives follows.

First, the direction in which the exchange rate should move needs to be ascertained. If capital inflows are predominantly portfolio investment or other short-term inflows, the equilibrium real exchange rate will probably depreciate if these capitals are used to finance

consumption or unproductive activities and will probably appreciate if they are channeled into productive capital formation. If predicting the equilibrium real exchange rate is particularly difficult, it is better to make the nominal exchange rate sufficiently flexible for market forces to establish equilibrium. This would isolate the monetary base from changes in net foreign assets, prevent speculation, and reduce further capital inflows by letting foreign investors bear higher exchange risks. At the same time, flexible exchange rates would enable the authorities to focus on other necessary measures, such as strengthening the financial system.

Second, since a fixed exchange rate system is more susceptible to arbitrage and speculative attacks in a world of high capital mobility, the implementation of such a system is appropriate only if (1) monetary and fiscal policies are flexible enough to maintain the real exchange rate in line with the fundamentals; (2) there are ample international reserves to defend the exchange rate and to maintain investor confidence; and (3) there is a strong and independent central bank that is prepared to use active interest rate policy to deal with speculative attacks, and the domestic financial system is strong enough to withstand large swings in foreign assets and liabilities.[14]

Third, the timing of policy action is crucial. Once it becomes evident that a stable real exchange rate cannot be maintained, decisive action is needed to realign the real exchange rate. In this context, it is better to obtain the real exchange rate realignment through changes in the nominal exchange rate than through changes in domestic prices, particularly if a real depreciation is required, because the fiscal contraction required to achieve the desired real exchange rate may be too costly and the adjustment too slow. Although fiscal restraint can be used to help reduce exchange rate volatility and restore current account sustainability throughout the adjustment process, such a measure is most appropriate at the beginning of the process, when it is needed to complement monetary policy to reduce interest rate differentials and when current account deficits are relatively small.

Fourth, the expansion of the monetary base could rapidly expand credit in the financial system, and this, in turn, could be the seed of a financial crisis, if it were to result in risk-taking by financial institutions. Although banks are risk-neutral agents, they can take very risky positions in the face of rapid credit expansion.[15] Implicit free deposit insurance schemes will induce banks to operate with huge mismatches between assets and liabilities, with inadequate credit screening, resulting in resource misallocation (e.g., unproductive projects, real estate speculation), nonperforming loans, and the like. Strengthening reforms and surveillance of the financial system is necessary for the success of the adjustment process.

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[14]Interestingly, Goldstein (1998, p.26) notes that "Hong Kong and Argentina have thus far fared better in the crisis than some of their neighbors not because they have currency boards but rather because they have gone farther in strengthening their banks and their liquidity defenses."

[15] This point is discussed in Khan and Reinhart (1995).

CAUSALITY TEST USING VAR

A bivariate VAR model can be written as:

$$\begin{pmatrix} x_t \\ y_t \end{pmatrix} = \begin{pmatrix} a_1 \\ a_2 \end{pmatrix} + \begin{pmatrix} b_{11}^1 & b_{12}^1 \\ b_{21}^1 & b_{22}^1 \end{pmatrix} \begin{pmatrix} x_{t-1} \\ y_{t-1} \end{pmatrix} + \begin{pmatrix} b_{11}^2 & b_{12}^2 \\ b_{21}^2 & b_{22}^2 \end{pmatrix} \begin{pmatrix} x_{t-2} \\ y_{t-2} \end{pmatrix} + \ldots\ldots + \begin{pmatrix} b_{11}^q & b_{12}^q \\ b_{21}^q & b_{22}^q \end{pmatrix} \begin{pmatrix} x_{t-q} \\ y_{t-q} \end{pmatrix} + \begin{pmatrix} e_{1t} \\ e_{2t} \end{pmatrix}$$

where e_{it} is a white noise for i = 1 and 2, satisfying $E(e_{it}) = 0$ and $E(e_{it}, e_{js}) = \sigma_{ij}$ for t = s and $E(e_{it}, e_{js}) = 0$, for $t \neq s$. In matrix form:

$$\mathbf{Z}_t = \mathbf{a} + \mathbf{B}(\mathbf{L})\mathbf{Z}_t + \mathbf{e}_t \qquad \text{(A1)}$$

where

$$\mathbf{B}(\mathbf{L}) = \sum_{t=1}^{q} \mathbf{B}_t L^t$$

and $\mathbf{B}_t$ is a 2x2 matrix and L is the lag operator.

A. The Granger Causality Test

Following Granger's definition of causality, y fails to cause x if, for any $s > 0$, the mean squared error of a forecast of x_{t+s} based on past values of x and y is the same as the mean squared error of a forecast of x_{t+s} based only on past values of x, that is, the information contained in y is not relevant for predicting future x (Granger, 1969). In terms of the above model, y fails to cause x if:

$$b_{21}^{j} = 0 \quad \textit{for all} \quad j > 0 \qquad \text{(A2)}$$

Or in matrix terms, $\mathbf{B}_t$ is a lower triangular matrix for all t = 1,..., q. The number of lags must be sufficient to summarize all of the dynamic correlations between the endogenous variables. The Akaike information criterion (AIC) was used to determine the appropriate lag length in each case. The results are provided in Table A1.

To test for causality the paper imposes the null hypothesis (A2) for all j and uses the Wald test (see Judge and others, 1985). Given the small sample problem, the F-test becomes unreliable because of the presence of lagged dependent variables.

B. The Impulse-Response Function

If the eigenvalues of $\mathbf{B}_t$ lie inside the unit circle, then $_z$ will have a moving average representation of infinite order, that is, MA(∞) vector representation. Using equation (A1),

$$\mathbf{Z}_t = \mathbf{D}(\mathbf{L})\mathbf{e}_t \qquad \text{(A3)}$$

where

$$\mathbf{D(L)} = (\mathbf{I} - \mathbf{B(L)})^{-1} = \mathbf{I} + \mathbf{D}_1\mathbf{L} + \mathbf{D}_2\mathbf{L}^2 + \mathbf{D}_3\mathbf{L}^3 + ...$$

which is a convergent sequence since the eigenvalues of **B(L)** lie inside the unit circle.

The response of x_{t+s} for all s > 0 to a one-time impulse in $e_{i,t}$, while keeping the other component of $\mathbf{e}_t$ constant, is called the impulse-response function of x. The impulse-response function helps to understand the dynamic relationship embedded in the VAR model. A shock ("impulse") in only one period to a variable filters to the model to affect other variables and eventually feed back to the original variable. However, since $\sigma_{1,2}$ is different from zero, that is, $\mathbf{e}_t$ is contemporaneously correlated, the original VAR innovations need to be transformed into an uncorrelated vector to obtain what is known as the orthogonalized impulse-response function (for an explanation see Hamilton, 1994).

Notice that when **B(L)** is a lower triangular matrix, $(\mathbf{I} - \mathbf{B(L)})^{-1}$ is also a lower triangular. Therefore, if y fails to Granger-cause x, x will not respond to changes in the stochastic term $e_{2,t}$.

Table A1. Composition of Net Capital Inflows in Four Countries
(in percent of GDP)

	Foreign Direct Investment				Portfolio Investment				Other Investment			
	Argentina	Mexico	Philippines	Thailand	Argentina	Mexico	Philippines	Thailand	Argentina	Mexico	Philippines	Thailand
1976	...	...	...	0.49	-0.09	...	...	-0.01	1.13	...	...	3.35
1977	0.21	...	1.10	0.57	0.00	...	0.03	0.00	0.46	...	2.00	5.16
1978	0.31	...	0.45	0.22	0.11	...	0.00	0.34	-0.60	...	7.99	6.17
1979	0.18	0.93	0.03	0.20	0.15	-0.28	0.05	0.69	2.80	2.82	6.13	7.09
1980	0.38	1.06	-0.33	0.58	0.07	0.02	0.01	0.30	0.74	4.68	9.38	5.43
1981	0.56	1.23	0.48	0.83	0.66	0.46	0.01	0.13	-0.20	8.94	6.23	7.69
1982	0.30	1.11	0.04	0.52	2.24	0.54	0.00	0.19	-0.07	4.20	7.42	3.33
1983	0.18	1.47	0.32	0.87	1.10	-0.44	0.02	0.27	0.32	-0.80	3.34	4.78
1984	0.23	0.88	0.03	0.96	0.65	-0.43	-0.01	0.37	1.45	0.30	4.05	4.64
1985	1.04	1.08	0.04	0.42	-0.57	-0.53	0.02	2.30	3.50	-0.71	-2.03	1.49
1986	0.54	1.85	0.43	0.61	-0.34	-0.95	0.04	-0.07	1.51	1.19	-0.01	-1.23
1987	-0.02	1.88	0.92	0.36	-0.09	-1.00	0.06	0.68	2.91	-1.75	-0.60	0.57
1988	0.90	1.57	2.47	1.75	-0.52	1.46	0.13	0.86	2.46	-3.66	-1.37	3.19
1989	1.26	1.42	1.32	2.39	3.20	0.13	0.66	2.06	-4.79	-0.72	1.45	4.19
1990	1.30	1.00	1.20	2.69	-0.93	-1.52	-0.11	-0.04	-1.89	4.12	2.79	7.66
1991	1.29	1.51	1.20	1.92	0.25	3.86	0.24	-0.08	0.06	2.68	5.41	10.39
1992	1.76	1.21	0.43	1.79	0.40	5.28	0.08	0.84	1.50	0.79	5.66	6.01
1993	1.27	1.09	1.59	1.28	11.00	7.03	-0.10	4.46	-7.55	-0.04	4.72	2.84
1994	1.06	2.61	2.01	0.61	1.61	1.76	0.42	1.72	1.12	-0.90	5.21	6.10
1995	1.66	3.32	1.46	0.70	1.85	-3.62	1.61	2.43	-2.54	5.69	3.61	9.90
1996	1.64	2.31	...	0.77	3.66	4.45	...	1.95	-2.75	-5.75	...	8.01

Source: IMF, Economic Information System.

Table A2. Composition of "Other Investment" (Net) in Four Countries
(in percent of GDP)

	Loans				Currency and Deposits				"Other"[1]			
	Argentina	Mexico	Philippines	Thailand	Argentina	Mexico	Philippines	Thailand	Argentina	Mexico	Philippines	Thailand
1976	1.58	...	...	2.30	-0.32	...	...	0.53	-0.13	...	...	0.52
1977	-0.02	...	2.57	2.16	-0.39	...	0.00	1.95	0.87	...	-0.57	1.05
1978	0.64	...	5.27	3.41	-0.05	...	2.65	2.84	-1.19	...	0.06	-0.08
1979	3.84	3.30	5.72	5.46	-0.21	-0.48	-0.95	1.24	-0.83	0.00	1.37	0.40
1980	3.11	5.34	5.99	5.44	-0.15	-0.66	0.98	-1.36	-2.23	0.00	2.41	1.34
1981	3.04	8.53	7.38	8.37	-0.03	0.41	-0.61	-0.03	-3.21	0.00	-0.54	-0.65
1982	-1.89	4.88	6.98	3.76	0.88	-0.68	0.28	-0.62	0.93	0.00	0.16	0.18
1983	1.05	2.12	0.88	3.15	-0.32	-2.92	-0.80	1.57	-0.42	0.00	3.26	0.05
1984	0.42	1.11	2.60	4.61	-0.33	-0.80	-0.47	0.23	1.35	0.00	1.93	-0.20
1985	6.69	-0.18	0.90	2.88	0.58	-0.54	-3.06	-0.92	-3.77	0.00	0.12	-0.46
1986	2.63	0.45	2.58	0.73	0.02	0.73	-0.84	-1.31	-1.14	0.00	-1.76	-0.66
1987	2.76	1.08	-1.18	-0.48	0.13	-2.83	1.21	0.60	0.02	0.00	-0.63	0.46
1988	1.44	-3.42	-1.78	0.66	-0.05	-0.24	0.85	1.91	1.07	0.00	-0.44	0.62
1989	1.01	-0.32	1.23	3.49	0.36	-0.40	0.87	0.86	-6.16	0.00	-0.65	-0.16
1990	1.41	3.10	2.44	5.87	-0.50	1.02	0.70	1.30	-2.81	0.00	-0.34	0.48
1991	0.43	1.84	4.21	8.92	0.16	0.84	1.04	0.36	-0.53	0.00	0.16	1.11
1992	0.35	-0.76	1.64	4.08	-0.41	1.55	3.62	1.70	1.56	0.00	0.39	0.24
1993	-3.95	-0.12	...	3.37	-0.21	0.08	...	-0.48	-3.38	0.00	...	-0.06
1994	0.82	0.35	...	5.75	0.22	-0.92	...	0.76	0.07	-0.34	...	-0.41
1995	1.98	8.70	...	9.35	-0.04	-1.65	...	0.39	-4.48	-1.36	...	0.16
1996	0.03	-3.66	...	5.04	-0.75	-1.82	...	3.12	-2.03	-0.28	...	-0.14

Source: IMF, Economic Information System.

[1] "Other Investment" minus "Loans" and "Currency and Deposits."

Table A3. Unit Root Analysis 1/

Country (Period)		Variables	Without Constant lag[2/]	β	t-adf[3/]	With Constant lag	β	t-adf
Argentina	(1976.1-1996.4)	CA	4	0.848	-2.059**	4	0.719	-3.047**
		KA	1	0.526	-3.516***	1	0.495	-3.670***
Mexico	(1979.1-1996.4)	CA	1	0.924	-1.931*	1	0.888	-2.317
		KA	3	0.777	-2.364**	3	0.725	-2.636*
Philippines	(1977.1-1995.4)	CA	1	0.889	-1.675*	0	0.620	-3.990***
		KA	2	0.835	-1.512	1	0.420	-3.838***
Thailand	(1976.1-1997.4)	CA	4	0.869	-2.813***	4	0.799	-3.037**
		KA	5	0.814	-2.977***	5	0.731	-3.025**

1/ The Augmented Dickey-Fuller Test for a time series variable y_t is to test the null hypothesis of $\beta=1$ in the following specification:

$$\Delta y_t = \alpha + (\beta - 1) y_{t-1} + \sum_{i=1}^{q} \delta_i \, \Delta y_{t-i} + \epsilon_t$$

where y in the present case is represented by either CA or KA.

2/ The number of lags (q in the above specification) is determined by selecting the highest q with a significant δ coefficient.

3/ The number of asterisks indicates the level of significance: * , **, and *** denote rejection at the 10, 5, and 1 percent level, respectively.

Table A4. Lag Length Determination (Using the Akaike Information Criterion)

Lag Length	First Sample[1]	Second Sample[2]
Argentina		
1	25.886	27.529
2	25.787	27.450
3	25.532	28.124
4	25.288	27.951
5	25.141	27.729
6	25.988	28.354
Mexico		
1	28.084	28.464
2	27.737	28.144
3	27.671	29.016
4	28.383	28.693
5	28.329	28.337
6	28.235	28.947
Philippines		
1	22.210	23.969
2	22.105	23.086
3	22.009	23.038
4	21.966	22.793
5	22.758	23.726
6	22.737	23.451
Thailand		
1	22.136	26.912
2	21.868	26.492
3	21.808	26.411
4	21.644	26.988
5	21.430	26.631
6	22.273	26.349

[1] Sample period: Argentina: 1976.1-1984.4; Mexico: 1979.1-1988.4; Philippines: 1997.1-1988.4; Thailand: 1976.1-1988.4.

[2] Sample period: Argentina: 1989.1-1994.4; Mexico: 1989.1-1994.3; Philippines: 1989.1-1995.4; Thailand: 1989.1-1996.4.

Table A5. Central Government Budget Balance
(in percent of GDP)

	Argentina	Mexico	Philippines	Thailand
1976	-8.83	-4.08	-1.74	-3.99
1977	-4.25	-2.99	-1.82	-3.24
1978	-3.78	-2.87	-1.22	-3.63
1979	-3.04	-3.02	-0.16	-3.65
1980	-3.11	-3.00	-1.39	-4.85
1981	-5.43	-6.52	-4.32	-3.35
1982	-4.22	-11.98	-4.54	-6.36
1983	-7.52	-8.15	-2.02	-3.95
1984	-3.79	-7.25	-1.90	-3.41
1985	-5.35	-7.59	-1.95	-5.24
1986	-2.40	-13.13	-5.03	-4.23
1987	-2.69	-14.22	-2.45	-2.23
1988	-1.34	-9.61	-2.91	0.68
1989	-0.66	-4.99	-2.11	2.95
1990	-0.33	-2.80	-3.45	4.55
1991	-0.53	-0.23	-2.11	4.72
1992	-0.03	1.54	-1.18	2.83
1993	-0.61	0.33	-1.48	2.09
1994	-0.67	-0.70	1.07	1.86
1995	-0.51	-0.57	0.58	2.88
1996	-1.76	...	0.28	2.32

Source: IMF, Economic Information System.

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