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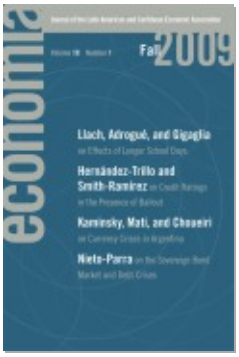

Graciela Kaminsky, Amine Mati, Nada Choueiri

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GRACIELA KAMINSKY
AMINE MATI
NADA CHOUEIRI

Thirty Years of Currency Crises in Argentina: External Shocks or Domestic Fragility?

Argentina has had an active presence in international capital markets since its independence in the early nineteenth century. However, its participation has been quite volatile. In the early 1800s, in the midst of the lending boom fueled by the end of the Napoleonic wars, Argentina and many other countries in Latin America were able to issue bonds in London to finance their wars of independence and the civil wars that followed. This lending boom ended in the summer of 1825 when the Bank of England raised the discount rate to stop the drain in its reserves. The tightening of liquidity was followed by stock market crashes, banking problems, and recessions in England and on the Continent. Within months the crisis also spread to Latin America. Argentina defaulted in 1827, in the midst of what is known as the first Latin American debt crisis, only resuming payments in 1857.

Similar international capital flow booms to emerging markets occurred in 1867–72, 1880–90, 1893–1913, and 1920–29, fueled by an easing monetary stance in the financial centers of those times and by the financial needs of railway expansion, urbanization, and development of the banking sector of countries in the periphery. While Argentina was heavily involved in all these capital flow bonanzas, its participation was quite volatile, with financial crises often following booms.[1]

Kaminsky is with George Washington University and the National Bureau for Economic Research, and Mati and Choueiri are with the International Monetary Fund.

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1. For example, the boom of the 1880s ended with banking and currency crises as well as a sovereign default, while the end of the capital inflow episode of the 1920s led to Argentina's abandonment of the gold standard. See Kaminsky (2009) for an analysis of Latin America's participation in international capital markets from independence to the Great Depression.

In the aftermath of the crisis of the 1930s, international capital markets all but disappeared, and Argentina was unable to borrow again until the 1970s. The period from the mid-1970s to 2002 was as tumultuous as that of the earlier eras and was characterized by booms and busts in international capital flows, crises, and failed stabilization programs. During this period, Argentina had eight currency crises, four banking crises, and two sovereign defaults. Many argued that domestic fragilities were at the heart of these crises.[2] Others blamed erratic international capital markets by pointing out the lending boom of the late 1970s that ended with defaults across all Latin American countries, or the lending cycle of the 1990s that triggered banking and currency crises in the most active participants in international capital markets, such as Argentina, Brazil, Colombia, Mexico, Peru, and Venezuela.[3] This important debate is still unsettled. Now, in the midst of the worst international financial crisis since the Great Depression, untangling the roots of financial distress becomes crucial. This is the question we plan to examine in this paper.

We focus on Argentina's currency crises of the last thirty years and cast our net wide to examine the role of three external shocks and four sources of domestic vulnerability in the development of currency turmoil. Our selection of external shocks centers on the easing and tightening of monetary policy in the world financial centers, financial contagion and overall "international investors' sentiment" about emerging markets, and real exchange rate misalignments caused by currency depreciations among Argentina's major trading partners. With respect to domestic vulnerabilities, we focus on the boom-bust cycle of domestic credit and monetary policy, fiscal problems, shocks to economic activity, and increases in households' risk aversion triggered by spells of hyperinflation, controls on foreign exchange transactions, cycles of controls on prices and wages, and bank deposit confiscations that have plagued Argentina's recent history. To capture the onset of the crises and track the buildup of fragility during fixed exchange rate regimes, we look at the evolution of foreign exchange reserves of the central bank as a proportion of domestic credit. For short periods of time in the early 1970s and late 1980s, Argentina adopted a dual exchange rate regime, with a fixed exchange rate for commercial transactions and a freely floating exchange rate for capital account transactions. For these episodes, the onset of a crisis is captured by an index of exchange market pressure, which is constructed as a composite index of losses of reserves of the central bank and the dual exchange market premium.

2. See, for example, Mussa (2002) and Perry and Servén (2002).
3. See, for example, Calvo, Leiderman, and Reinhart (1992, 1996).

Structural Vector Autoregression (VAR) techniques are used to identify the effects of domestic and external shocks on the onset of the crises.

The next section presents a chronology of Argentina's currency crises since 1970. This is followed by the presentation of a basic model to underpin the VAR specification. The third section discusses the estimation, presents the data, and examines key empirical results, and the final section summarizes our findings.

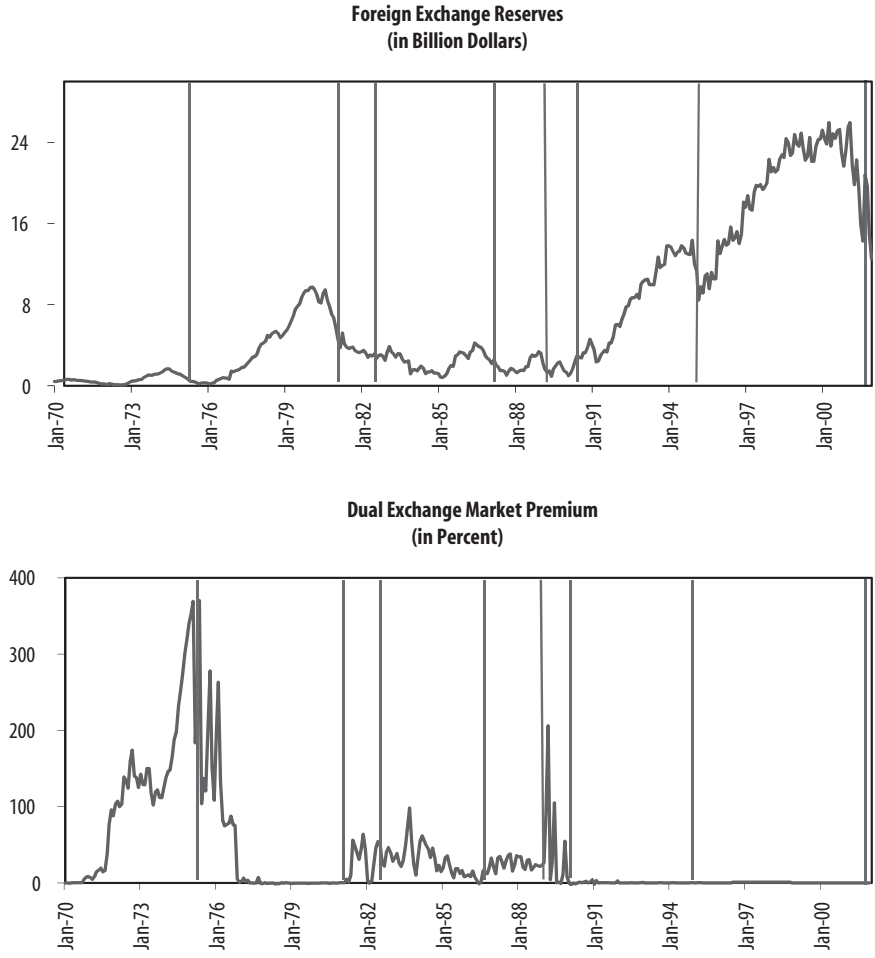
Chronology of the Currency Crises[4]

During most of the post–World War II period, Argentina experienced chronic inflation. Many stabilization programs using the exchange rate as an anchor were launched in the belief that with fixed exchange rates, domestic inflation would converge quickly toward world levels. These programs also included plans for fiscal and monetary austerity (although, in most cases, they were later abandoned). All the programs ended up with currency crises. In addition to failed stabilization attempts, global external factors also contributed to the general instability of the domestic currency. Declining interest rates in the industrialized world fueled capital flows to developing countries in the late 1970s and in the 1990s, and while these capital flow bonanzas are generally considered beneficial to emerging markets, they also trigger real exchange rate appreciations and current account deficits, which often lead to currency crises. Furthermore, these flows are prone to quick reversals whenever monetary policy in the center economies switches to a contractionary stance. Also, fragilities in the domestic financial system as well as forced conversions of deposits were another potential cause of runs against the Argentine peso. Thus our chronology of crises will highlight the evolution of the different stabilization programs implemented in this period as well as the role of world shocks and financial vulnerabilities.

To help in our crisis chronology, figure 1 shows the evolution of the central bank's foreign exchange reserves and the dual market premium from January 1970 to January 2002, the month of the onset of the last crisis. The dates of the currency crises are indicated by the vertical lines. It is clear from figure 1 that

4. This chronology is partly based on Blejer and Liviatan (1987), Cumby and van Wijnbergen (1989), D'Amato, Grubisic, and Powell (1997), De la Torre, Levy Yeyati, and Schmukler (2002), Di Tella and Dornbusch (1989), Dornbusch and de Pablo (1989), Edwards (2002a and 2002b), Giorgio and Sagari (1996), Hausman and Velasco (2002), International Monetary Fund (2004a and 2004b), Kiguel (1989), Montanaro (1990), and Rodriguez (1994).

FIGURE 1. Indicators of the Fragility Buildup, 1970–2002[a]



Sources: See appendix A.
a. The vertical lines indicate the month of the crises.

almost all crises were preceded by losses of reserves or by sharp increases in the dual market premium when foreign exchange controls were introduced.

Table 1 reports crisis dates and the names of the stabilization programs preceding them, as well as the time during which these programs were implemented. To illustrate the severity of each crisis, table 1 shows the loss of foreign exchange reserves of the central bank in the months leading into

TABLE 1. Stabilization Plans and Crises, Argentina, 1973–2002

Stabilization plans						
Name	*Date implemented*	*Crisis date*	*Reserve losses*[a] *(percent)*	*Dual market premium on the month of the crisis (percent)*	*Devaluation on the month of the crisis (percent)*	*Cumulative devaluation the first six months after crisis (percent)*
Gelbard	May 1973	March 1975	56	369	100	628
Tablita	December 1978	February 1981	45	. . .	10	136
Alemann	December 1981	July 1982	17	. . .	148	244
Austral	June 1985	September 1987	75	. . .	16	133
Primavera	August 1988	April 1989	62	206	387	4025
BB	July 1989	February 1990	58	105	220	232
Convertibility	April 1991	March 1995	41	. . .	0	0
		January 2002	50	. . .	40	265

Sources: See appendix A.

a. For each episode, reserve losses are computed from the month the stock of reserves held by the central bank peaks until the crisis date.

the crisis, the dual exchange market premium at the onset of the crisis, and the devaluations following the crisis. All speculative attacks ended with a sharp devaluation, with the exception of the one in 1995; in this instance, the central bank managed to avoid a devaluation during the speculative attack despite a 41 percent loss in foreign exchange reserves.

The first crisis, associated with the collapse of the stabilization plan implemented by the then minister of finance, José Gelbard, occurred in March 1975 after various speculative attacks that resulted in a 56 percent loss of foreign exchange reserves, even in the presence of many restrictions to free convertibility.[5] At that time, the domestic currency in both the commercial and financial markets was devalued by 100 percent and 50 percent, respectively. More than a dozen additional devaluations followed over the course of the year.[6]

The second crisis and the collapse of the second stabilization plan (the Tablita Plan) occurred in February 1981 when a 10 percent devaluation was announced. Two other devaluations followed: 34 percent in April and 38 percent in June of that year. The Tablita Plan, launched in December 1978, was characterized by a slowly declining, preannounced rate of exchange rate depreciation (the *tablita*). The program also included fiscal and monetary

5. Part of the exchange rate pressures led to a sharp increase in the financial market premium, which peaked at 369 percent right before the abandonment of the program.

6. During 1975 there were several devaluations, such as the one in June 1975 when Celestino Rodrigo was the finance minister, but these devaluations are not examined separately. Consecutive devaluations less than six months apart from the first devaluation are considered part of the same crisis.

reforms as well as a sweeping financial liberalization plan that led to the complete deregulation of domestic banking activities and a removal of capital account restrictions. This episode coincided with the capital flow bonanza fueled by the savings of OPEC economies after the 1973 oil shock and channeled to emerging markets through the Eurodollar market. By 1980 the boom in capital inflows to Argentina had triggered an explosive growth in domestic credit and overall banking fragilities, which ended with the failure of two of the largest private banks, as well as the liquidation of almost 100 financial institutions.[7] The crisis in 1981 also coincided with the reversal in international capital flows triggered by a shift toward anti-inflationary monetary policy in the United States.

The third crisis took place in July 1982. Following the February 1981 crisis, a variety of programs to refinance banks and insure holders of foreign currency–denominated debt were implemented, maximum interest rates were reimposed and then abandoned, and dual rates were reintroduced from March to December 1981.[8] Naturally, the continuous regulatory changes regarding interest rates and foreign exchange markets contributed to reducing investors' already jittery confidence in the domestic currency and the banking sector. During this period, inflation continued to accelerate, in part fueled by the bailout of the banking sector. Despite the announcement of a new stabilization plan in December 1981, the so-called Alemann Plan, inflation continued to surge, fueled this time by central bank financing of massive military spending during the Malvinas war. The economy was also hit hard by many adverse external shocks: the decrease in international commodity prices, the increase in foreign interest rates, a worldwide recession, and the beginning of the world debt crisis. After a 17 percent loss in foreign exchange reserves, the crisis culminated in July 1982 with a 148 percent devaluation, the introduction of dual exchange rates with controls on domestic interest rates and the capital account, and an exchange rate that floated for the following three years.

During the floating regime, inflation continued to increase, reaching 300 percent during the first half of 1985. In June 1985, a new stabilization plan, the Austral Plan, was launched. A new currency, the austral, was introduced; the dual exchange rate regime was abandoned; the domestic currency was fixed again to the dollar; and interest rate controls were eliminated.[9]

7. See Baliño (1987) for a detailed analysis of the banking crisis in 1980–1981.

8. See Baliño (1987) and Machinea and Fanelli (1988) for a detailed analysis of the measures adopted during this period.

9. One austral was equivalent to 1,000 pesos.

The introduction of the austral was accompanied by a forced renegotiation and markdown of debt contracts and banking deposits. While inflation was contained, the annual rate of inflation was still at about 100 percent by mid-1986, forcing the government to abandon the peg. The government tried to save the program with repeated rounds of enforcement and then relaxation of price controls, and with other restrictions, all with no success. In the first nine months of 1987, reserves of the central bank declined by 1.5 billion dollars (75 percent), leading to a collapse of the Austral Plan in 1987, with the domestic currency being devalued by 16 percent in September and by 33 percent in October.

The next two currency crises occurred in the midst of a hyperinflation period.[10] The first crisis occurred in April 1989, with a 387 percent devaluation. The second crisis erupted within eight months, with a 175 percent devaluation in December 1989 and a 220 percent devaluation in February 1990. During this period, there were two more stabilization attempts: the Primavera Plan in August 1988 and the BB Plan in July 1989. Both plans included price controls, dual exchange rates, and fiscal and monetary contraction. In both plans, monetary and fiscal restraints were rapidly abandoned, and investors' confidence immediately deteriorated. In December 1989, the government froze most domestic austral-denominated time deposits and converted them to ten-year, dollar-denominated Bonex bonds. The value of these bonds immediately dropped to less that 30 percent of face value, weakening investors' faith in the domestic currency.

The last two currency crises were in March 1995 and in January 2002. In April 1991, the Convertibility Plan was launched. Its main feature was the creation of a currency board to enforce the one-to-one peg of the peso to the dollar.[11] In addition, the plan included a series of privatization and deregulation measures as well as fiscal reforms. Also in the early 1990s, Argentina, along with other emerging markets, witnessed another round of capital inflows triggered by declining interest rates in the United States together with the 1989–1990 Brady Plan agreement for Mexico and other Latin American countries. As in the late 1970s, capital inflows led to a domestic credit explosion and to consumption, real estate, and stock market booms. The real exchange rate appreciated and the current account deteriorated. In 1994 the shift back to

10. From the collapse of the Austral Plan in September 1987 to the implementation of the Convertibilty Plan in 1991, prices in Argentina increased by 4,500.

11. The monetary reform in January 1992 replaced the austral with the peso at a rate of 10,000 australs for 1 peso.

a tight monetary policy in the United States (the Federal Funds interest rate was raised by 250 basis points in 1994 alone) led to worldwide interest rate increases, contributing to banking fragilities and a credit crunch amid a severe recession in Argentina. After the Mexican crisis in December 1994, Argentina's banking system suffered from large deposit withdrawals. As investors converted pesos into dollars, the central bank's reserves decreased sharply (41 percent in the first quarter of the year), marking the first currency crisis of the Convertibility Plan. At that time, however, the convertibility program did not end up with a devaluation of the domestic currency, and the reversal of capital flows to Argentina was only transitory.

By the end of 1995, capital flows not only had resumed but even surpassed the levels reached before the Mexican crisis. Capital flows to Argentina and Latin America continued to grow even in the midst of the 1997–98 Asian crisis. Eventually, these flows started to diminish as the behavior of international capital markets changed drastically during the Russian crisis and the collapse of Long-Term Capital Management in the fall of 1998. This time around, as in the mid-1980s, the collapse in capital flows was of a more permanent nature. Argentina still fared comparably better than other countries in the region, with capital flows to Argentina still relatively high in the last half of 1999. The relief, however, was only temporary as capital flows to Argentina completely dried up in the last half of 2000 and especially in 2001. By this time, political uncertainty (President Menem's desire to remain in power for a third term) as well as financial turmoil following Brazil's crisis in January 1999 had severely affected private investment and consumption in Argentina, with economic activity plummeting through 2001. As the situation continued to deteriorate, the government sought more financing. When the government found it difficult to reschedule its debt, it resorted to compulsory placing of government bonds at banks, with banks becoming increasingly more exposed to government default. By June 2001, a massive bank run had started, sealing the fate of the currency board. In December the government announced a deposit freeze, foreign exchange controls, and a debt moratorium. The currency board was formally abandoned in January 2002 with a 40 percent devaluation of the peso. The convertibility regime was replaced with a dual exchange rate system based on an official exchange rate of 1.4 pesos per dollar for the public sector and most trade-related transactions while all other transactions were conducted at market rates. On February 11, the dual exchange rate was abolished, and the peso depreciated to 1.8 pesos per dollar. By June 2002, the exchange rate had reached 4 pesos per dollar.

A Basic Model

The numerous crises in Argentina in the last quarter of a century have stirred a heated debate about the causes behind the periodic collapses of the peg. Throughout the years, several explanations have been offered. Many argue, as it is also evident in our chronology, that at the heart of the crises are large fiscal deficits, leading to rapid growth in money creation and eventually to a depletion of reserves that makes the peg unsustainable. Another view stresses that crises erupt because of real exchange rate misalignments brought about by exchange-rate-based stabilization plans or by devaluations in neighboring countries.[12] According to this view, the exchange rate misalignment eventually leads to unsustainable current account deficits and to speculative attacks against the domestic currency. Another version of the "real appreciation" theory of currency crises links the real appreciation with protracted recessions and with governments' inability to defend the peg in bad times. For example, Drazen and Mason (1994) conclude that in the presence of persistent unemployment, a tough policy (such as one required by the commitment to the currency board in Argentina in the late 1990s) may lower rather than raise the credibility of a no-devaluation pledge and thus trigger a currency attack.

The crises of the 1990s brought to the spotlight the fact that crises may be of a contagious nature. While crises could be synchronous across countries because of a common adverse shock (such as a rise in world interest rates), crises may spill over when the infected country is linked to others via trade or finance. For example, Kaminsky, Lyons, and Schmukler (2004) argue that the 1994 Mexican crisis spread to Argentina and Brazil via mutual fund withdrawals as mutual fund managers scrambled for liquidity after investors' major redemptions from mutual funds specializing in Latin America. Similarly, Kaminsky and Reinhart (2000) conclude that the Mexican default in 1982 propagated to all Latin American countries when U.S. banks, badly damaged by the Mexican default, tried to rebalance the overall risk of their portfolios by calling loans and drying up credit lines not only in Mexico but also in all the Latin American countries where they had exposure. Calvo (1999) provides a different interpretation of the collapse of the peg, which he labels "the sudden stop" syndrome. While this view, like the aforementioned ones, acknowledges the problems of fiscal unsustainability and real

12. See, for example, Reinhart and Végh (2002).

exchange rate misalignments, it places strong emphasis on international financial shocks. At the core of Calvo's explanation lies an unexpected and persistent stop in international capital flows, such as the one observed after the Russian crisis in August 1998. As explained in Calvo, Izquierdo, and Talvi (2002), the unexpected slowdown in capital flows forces emerging economies, such as Argentina, to drastically adjust their current account deficits to accommodate the shortage of external credit. Naturally, a real exchange rate adjustment becomes the essential ingredient for this adjustment to take place. With sticky prices, this adjustment can only be accomplished with a devaluation.

Finally, Kiguel and Neumeyer (1995) and Ericsson and Kamin (1993), among others, have emphasized investors' jittery confidence in Argentina's domestic currency and the banking sector due to continuous changes in regulations on interest rates and foreign exchange markets, as well as the forced conversions of bank deposits in 1985, 1989, and 2001, as triggers of runs against the peso. This section will incorporate these features into a small open economy model, which will be estimated afterwards.

As discussed earlier, the monetary authority in Argentina alternated between the adoption of fixed and dual exchange rate systems. For example, a fixed exchange rate and full convertibility for both current and capital account transactions were at the core of the Tablita Plan and the Convertibility Plan, while a dual exchange rate system was introduced during the Gelbard Plan. In most cases, when the peg collapsed, the central bank allowed the exchange rate to float for some time. Our model should reflect these changing exchange rate regimes. Thus there are two versions of the model that respectively capture the stylized features of each system.

Fixed Exchange Rate Regime

The model is a discrete-time model of an open economy with a fixed and unique exchange rate. The government has a predefined goal for domestic credit, not necessarily consistent with the goal of a fixed exchange rate. Fixing the exchange rate is a secondary goal that can be abandoned if it hinders discretionary monetary policy. This assumption seems to capture quite well monetary and exchange rate policies in Argentina in the post–World War II period. Investors realize that these two goals might conflict and expect the central bank to abandon the peg when it runs out of reserves (Krugman 1979). We follow Blanco and Garber (1986) to model the onset of the crisis, but with a twist. In that paper, the authors only focus on the effect of money supply

shocks. Here, we extend their model to account for foreign shocks as well as other domestic shocks, such as fiscal policy.

The money market is the central component of our model. Equilibrium in that market is given by the following equation,

$$m_t - p_t = -\alpha i_t + \beta c_t + \gamma y_t + \mu_t^d, \tag{1}$$

where m and p are, respectively, the logarithms of the money stock and the price level, i is the domestic interest rate, y is the logarithm of output, and μ^d represents money demand shocks. A negative money demand shock can capture investors' shift out of pesos into dollars in the midst of the financial instability of the 1980s or the run against deposits due to confiscation risk in 2001. A new feature of the money demand is the component c. As we examine in more detail below, this component will try to capture shifts in international investors' perception about emerging markets. For example, an increase in c could capture international investors' renewed interest in emerging markets following the resolution of the debt crisis, whereas a decline in c could typify the sudden stop syndrome, such as the one triggered by the Russian crisis of August 1998, or a contagion effect, such as the reversal in capital flows following the 1994 Mexican crisis.

In the open economy, interest rates and prices are determined by

$$i_t = i_t^* + E_t e_{t+1} - e_t + \rho_t \tag{2}$$

$$p_t = e_t - q_t, \tag{3}$$

where i^* is the world interest rate, e is the logarithm of the nominal exchange rate, ρ is the risk premium, q is the log of the real exchange rate, and E is an expectations operator. Equation 2 allows for deviations from interest parity. Equation 3 allows for deviations from purchasing parity. In equation 3, the log of the foreign price level is normalized to zero. Money supply in the fixed exchange rate system can be written as follows:

$$m_t = d_t + r_t, \tag{4}$$

where r is the ratio of foreign exchange reserves of the central bank to domestic credit in foreign currency and d is the logarithm of the domestic credit

component of money supply. In this simple model, changes in domestic monetary policy or in bank credit to the private sector, changes in the world interest rate, shocks to money demand, and sudden stop or contagion effects will determine the evolution of reserves of the central bank. When reserves are depleted, the central bank will not be able to intervene in the foreign exchange market any longer and will have to let the exchange rate float. Using the money market clearing conditions, we can determine the equilibrium flexible exchange rate $\tilde{e}_t$.[13]

$$d_t + \alpha\left(i_t^* + \rho_t\right) - \beta c_t - \gamma y_t + q_t = \left(1 + \alpha\right)\tilde{e}_t - \alpha E_t \tilde{e}_{t+1}. \tag{5}$$

To obtain the time path of the permanently floating exchange rate $\tilde{e}$, we need to specify the stochastic processes that govern domestic credit, risk premium, foreign interest rates, the real exchange rate, output, and the "sentiment" of international investors towards emerging markets.

$$d_t = \phi g_t + d_{t-1} + \mu_t^s \tag{6}$$

$$\rho_t = \rho + \mu_t^g \tag{7}$$

$$i_t^* = i_{t-1}^* + \mu_t^* \tag{8}$$

$$c_t = c_{t-1} - \omega i_t^* + \mu_t^c \tag{9}$$

$$g_t = g_{t-1} + \mu_t^g \tag{10}$$

$$q_t = \delta q_{t-1} - \chi \mu_t^s + \mu_t^q \tag{11}$$

$$y_t = \bar{y} + \lambda q_t + \mu_t^y \tag{12}$$

where g is the fiscal deficit, $\bar{y}$ is the logarithm of the full employment level of output, and μ^s, μ^g, μ^*, μ^c, μ^y are shocks to money supply, fiscal policy, world interest rates, foreign investors' sentiment towards emerging market assets

13. In a pure flexible exchange rate regime, by assumption, the stock of reserves of the central bank drops to zero.

(either exuberance or sudden stop or contagion syndrome), and the shock to aggregate demand, respectively. Finally, μ^q captures exogenous shocks to the real exchange rate. For example, it may reflect nominal devaluations in trading partner countries, such as the Brazilian depreciation in January 1999. The shocks μ^j are normally distributed white noise shocks with zero mean and standard deviation σ_j, for $j \in \{d, y, s, g, *, c, q\}$.

Equation 6 represents the domestic credit process, where we allow fiscal imbalances to be (partly or totally) financed by money creation. Equation 7 captures a time-varying risk premium, with fiscal deficits triggering a higher premium.[14] Equation 8 reflects the process followed by the world interest rate. Equation 9 captures investors' interest in emerging markets. Naturally, this interest cannot just be explained by shocks to risk aversion triggered by, say, the resolution of the debt crisis in 1989. Fluctuations in interest rates in financial centers can also affect the reallocation of portfolios toward emerging economies. This is why increases in i^* in equation 9 affect adversely the reallocation of portfolios toward emerging economies. In equation 10, we model fiscal policy as an exogenous process. Equation 11 models the real exchange rate as a mean reverting process. We allow the real exchange rate to be affected by monetary shocks since expansionary monetary policy in fixed exchange rate regimes will lead to higher inflation and a transitory real appreciation (see Reinhart and Végh 2002). We also allow for other exogenous shocks to the real exchange rate. With these shocks, we would like to capture the effects of a depreciation in a trading partner country, such as the effect of the devaluation of the Brazilian real in January 1999. Finally, output deviates temporarily from the full employment level with fluctuations of the real exchange rate or in response to other aggregate demand shocks. The relationship between the real exchange rate and economic activity in equation 12 is ambiguous since a real depreciation can increase competitiveness and fuel demand for domestic goods ($\lambda > 0$), but it also can lead to a contractionary effect because of liability dollarization ($\lambda < 0$) (Céspedes, Chang, and Velasco 2004).

14. In models with sovereign debt, a positive risk premium is always associated with the possibility of default. It is argued that as debt increases, it may become unsustainable, or the country may become unwilling to pay it back. These models suggest including foreign debt as an explanatory variable for risk. Unfortunately, for empirical purposes, we cannot relate the risk premium to foreign debt because debt statistics are at best only available at annual frequencies, and our estimations use monthly data. Since government deficits in Argentina have been associated with foreign borrowing, we include the fiscal indicator, for which we have monthly data, as the determinant of the premium.

Using equations 5–12, we obtain the equilibrium flexible exchange rate:

$$\tilde{e}_t = d_t + \alpha(1+\beta\omega)i_t^* + \alpha\rho - \beta c_t - \gamma\bar{y} + \left[\frac{1-\gamma\lambda}{(1+\alpha)-\alpha\delta}\right]q_t + \alpha\phi g_t - \frac{1}{1+\alpha}\left(\mu_t^d + \gamma\mu_t^y - \alpha\mu_t^g\right) \tag{13}$$

The exchange rate depreciates in response to expansionary monetary shocks, fiscal deficits, and positive shocks to world interest rates; it appreciates in response to positive output shocks, increases in investors' interest in emerging markets, and positive money demand disturbances. Finally, a real exchange rate depreciation has an ambiguous effect on the equilibrium flexible nominal exchange rate. The decline in domestic prices triggering the real depreciation leads to higher real money balances and lower domestic interest rates, which fuel a depreciation of the nominal exchange rate. But the real depreciation may stimulate economic activity and demand for money, which results in an appreciation of the equilibrium exchange rate.

The peg will collapse at time $t+1$ if $\tilde{e}_{t+1} > e$. Thus the time t probability of a currency collapse in the next period can be written as follows:

$$1 - F(k_t) = \Pr\left[\upsilon_{t+1} > k_t\right], \tag{14}$$

where

$$\upsilon_{i+1} = \theta_1\mu_{i+1}^g + \theta_2\mu_{t+1}^* + (1-\theta_3)\mu_{t+1}^s + \theta_3\mu_{t+1}^q - \beta\mu_{t+1}^c - \theta_4\left(\gamma\mu_{t+1}^y + \mu_{t+1}^d\right)$$

$$k_t = e - d_t - \phi(1+\alpha)g_t - \theta_2 i_t^* - \theta_3 q_t - \alpha\rho + \beta c_t + \gamma\bar{y}$$

and

$$F'(k_t) > 0, \theta_1 = \phi(1+\alpha) + \alpha/(1+\alpha);$$

$$\theta_2 = \alpha(1+\beta\omega) + \beta\omega, \theta_3 = \frac{1-\gamma\lambda}{1+\alpha(1-\delta)}, \theta_4 = \frac{1}{(1+\alpha)}.$$

Knowing the distribution function of the shocks $F(k_t)$, agents can form expectations of the future exchange rate, based on the average of the current fixed exchange rate and the rate expected to materialize conditional on a devaluation, both weighed by the respective probabilities of occurrence:

$$E_t e_{t+1} = F\left(k_t\right)e + \left[1 - F\left(k_t\right)\right]E_t\left(\tilde{e}_{t+1}\middle|\upsilon_{t+1} > k_t\right). \tag{15}$$

After linearizing equation 15, we can solve the model in equations 1–4 and obtain the path of reserves in the fixed exchange rate system when there is a chance that there will be an abandonment of the peg:

$$r_t = \eta_0 - \eta_1\left(d_t - e\right) - \eta_2 i_t^* + \eta_3 c_t + \eta_4 y_t - \eta_5 g_t + \eta_6 q_t + \mu_t^d. \tag{16}$$

The coefficients η_i are a function of the parameters of the distribution of the shocks and of the structural parameters of the model. Reserves will fall with expansionary monetary and fiscal policies, and with hikes to world interest rates. In contrast, a positive shock to money demand or demand for domestic goods as well as investors' shift toward emerging markets lead to an increase in foreign exchange reserves. Shocks to the real exchange rate have an ambiguous effect on reserves. The VAR to be estimated is based on equations 6–12 and 16.

Dual Exchange Rate Regime

To relieve balance of payment pressures on foreign exchange reserves, albeit temporarily, Argentina implemented dual rates in the early 1970s and in the 1980s, with a fixed exchange rate for trade account transactions and a flexible exchange rate for all other transactions. We now proceed to develop a simple model of the economy under a dual rate regime to examine the behavior of the central bank's foreign exchange reserves and the dual market premium.

The core of our model is still the money market equilibrium condition given by equation 1. Prices continue to be determined by equation 3. The interest parity condition is now written as:

$$i_t = i_t^* + E_t f_{t+1} - f_t + \rho_t, \tag{2′}$$

where f_t is the log of the exchange rate for nontrade account transactions. Note that in equation 2 it is assumed that the purchase and sale of assets as well as the interest rate proceeds are channeled through the nontrade account exchange rate market. Using equations 1, 2 , and 3, we can write the equilibrium condition in the money market as:

$$(17) \qquad d_t + r_t - e + \alpha\left(i_t^* + \rho_t\right) - \beta c_t - \gamma y_t + q_t - \mu_t^d = \alpha f_t - \alpha E_t f_{t+1},$$

where e is the log of the fixed exchange rate for trade account transactions. Note that reserves at the central bank can still change in response to trade account imbalances because the central bank intervenes to keep the commercial rate fixed. A persistent deficit in the trade account may deplete reserves holdings. When reserves are depleted, the central bank will not be able to intervene again in the foreign exchange market and will have to allow the commercial rate to depreciate. We assume that the foreign exchange rate market is unified after the abandonment of the peg.

Naturally, investors will try to forecast as best as they can the time and the size of the devaluation. To examine the likelihood of a devaluation, we need to describe the behavior of the trade account. We assume that the trade account depends on the real exchange rate:

$$(18) \qquad R_t - R_{t-1} = \kappa q_t.$$

The probability of a unique floating exchange rate can be written as:

$$(19) \qquad \Pr\left(R_{t+1} \le 0\right) = \Pr\left[\kappa\left(\mu_{t+1}^q - \chi\mu_{t+1}^s\right) \le -R_t - \kappa\delta q_t\right].$$

Equation 19 indicates that a devaluation in a trading partner (a negative μ^q) will worsen the trade account and increase the probability of a currency crisis. Similarly, expansionary domestic monetary policy will trigger higher prices, a real appreciation of the domestic currency, and a deterioration of the trade balance. In the event of a currency crisis, the exchange rate market will be unified, with the exchange rate equal to $\tilde{e}$. Note that the expected future value of the financial exchange rate can be written as:

$$E_t f_{t+1} = \Pr\left(R_{t+1} \le 0\right)\tilde{e}_{t+1} + \left[1 - \Pr\left(R_{t+1} \le 0\right)\right]E_t\left(f_{t+1}\middle|R_{t+1} > 0\right). \quad (20)$$

The expected financial exchange rate is a nonlinear function of monetary and fiscal shocks, investors' preference for emerging markets, world interest rates, output, and real exchange rate shocks. To aid in the solution, we linearize equation 20. Instead of evaluating separately the path of the financial rate and foreign exchange reserves, we follow the crisis literature and estimate an index of severity of the speculative attack by using a composite indicator tracking foreign exchange reserve losses and the dual market premium.[15]

$$\left(f_t - e\right) - \Delta R_t = \tau_0 + \tau_1\left(d_t - e\right) + \tau_2 i_t^* - \tau_3 c_t - \tau_4 y_t + \tau_5 g_t - \tau_6 q_t - \mu_t^d, \quad (21)$$

where R is the percent change in foreign exchange reserves of the central bank. In equation 21, the index of exchange market pressure increases with expansionary monetary and fiscal policy and with positive hikes in world interest rates; it decreases with positive shocks to economic activity and money demand as well as with higher investors' interest in emerging markets. In the following section, the VAR specification that corresponds to the dual markets system is based on equations 6–12 and 21.

Explaining the Nature of Currency Crises

In the following discussion, we apply the above described models to identify the nature of the shocks triggering a speculative attack. First, we review the estimation methodology, then we discuss the data, and finally we elaborate on the results.

15. In the crisis literature, the index of exchange market pressure is a composite index that incorporates reserve losses of the central bank, the rate of exchange rate depreciation, and hikes in interest rates. See, for example, Eichengreen, Rose, and Wyplosz (1996) and Kaminsky and Reinhart (2000). Here, we adapt the index to account for the buildup of pressure in the dual exchange rate market.

The VAR

Our theoretical model implies estimating the following system:

$$\mathbf{A}\mathbf{X}_t = \mathbf{A}(\mathbf{L})\mathbf{X}_{t-1} + \mathbf{C}\boldsymbol{\mu}_t, \quad \mathbf{V}(\boldsymbol{\mu}_t) = \boldsymbol{\Sigma}, \tag{22}$$

where $\mathbf{X}$ is the vector of variables $[i^*, c, g, y, (d-e), q, \hat{r}]$, $\hat{r}$ is the level of foreign exchange reserves as a proportion of domestic credit during the episodes of fixed exchange rates and is a composite index of reserve losses and the dual market premium in episodes with capital account inconvertibility, and $\boldsymbol{\mu}$ is the vector of the structural shocks, $[\mu^*, \mu^c, \mu^g, \mu^y, \mu^s, \mu^q, \mu^d]$. The theoretical framework of the preceding section provides guidelines for imposing zero restrictions on the elements of $\mathbf{A}$ and $\mathbf{C}$.

$\mathbf{A}(\mathbf{L})$ is a matrix polynomial of order n, where n is the number of lags, and $\mathbf{C}$ is a full rank matrix. The covariance matrix of the structural innovations is denoted by $\boldsymbol{\Sigma}$. Under the assumption of zero correlation across innovations, $\boldsymbol{\Sigma}$ is diagonal. The matrices $\mathbf{A}$ and $\mathbf{C}$ capture the contemporaneous interactions between all the variables in the system.

We can now obtain the reduced form VAR representation by multiplying both sides of equation 22 by $\mathbf{A}^{-1}$:

$$\mathbf{X}_t = \mathbf{B}(\mathbf{L})\mathbf{X}_{t-1} + \boldsymbol{\varepsilon}_t. \tag{23}$$

$\boldsymbol{\varepsilon}$ is the vector of reduced form innovations, $[\varepsilon^*, \varepsilon^c, \varepsilon^g, \varepsilon^y, \varepsilon^s, \varepsilon^q, \varepsilon^d]$. The structural and reduced form innovations are related by the following equation:

$$\boldsymbol{\varepsilon}_t = \mathbf{A}^{-1}\mathbf{C}\boldsymbol{\mu}_t. \tag{24}$$

The identification restrictions for both the unified and the dual exchange rate models, as implied by the analysis of the previous section, can be summarized as follows:

$$\varepsilon^* = \mu^*$$

$$\varepsilon^c = \gamma_{21}\mu^* + \mu^c$$

$$
\begin{aligned}
\varepsilon^{g} &= \mu^{g} \\
\varepsilon^{y} &= \gamma_{46}\mu^{q} + \mu^{y} \\
\varepsilon^{s} &= \gamma_{53}\mu^{g} + \mu^{s} \\
\varepsilon^{q} &= \gamma_{65}\mu^{s} + \mu^{q} \\
\varepsilon^{\hat{r}} &= \gamma_{71}\mu^{*} + \gamma_{72}\mu^{c} + \gamma_{73}\mu_{t}^{g} + \gamma_{74}\mu^{y} + \gamma_{75}\mu^{s} + \gamma_{76}\mu^{q} + \mu^{d}.
\end{aligned}
$$

Note that the parameters γ are functions of the structural parameters in the system, such as the degree of monetization of the fiscal deficit, and these may be changing over time. For example, with fixed exchange rates and capital mobility, central banks lose their ability to conduct an independent monetary policy. This is not the case with a dual exchange rate regime, making it necessary to estimate the systems for each exchange rate regime separately. Even within a particular exchange rate regime, parameters may vary. For example, the hard peg of 1991, approved by law, certainly introduced more barriers to the conduct of monetary policy than the fixed exchange rate regime implemented in the late 1970s. Again, we need to test parameter stability within a given exchange rate system.

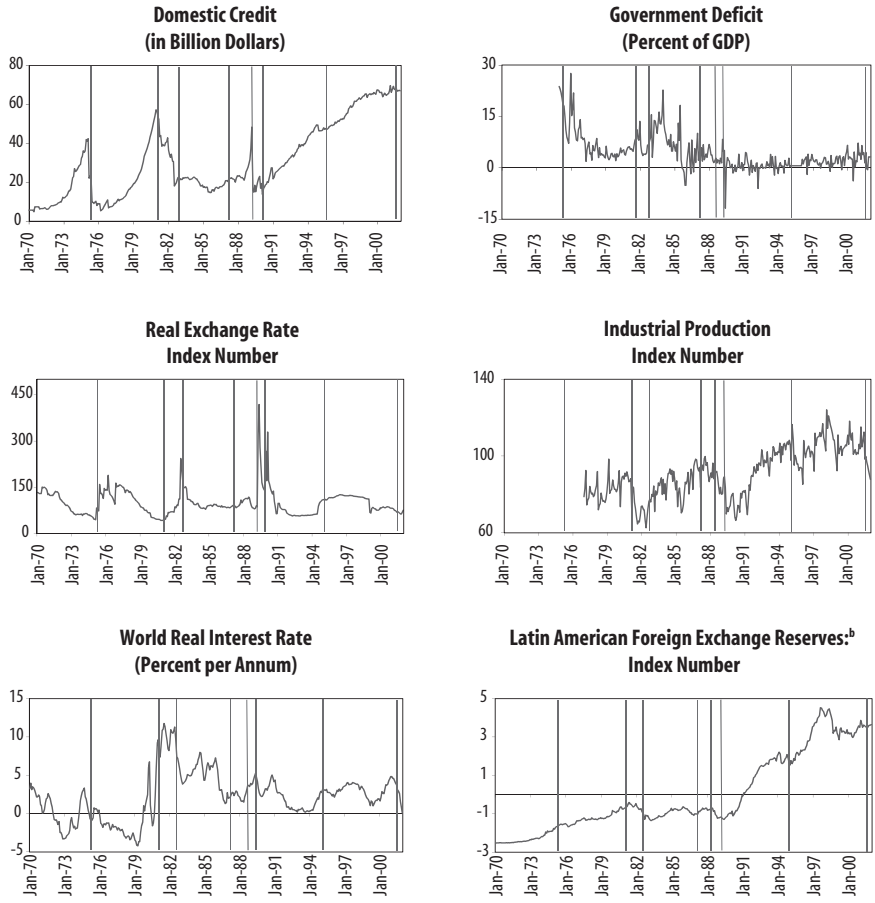
Data

Figure 2 shows the evolution of domestic and external indicators from January 1970 to December 2001, the month preceding the last crisis.[16] All the indicators are at a monthly frequency, so we can track closely the onset of domestic and external vulnerabilities. The dates of the currency crises are indicated by the vertical lines. The top two panels show the evolution of monetary and fiscal factors. Domestic credit in dollars (including both credit to the public and private sector), shown in the left panel, provides a measure of possible inconsistency between the fixed exchange rate and monetary shocks. The central government deficit (annualized as a proportion of GDP), shown in the right panel, provides a measure of government debt sustainability. While a broader measure of the public sector would have been more appropriate to measure the fiscal stance, long high-frequency time series on local governments and public enterprises are not available.[17]

The middle panels show the effective real exchange rate (a depreciation is shown as an increase in the real exchange rate index) and the index of manufacturing production. The bottom left panel shows the behavior of the world real interest rate, captured by the U.S. real interest rate. Finally, the bottom

16. See appendix A for data sources and definitions.
17. Information on public sector debt is available, although not at a monthly frequency.

FIGURE 2. Domestic and External Indicators, January 1970–2001[a]



Sources: See appendix A.

a. The vertical lines indicate the month of the crises.

b. First principal component of the largest Latin American countries (excluding Argentina): Brazil, Chile, Colombia, Mexico, and Venezuela.

right panel shows the first principal component of foreign exchange reserves of the five largest Latin American countries (with the exception of Argentina): Brazil, Chile, Colombia, Mexico, and Venezuela.[18] With this index, we try to

18. It would have been preferable to use international capital flow data to emerging markets to proxy "investors' interest in emerging markets." However, capital flow data are at best only available at quarterly or even annual frequencies.

provide a measure of investors' sentiments toward Latin America. Investors' overall enthusiasm about Latin American markets translates into increases in the first principal component of foreign exchange reserves held by central banks, whereas investors' worries about Latin America lead to losses of foreign exchange reserves across Latin American countries, again as captured by the first principal component of reserves. Since increases in foreign exchange reserves of central banks can also be affected by changes in interest rates in financial centers, we will separately identify in our estimations the effect of shocks on investors' preferences (possibly capturing contagion effects) and world interest rate shocks on the fluctuations of the first principal component (as shown in equation 9).

Results

As discussed in the chronology, we divide our sample into fixed and dual exchange rate regimes. The fixed exchange rate regimes include the Tablita, Alemann, Austral, and Convertibility Plans; the dual exchange rate regimes include the Gelbard, Primavera, and BB Plans.[19]

Macropolicies and credibility may vary across and within stabilization plans, affecting the transmission of shocks and making it necessary to test for parameter stability. Since periods with dual exchange rate regimes are very short, we cannot test this hypothesis. Thus we estimate a unique VAR for the Gelbard, Primavera, and BB Plans and for the currency crises that followed the implementation of those plans. Since the fixed exchange rate regime episodes are longer lasting, we can test for parameter stability during these episodes.[20] In particular, three possible structural breaks are studied. We examine whether the transmission mechanism during the Tablita-Alemann-Austral periods is different from that of the Convertibility Plan, and then also test for two structural breaks during the Convertibility Plan: the crisis in April 1995 (following the Mexican crisis) and the Brazilian crisis in January 1999.

Our results indicate that the transmission mechanism of the Tablita-Alemann-Austral periods is different from that of the Convertibility period and that the

19. Although there were never controls on foreign exchange transactions during the Tablita and Convertibility Plans, at times during the Alemann and Austral Plans the government allowed different rates for financial and commercial exchange rate transactions. Still, we include these last two episodes in our estimations of the fixed exchange rate episodes because when these plans were launched, a unique exchange rate regime was implemented.

20. To test whether VARs were different, we introduced slope dummies representing various periods into the reserves equation, with a significant slope dummy implying that transmission mechanisms were different across different periods.

dynamics during the Convertibility program change in the aftermath of the Brazilian crisis. Thus our results for the fixed exchange rate episodes will include three VAR systems: the first includes the Tablita, Alemann, and Austral programs; the second one refers to the Convertibility program from its implementation in April 1991 to December 1998; and the third episode, also during the Convertibility program, starts in January 1999 with the Brazilian devaluation and ends with the collapse of the currency board in January 2002.

As examined above, our VARs include seven variables: the world real interest rate; the first principal component of foreign exchange reserves of Brazil, Chile, Colombia, Mexico, and Venezuela; government deficit (as a proportion of GDP); industrial production; domestic credit in dollars; the real exchange rate; and foreign reserves (or the index of exchange market pressure for the dual periods). However, in light of the unavailability of data series on industrial production during the Gelbard Plan (1973–75), the VAR for the dual exchange rate regimes only includes six variables. Although some of our variables turned out to be I(1), we estimate an unrestricted VAR in levels in order to allow the data to pick up the underlying long-run cointegrating relationship.[21] We allow for two lags in all three systems, which was sufficient to produce serially uncorrelated residuals.[22]

The results are presented in three complementary ways. First, we examine the impulse responses to assess whether the various shocks have been identified correctly, that is, whether, for example, our "money supply" shock leads to a decline in foreign exchange reserves of the central bank, as predicted by

21. Dickey-Fuller tests failed to reject the unit root hypothesis at the 5 percent significance level for the first principal component of foreign exchange reserves of the five largest Latin American economies, foreign exchange reserves of the central bank of Argentina, and the industrial output and money variables (although there were mixed results on money variables, depending on number of lags ultimately chosen). The hypothesis was rejected for the world real interest rate, the exchange market pressure index, and the deficit.

22. The estimation was done with only one lag for the dual system due to the limited number of observations for the hyperinflation episode. We also estimated the system with one lag for the 1999–2001 unified exchange rate system.

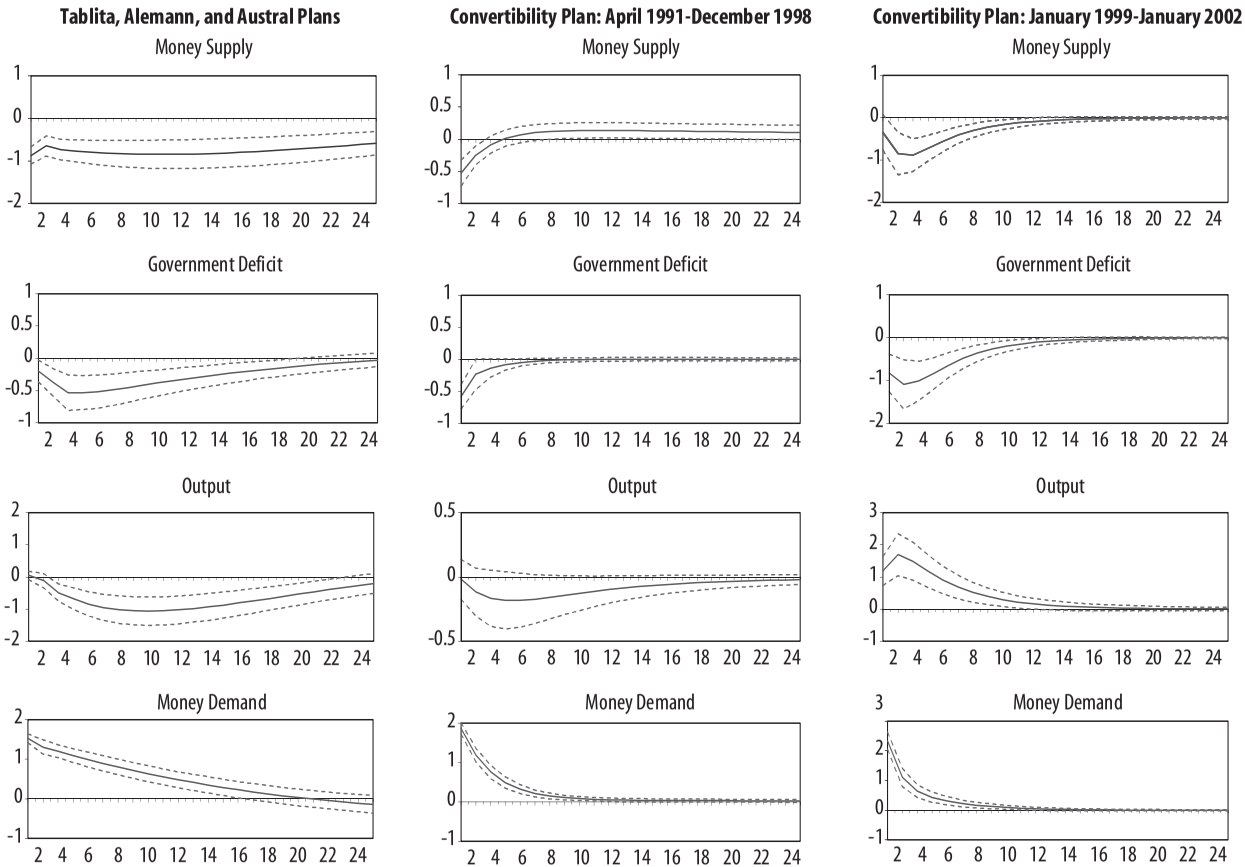
Slope dummies were introduced for hyperinflation periods and for periods in which no stabilization plan was being implemented. Based on the model's assumptions and the significance levels of variables, we formulate the world real interest rate equation as a univariate AR(1). The equation for the first principal component of reserves of the five largest Latin American countries only includes lags of the world real interest rate in addition to lags of the principal component variable itself. Ultimately, we end up estimating a near-VAR using seemingly unrelated regression (SUR) estimation while allowing for a Sims-Bernanke decomposition of the structural innovations.

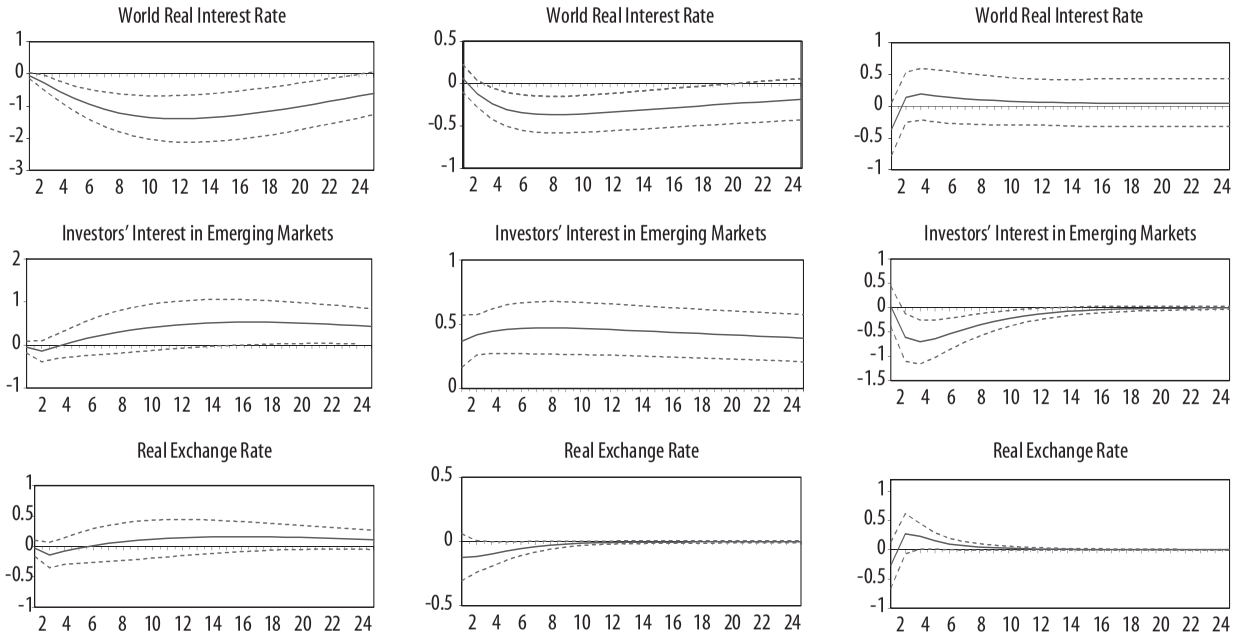
the first-generation model of currency crises described earlier in this paper. Second, we report the variance decomposition of reserves during the fixed exchange rate regimes and of the index of exchange market pressure during dual exchange rate regimes to assess the importance of domestic and foreign shocks. The variance decompositions provide a measure of the average role of each shock over the whole estimation period, that is, during both tranquil and crisis times. In some cases, such as during dual exchange rate periods, the variance decompositions show the importance of each shock over various stabilization plans and crisis episodes. To untangle the role of domestic and world shocks for each stabilization program and in the unfolding of the currency turbulences for each crisis examined, we then present the historical decompositions of foreign exchange reserves and the index of market pressure for the various stabilization plans, and then estimate the role of each shock from the onset of the fragilities until the crisis month.

Figure 3 shows the impulse responses of the ratio of foreign exchange reserves to domestic credit (shown in percent) to domestic and external shocks during episodes of unified exchange markets. The left panels show the impulse responses during the Tablita, Alemann, and Austral Plans; the middle panels show the impulse responses for the first part of the Convertibility Plan, from the implementation of the currency board until the Brazilian crisis; and the right panels show the impulse responses for the second part of the Convertibility Plan, from the Brazilian crisis to the Argentine crisis in January 2002. The top four rows of panels show the responses to the four types of domestic shocks. The effects of shocks to money supply, government deficit, and money demand are all statistically significant and of the expected signs, with positive shocks to money supply and government deficit and negative shocks to money demand triggering losses of reserves, with somewhat more persistent effects during the Tablita-Alemann-Austral Plans. In contrast, shocks to output only show a strong and positive effect on reserves during the second part of the Convertibility Plan. The effect of this shock on reserves is negligible during the other two episodes, as shown in table 2.

The bottom three rows of panels show the responses to world shocks. Shocks to the world real interest rate are only statistically significant during the Tablita-Alemann-Austral Plans and the first part of the Convertibility Plan (until the Brazilian crisis), with hikes in world interest rates triggering losses in reserves. Since the 1990s, a continuously increasing amount of research in international finance has emphasized the role of international investors' sentiments (or "risk appetite") in creating capital flow bonanzas to particular regions, such as Latin America in the late 1970s, Europe in the early 1990s, or

FIGURE 3. Impulse Responses of Foreign Exchange Reserves to Various Shocks during Fixed Exchange Rate Regimes[a]





Source: Authors' calculations.

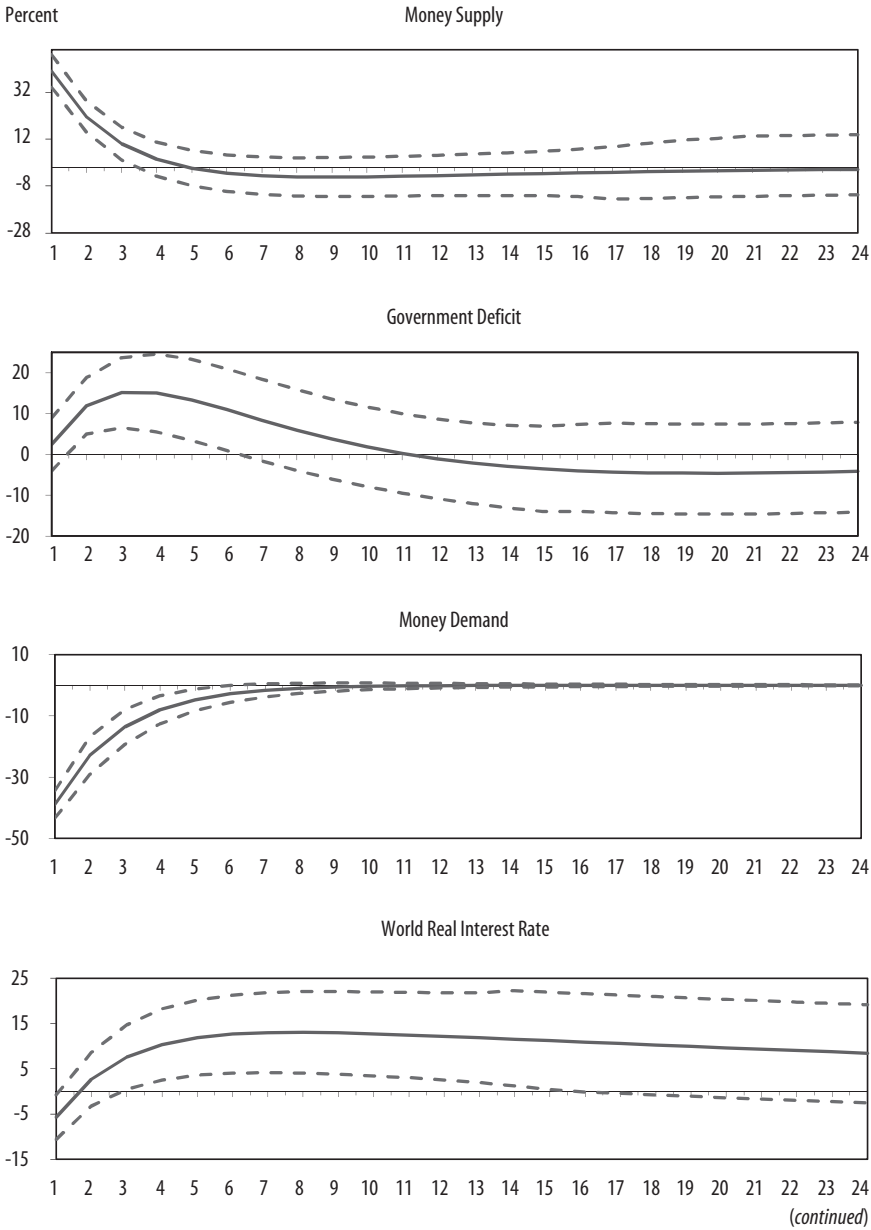
a. Dotted lines indicate the one-standard deviation band; solid lines show the impulse response of reserves (as a percentage of domestic credit) to a one percent shock (domestic or external) at time one.

East Asia in the mid-1990s. This same literature also has singled out the role of international investors' sentiments in capital flow reversals. As the impulse responses in figure 3 show, those effects, captured by shocks to the first principal component of foreign exchange reserves, are only important during the early 1990s up to the Brazilian crisis in January 1999. Finally, shocks to the real exchange rate (attempting to capture exogenous shocks, such as fluctuations in trade partners' real exchange rates due to crises or the adoption of a stabilization plan) are never statistically significant.

Figure 4 shows the dynamic responses during dual exchange rate regimes. Domestic shocks are also important during these episodes, with positive shocks to money supply and fiscal deficits and negative shocks to money demand all leading to currency turbulences, as captured by increases in the index of exchange market pressure. While the dual market system implemented in Argentina implied the use of controls on capital flows to insulate the domestic economy from world shocks, our results indicate that fluctuations in world real interest rates and shocks to investors' interest in emerging markets have statistically significant effects on the index of exchange market pressure, with hikes in world interest rates and negative shocks to investors' sentiment leading to currency turmoil in Argentina. As with fixed exchange rate regimes, real exchange rate shocks are never statistically significant.

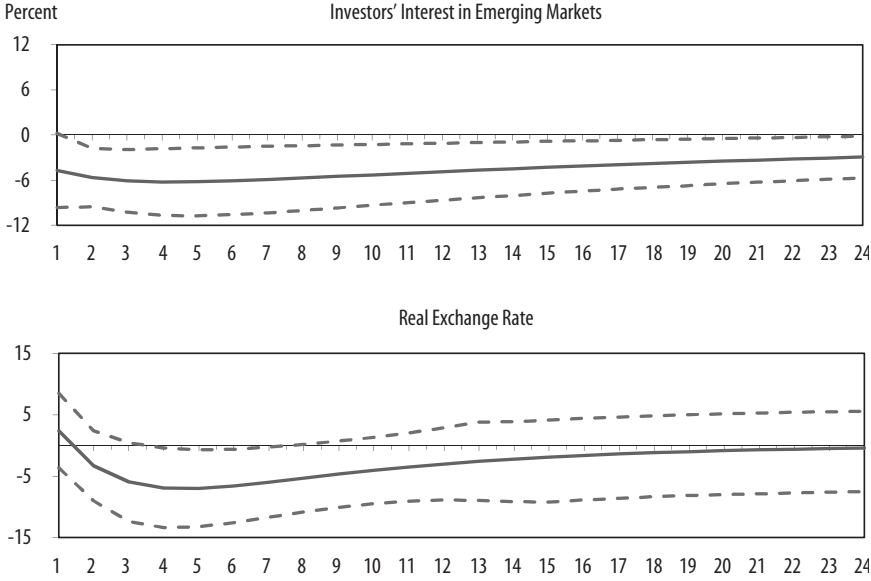
Tables 2 and 3 report the variance decompositions for the fixed exchange rate and the dual exchange rate episodes, respectively. As Table 2 shows, the shocks that move the currency market vary across all these episodes. Only money demand shocks are important across the whole sample (explaining between 18 and 80 percent of the conditional variance of foreign exchange reserves—as a proportion of domestic credit in dollars—at all horizons), suggesting that changes in rules as well as improvement or abandonment of property rights dramatically affect households' behavior and are at the core of all bonanzas and crises in Argentina. Interestingly, the period starting in April 1991, with the adoption of the currency board, and ending with the Brazilian crisis in January 1999 looks different from other episodes. During the earlier part of the currency board episode, world shocks—as captured by shocks to world real interest rates and investors' interest in emerging markets—account for about 20 to 70 percent of the conditional variance of foreign exchange reserves (as a proportion of domestic credit in dollars). In contrast, vulnerabilities in domestic indicators—fiscal deficits and shocks to economic activity—are the main drivers of reserve fluctuations during the last part of the Convertibility Plan, accounting for about 60 percent of the variance in foreign exchange reserve forecasting errors. Finally, currency booms and busts during the

FIGURE 4. Impulse Response of the Index of Market Pressure to Various Shocks during Dual Exchange Regimes[a]



(*continued*)

FIGURE 4. Impulse Response of the Index of Market Pressure to Various Shocks during Dual Exchange Regimes[a] (*Continued*)



Source: Authors' calculations.

a. Dotted lines indicate the one-standard deviation band; solid lines show the impulse response of the index of market pressure to a one percent shock (domestic or external) at time one.

Tablita, Alemann, and Austral Plans are mostly explained by world real interest rate shocks and by money supply and demand shocks (in line with the crisis chronology).

Table 3 reports the variance decomposition for the index of exchange rate pressure during dual exchange rate episodes. Again, as during the fixed exchange rate episodes, money demand shocks explain a substantial part of currency market ups and downs (between 20 and 50 percent of the forecasting variance of the index of exchange market pressure for all horizons). The dual exchange rate episodes look very similar to the Tablita-Alemann-Austral Plans, with money supply shocks and world interest rates explaining about 50 percent of the forecasting variance of the index of market pressure.

To track in real time the effects of the identified domestic and world shocks on currency bonanzas and crises, we present the historical decompositions of the foreign exchange reserves (as a percentage of domestic credit in dollars)

TABLE 2. Variance Decomposition for Foreign Exchange Reserves during Fixed Exchange Rate Regimes[a]
Percent

	Fraction of variance due to shocks to																				
	Tablita, Alemann, and Austral Plans							*Convertibility Plan: April 1991–December 1998*							*Convertibility Plan: January 1999–January 2002*						
Horizon in months	*Money supply*	*Govt. deficit*	*Output*	*Money demand*	*World real interest rate*	*Investors' interest in emerging mkts.*	*Real exchange rate*[b]	*Money supply*	*Govt. deficit*	*Output*	*Money demand*	*World real interest rate*	*Investors' interest in emerging mkts.*	*Real exchange rate*	*Money supply*	*Govt. deficit*	*Output*	*Money demand*	*World real interest rate*	*Investors' interest in emerging mkts.*	*Real exchange rate*
1	19	1	0	80	0	0	0	6	8	0	81	0	4	0	0	10	15	71	3	0	0
2	17	2	0	80	1	0	0	4	7	0	77	3	9	1	2	17	33	44	1	1	1
3	16	3	2	76	2	0	0	4	6	0	69	7	13	1	3	19	40	33	1	2	2
4	16	3	5	70	5	0	0	4	5	0	61	11	17	1	4	20	43	28	1	2	2
5	17	3	7	65	8	0	0	5	5	0	55	14	20	1	4	20	45	25	1	3	2
6	17	3	9	59	11	0	0	5	4	0	50	17	22	1	5	20	45	23	1	3	3
7	17	3	10	55	15	0	0	5	4	0	46	19	25	1	5	21	46	22	1	4	3
8	18	3	10	50	18	0	0	5	4	0	43	21	26	1	5	21	46	21	1	4	3
9	18	3	11	46	21	0	0	5	3	0	40	23	28	1	5	21	46	21	1	4	3
10	18	3	11	43	24	0	0	5	3	0	38	24	29	1	5	21	46	20	1	4	3
11	19	3	11	40	27	0	0	5	3	0	36	25	31	1	5	21	46	20	2	4	3
12	19	3	11	38	29	0	0	5	3	0	34	25	32	1	5	21	45	20	2	4	3
13	20	3	10	36	31	0	0	5	3	0	33	26	33	1	5	20	45	20	2	4	3
14	20	3	10	34	33	0	0	5	3	0	31	26	34	1	5	20	45	19	3	4	3
15	21	3	10	32	34	0	0	5	3	0	30	27	35	1	5	20	45	19	3	4	3
16	21	2	10	31	35	0	0	5	2	0	29	27	36	1	5	20	45	19	4	4	3
17	21	2	9	30	36	0	0	5	2	0	28	27	36	1	5	20	44	19	4	4	3
18	22	2	9	29	37	0	0	5	2	0	27	27	37	1	5	20	44	19	5	4	3
19	22	2	9	28	38	0	0	5	2	0	27	28	38	1	5	20	44	19	6	4	3
20	23	2	9	27	38	0	0	5	2	0	26	28	39	1	5	20	44	19	6	4	3
21	23	2	9	27	38	1	0	5	2	0	25	28	39	1	5	20	43	18	7	4	3
22	24	2	8	26	39	1	0	5	2	0	25	28	40	1	5	19	43	18	7	4	3
23	24	2	8	26	39	1	0	5	2	0	24	28	40	1	5	19	43	18	8	4	3
24	24	2	8	26	39	1	0	5	2	0	24	28	41	1	5	19	42	18	9	4	3

Source: Authors' calculations.
a. This table shows the variance decomposition of reserves as a percentage of domestic credit in dollars.
b. Captures responses to exogenous shocks to the real exchange rate, such as nominal devaluations in trading partner countries.

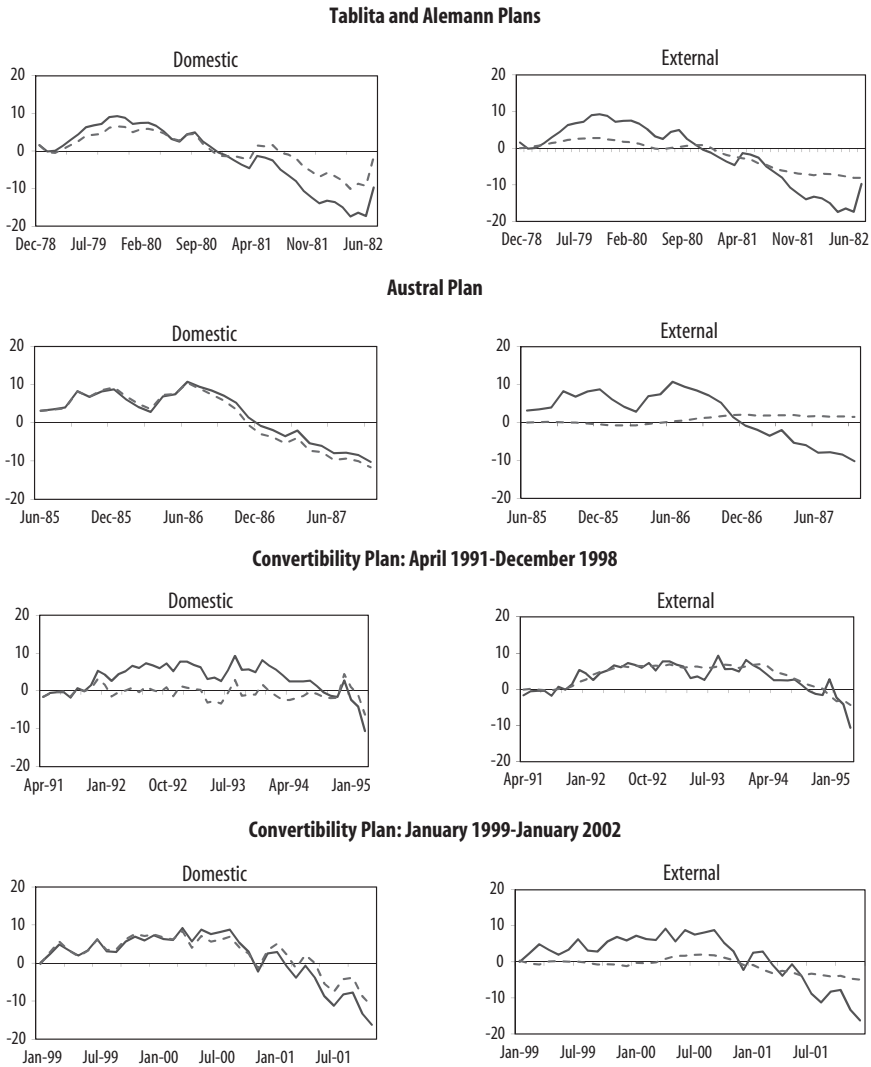
TABLE 3. Variance Decomposition for the Index of Exchange Market Pressure during Dual Market Regimes
Percent

	Fraction of variance due to shocks to					
Horizon in months	*Money supply*	*Government deficit*	*Money demand*	*World real interest rate*	*Investors' interest in emerging markets*	*Real exchange rate*[a]
1	51	0	47	1	0	0
2	48	3	47	1	1	0
3	44	7	45	2	2	1
4	40	10	42	4	2	2
5	37	12	40	7	3	3
6	35	13	37	9	3	4
7	33	13	35	11	3	4
8	32	13	34	14	4	5
9	31	12	32	16	4	5
10	30	12	31	18	4	5
11	29	11	30	19	4	5
12	29	11	29	21	5	5
13	28	11	29	22	5	5
14	28	11	28	24	5	5
15	27	11	27	25	5	5
16	27	11	27	26	5	5
17	26	11	26	27	5	5
18	26	11	26	27	5	5
19	25	11	25	28	5	5
20	25	11	25	29	5	4
21	25	11	25	29	6	4
22	24	12	24	30	6	4
23	24	12	24	30	6	4
24	24	12	24	31	6	4

Source: Authors' calculations.
a. Captures responses to exogenous shocks to the real exchange rate, such as nominal devaluations in trading partner countries.

and the index of exchange market pressure. Figures 5 and 6 show, respectively, the historical decomposition for the fixed exchange rate and the dual exchange rate episodes from the implementation of each stabilization plan until the crisis. In these figures, the solid line shows the difference between the actual value of reserves (as a percentage of domestic credit in dollars) or index of market pressure and the corresponding forecasted value based on information at the start of the stabilization plan, while the dotted lines show the part explained by either domestic or international shocks. Since the Alemann Stabilization Plan only lasted a few months, and this plan also helped maintain the fixed exchange rate regime launched with the Tablita Plan, we report the historical decomposition jointly for both plans.

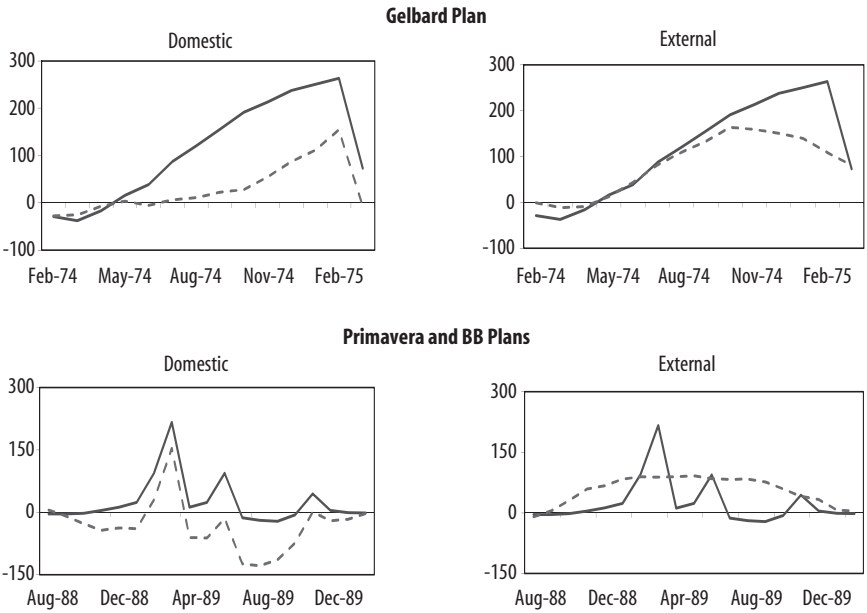
FIGURE 5. Sources of the Fluctuations in Foreign Exchange Reserves during Fixed Exchange Rate Regimes[a]



Source: Authors' calculations.

a. In each panel, the solid line shows the difference between the level of reserves (as a share of domestic credit in dollars, in percent) and the level that would have been forecasted based upon the history of the system up through the implementation of the stabilization plan. Thus it reflects the cumulative impact of both domestic and foreign shocks. The dotted line shows the actual path of reserves that would have prevailed if either domestic or foreign shocks had hit the system.

FIGURE 6. Sources of Fluctuations in the Index of Market Pressure during Dual Exchange Rate Regimes[a]



Source: Authors' calculations.

a. In each panel, the solid line shows the difference between the level of the index of exchange market pressure (in percent) and the level that would have been forecasted based upon the history of the system up through the implementation of the stabilization plan. Thus it reflects the cumulative impact of both domestic and foreign shocks. The dotted line shows the actual path of the index of exchange market pressure that would have prevailed if either domestic or foreign shocks had hit the system.

The results in Figure 5 indicate that the capital flow bonanza, as captured by the increases in reserves, in the year following the implementation of the stabilization plans was mostly fueled by better domestic fundamentals across all episodes. This finding agrees with the conventional wisdom in both academic and policy circles that the launching of the stabilization plans coincided, at least transitorily, with fiscal and monetary reforms as well as deregulation of the financial sector.[23] Our results for the Tablita Plan and first part of the Convertibility Plan also show that the capital flow bonanzas in the year following the implementation of the plans were triggered by favorable external conditions. We feel confident about our identification since the implementa-

23. See, for example, International Monetary Fund (2004a, 2004b), Blejer and Liviatan (1987), Kiguel (1989), and Machinea and Fanelli (1988).

tion of the Tablita Plan in the late 1970s and Convertibility Plan in the beginning of the 1990s coincided with episodes of low world real interest rates and with a surge in investors' interest in emerging markets following the Brady debt relief program of 1989–90. The historical decompositions in figure 5 indicate that capital flow reversals and the onset of the crises in 1981–82 and 2001 were caused in part (totally for the crisis in 1987) by deteriorating domestic fundamentals. In contrast, the reversal in the path of reserves starting in 1994 was mostly due to unfavorable world conditions. Only during the four months preceding the 1995 crisis were fragilities observed on the home front, mostly driven by bank deposit runs.

Figure 6 shows the historical decompositions for the stabilization plans during the dual exchange rate regimes. In this figure, we jointly examine the two stabilization plans during the hyperinflation episode. In contrast to the stabilization plans during the fixed exchange rate regimes, the implementation of the Gelbard, Primavera, and BB Plans does not trigger a reduction (even transitorily) in exchange market pressures. In the Gelbard Plan, a large part of the initial vulnerabilities is triggered by adverse external conditions, driven by hikes in world interest rates in 1974. In the stabilization plans in the late 1980s, the exchange market pressure is mostly explained by rapidly deteriorating monetary conditions. Remember that these plans take place at the height of the hyperinflation period, which only ends with the implementation of the Convertibility Plan.

Figures 5 and 6 only assess the combined effect of all domestic shocks or that of external shocks. Also, the historical decompositions in these figures cover times of both bonanza and crisis. Table 4 provides a higher resolution picture of crisis times. First, it untangles the various sources of domestic fragility into money supply, government deficit, output, and money demand shocks. Second, it sorts out the origins of external vulnerability into world real interest, investors' interest in emerging markets (or contagion), and real exchange rate shocks. Third, it concentrates on the onset of the currency turmoil until the crisis, that is, it shows the historical decompositions from the times reserves start to fall or the index of market pressure starts to increase. Each cell in this table shows the share of the fluctuations in foreign exchange reserves as a percentage of domestic credit in dollars, or, alternatively, in the index of exchange market pressure, explained by each single shock. As shown in table 4, all currency crises are preceded by domestic vulnerabilities, with the exception of the 1995 crisis. Monetary shocks are at the core of the domestic fragilities for all crises, with the exception of the 2002 crisis, when dramatic adverse shocks to economic activity seal the fate of the currency board.

TABLE 4. Role of Domestic and External Shocks in the Onset of Crises, 1973–2009[a]
Percentage share

	Losses of Reserves or Increases in the Index of Exchange Market Pressure: Percentage Share Explained by								
	External shocks				*Domestic shocks*				
Crisis	*Total*	*World real interest rate*	*Investors' interest in emerging markets*	*Real exchange rate*	*Total*	*Money supply*	*Government deficit*	*Output*	*Money demand*
March 1975	41	**34**	–3	9	59	**36**	7	n.a.	**16**
February 1981 and July 1982	42	**53**	–9	–2	58	**18**	**2**	–3	**40**
September 1987	0	**–14**	6	8	100	**23**	**–14**	14	**77**
April 1989 and February 1990	41	**17**	**12**	12	59	**72**	2	n.a.	**–16**
March 1995	93	**69**	**24**	–1	7	**–1**	**–3**	–4	**15**
January 2002	11	22	–20	8	91	**13**	**–7**	**63**	**22**

Source: Authors' calculations.

a. This table focuses on explaining the onset of crises. For the crises during fixed exchange rate regimes, the historical decomposition starts in the month when foreign exchange reserves (as a share of domestic credit in dollars) start to fall and continues up to the month of the crisis. For the crises during dual exchange rate regimes, the historical decomposition starts in the month the index of exchange market pressure starts to increase and continues up to the month of the crisis. Numbers in bold signify that impulse responses for the individual shocks are significant for most horizons.

Notably, monetary shocks do not just reflect money supply shocks. In particular, money demand shocks are very important during the Tablita, Alemann, and Austral crises. As described in our chronology, these are episodes plagued by numerous regulatory changes regarding interest rates and foreign exchange markets—as during the period from February 1981 to June 1982—or by the stop-and-go cycles of controls on prices, wages, and public utilities during the Austral Plan.[24] Naturally, these continuous changes in rules on financial and price contracts fuel uncertainty, reducing households' faith in the financial system and overall ability of the authorities to maintain the peg. Finally, our results do not uncover an important fiscal effect at the onset of the crises. These results may be due to our "fiscal deficit" indicator that includes the central government but not the local governments and public enterprises, which ran particularly large deficits during the Tablita Plan and the latter part of the Convertibility Plan. Since our fiscal indicator captures only partially the fiscal

24. The management of prices was a central part of the Austral Plan. Prices and wage controls were introduced at the start of the program, but the first adjustment in prices was implemented in April 1986. In July 1986, the government introduced ceilings for monthly increases in prices as well as limits on wage increases. By the last months of 1986, prices were again fluctuating freely. In February 1987, a price freeze was again announced, only to be relaxed in May 1987.

deficit of the consolidated public sector, fiscal shocks may, in fact, be captured by the shocks to money supply in equation 6.[25]

External shocks are also important in explaining currency turbulences. For example, hikes in world interest rates have a major impact on currency vulnerabilities during the Tablita and Alemann Plans, when world real interest rates increased from −1 percent in July 1980 to about 10 percent on average in 1981–1982, and during the Convertibility Plan in 1994, when the Federal Reserve increased its policy rate by 250 basis points. Indeed, our results indicate that 53 percent of the total decline in the historical forecast error of Argentina's reserves between October 1979 and June 1982 is explained by world interest rate shocks, with the world interest rate effect increasing to 69 percent in the 1995 crisis.

In the 1990s, external shocks are not limited to those fueled by changes in monetary conditions in industrialized countries. Spillover effects from other Latin American countries (as captured by a shock to investors' interest in emerging markets) magnify reserve losses triggered by monetary tightening in financial centers. Our empirical estimations suggest that about one-fourth of the fall in reserves from December 1993 to February 1995 can be explained by contagion factors. However, contrary to theories advocating sudden stops as an explanation of the 2002 Argentine crisis (Calvo, Izquierdo, and Talvi 2002), we find that adverse shocks to investors' interest in emerging markets played no role in explaining the collapse of the currency board since capital inflows already had dried up following the Russian crisis in late 1998. By 2001 investors had already started regarding Argentina as a country with problems of its own.

We also examined the costs of crises fueled by domestic fragilities and those triggered by adverse external shocks, even in the presence of immaculate domestic fundamentals. Table 5 shows various costs for these two types of crises. First, we looked at the severity of the crises as captured by reserve losses in the six months before the crises and the real exchange rate depreciation in

25. Since the results in table 2 show that even our partial measure of fiscal shocks can explain 20 percent of the variance decomposition for foreign exchange reserves during the last part of the Convertibility Plan (January 1999–December 2001), we examine the possibility of a time-varying effect of the fiscal shock. The historical decomposition in table 4 is further decomposed into two episodes. The first episode starts in January 2001, from the onset of currency turmoil, and lasts until July 2001. The second episode starts in August 2001 and ends in December 2001, with the collapse of the Convertibility Plan. During the first episode, increases in government deficit explain 18 percent of the losses of reserves. But on 29 July 2001, the Argentine Congress passes the Zero Deficit Law, requiring a balanced budget by the fourth quarter of 2001. In August 2001, the deficit starts to decline while reserves losses continue to increase, explaining the almost zero cumulative net effect of fiscal shocks on reserves from January to December 2001, as shown in table 4.

TABLE 5. Costs of Crises, 1975–2002
Percent

Crisis	*Reserve losses in the 6 months before crisis*	*Real exchange rate depreciation in the 6 months after crisis*	*Output changes in the year of crisis and following year*	*Export changes in year after crisis*	*Import changes in year after crisis*
March 1975	40	181	–5	20	–46
February 1981	56	53	–5	30	–50
July 1982	10	30	–8	19	–6
September 1987	36	27	1	34	–4
April 1989	47	66	–8	35	–39
February 1990	20	–20	9	6	4
March 1995	16	5	3	35	10
January 2002	25	174	–15	4	–16
Average costs of currency crises					
Crises with domestic vulnerabilities	33	73	–5	21	–23
Crises with external adverse shocks	16	5	3	35	10

Source: Authors' calculations.

the six months after the crises. On average, losses of reserves for crises fueled by domestic vulnerabilities reach 33 percent but only reach 16 percent for crises triggered by external shocks. Similarly, real depreciations are far larger (73 percent) for crises triggered by fragile domestic fundamentals than for crises with only adverse external shocks (5 percent). Second, we examined the impact of the crisis on the economy. Output losses in the year of the crisis and the following year average 5 percent for crises with domestic fragilities while the economy grows 3 percent during the crisis triggered by adverse external shocks. Finally, we examined the external adjustment following the crises. Access to international capital markets can be severely impaired in the aftermath of crises, with countries having to run sizable current account surpluses to repay their debt. We examined the size and type of the adjustment across these two types of crises. In the case of crises with domestic vulnerabilities, most of the adjustment occurs on the import side, with imports falling approximately 23 percent in the year following the crisis and exports only growing 21 percent, despite large depreciations during this type of crisis. This evidence suggests that Argentina might have been unable to attract trade credits to finance exports when its economy was quite fragile. In contrast, in the aftermath of the 1995 crisis, booming exports were at the heart of the recovery of the current account (35 percent increase) and even imports continued to increase (10 percent).

Conclusions

Economists have puzzled at length over the causes and severity of currency crises. As a result, research in this area has surged, especially since the Exchange Rate Mechanism crises in 1992–93. Most of the empirical research has focused on predicting crises by using reduced-form estimations and failed to uncover the effect of policy and structural shocks on the changing severity of currency turmoil. This paper uses an old methodology to study this new problem, implementing VAR techniques to quantify the role of different shocks in the severity of currency crises. Our case study is Argentina, a country that not only has been at center stage in every single episode of international financial turmoil (such as the 1982 debt crisis, the 1994 tequila crisis, and the 1999 Brazilian crisis) but also has had many currency collapses of its own. Thus, while our analysis is confined to one country, it does provide a glimpse into the nature of worldwide currency turbulences. Our results confirm previous findings in the literature but also suggest new results.

The major conclusions that emerge from our analysis are as follows. First, our estimations confirm the results obtained by Calvo, Leiderman, and Reinhart (1992) regarding the role of monetary tightening in industrial countries during the episodes of capital flow reversals of the early 1980s and mid 1990s. Both the collapse of the Tablita-Alemann Plans and the speculative attack against the peso in 1994–95 in the midst of the Convertibility Plan were in large part precipitated by the shift to a contractionary monetary stance in the United States.

Second, as expected, inconsistent monetary and exchange rate policies did trigger many of the main speculative attacks against the peso. But as our event chronology and historical decompositions suggest, loose monetary policy was not the only culprit. The erratic nature of capital account restrictions and interest rate and credit controls, as well as the stop-and-go cycles on price and wage controls in the mid-1980s, also played a key role—with the uncertainty triggered by forced conversion of contracts leading to capital flight and downward pressure on money demand.

Third, the mid-1990s look somewhat different. Spillovers from Mexico and other Latin American countries seem to have been a source of financial distress for Argentina, explaining about 25 percent of the severity of the speculative attack in 1995. This is not surprising given that the extent of Latin American integration into international capital markets increased sharply in 1990s. It was also in the 1990s that mutual funds became important players in Latin America. Naturally, this provided a new channel for spillovers, as

was the case when mutual funds retreated from several countries in Latin America after the losses they suffered from the Mexican devaluation.

Fourth, the origin of the 2002 crisis lies in the sharp depression that started in the last half of 1998 and continued and deepened throughout the precrisis period. As the economy slid into recession, the currency board became a liability as the government was constrained to carry out a contractionary monetary policy in the midst of a profound recession. Financial contagion from Brazil or other Latin American countries was found to play no role in explaining the collapse of the currency board in 2001.

Finally, our results show that the participation in international capital markets can be risky and that crises may occur even in the presence of immaculate domestic fundamentals. Still, the costs of crises triggered just by adverse external shocks are far smaller than those of crises fueled by fragile domestic fundamentals.

Appendix A. Data Sources and Definitions

The data used in the VAR estimation are at monthly frequency and cover the periods 1970:1–2001:12.

Data Sources

All data are from the International Monetary Fund's *International Financial Statistics,* except as noted below.

Definitions and Units of the Variables

r: Ratio of Argentina's foreign exchange reserves to domestic credit in U.S. dollars (in percent).

(f − e): Percentage difference between the black–dual exchange market exchange rate and the commercial exchange rate.

d − e: Total domestic credit of the banking sector, measured in billions of dollars at the commercial exchange rate.

q: Real effective exchange rate with respect to Argentina's main trading partners.

i:* U.S. real interest rate: nominal interest rate on one-year U.S. Treasury bills adjusted for consumer price index inflation (in percent).

c: First principal component of foreign exchange reserves of the following countries: Brazil, Chile, Colombia, Mexico, and Venezuela. The principal component is constructed as a linear combination of the five series, where the weights correspond to the eigenvector associated with the largest eigenvalue of the covariance matrix of the individual series (See Drhymes [1974] for an explanation of principal components analysis.)

g: Annualized central goverment deficit measured as a proportion of GDP, in percent. Obtained from the Ministry of Finance and from the International Monetary Fund's Government Finance Statistics database (www.imf.org/external/pubs/ft/gfs/manual/gfs.htm) and staff reports.

y: Monthly index of industrial production. Obtained from the Fundación de Investigaciones Económicas Latinoamericanas database.

Comment

Carlos Winograd: The paper by Kaminsky, Mati, and Choueiri makes an interesting contribution toward disentangling the role of both domestic and foreign factors in shaping currency crises in Argentina since 1970. Nevertheless, I suggest that the following issues be addressed.

The link between the motivation and the sample period used in the econometric estimations is not clear cut. On the one hand, the paper starts with a motivation concerned with the long view of Argentina and international financial markets since the beginning of the nineteenth century, but the sample only starts in 1970. On the other hand, the authors mention that "in the midst of the worst current international financial crisis since the Great Depression, untangling the roots of financial distress becomes crucial." While the question seems relevant, the authors only extend their focus through 2001. I suggest that the authors make clearer the link between the motivation and the sample period, explaining carefully the choices made.

The authors should make an effort to clarify why they think the technique they use is the most appropriate for the problem at hand. This issue was already mentioned at the Thirteenth Annual Meeting of the LACEA in Rio in 2008. In particular, while (structural) VAR models seem suitable to evaluate the impact of external and domestic variables over continuous variables, they are less appropriate for modeling dichotomic variables. Since currency crises are not continuous but dichotomic, maybe a dynamic probit-logit approach would be more appropriate. The authors seem to recognize this point when they compute the probability of a currency collapse in equation 14.

Since the structured VAR results heavily depend on the restrictions suggested by the theoretical model presented in the second section, more care should be taken in developing and justifying the theoretical model. For example, what is the relevance of foreign variables when the country does not have access to international markets? Why doesn't the fiscal deficit depend on output? Why doesn't output depend on credit and vice versa? Why does the

fiscal deficit follow a random walk? These are just a few questions that should be addressed in the theoretical section.

The authors also should carefully explain why they prefer to split the sample into fixed and dual exchange rate regimes instead of estimating, for example, a Markov switching regime model with two regimes. This would have the advantage of leading to more efficient estimates than just splitting the sample. It is also unclear why the authors did not handle the presence of breaks within the VAR framework.

There is no table including the output of the structural VAR estimations, together with residual diagnostic tests. A presentation and discussion of such results (significance of variables, multivariate normality, multivariate absence of autocorrelation, and so forth.) should be included.

The section on results can be made much more reader friendly by streamlining it to emphasize those results that are more relevant to the main goal of the paper.

Finally, the conclusion could provide clear policy prescriptions. Hence, based on the estimation results, which policies would the authors suggest to help Argentina avoid or mitigate the consequences of a currency crisis?

References

Baliño, Tomás. 1987. "The Argentine Banking Crisis of 1980." Working Paper WP/87/77. Washington: International Monetary Fund.

Blanco, H., and P. M. Garber. 1986. "Recurrent Devaluations and Speculative Attacks on the Mexican Peso." *Journal of Political Economy* 94 (1): 148–66.

Blejer, M., and N. Liviatan. 1987. "Hyperinflation: Stabilization Strategies in Argentina and Israel, 1985–1986." *International Monetary Fund Staff Papers* 34 (3): 409–38.

Calvo, G. 1999. "The Russian Virus." Mimeo. University of Maryland.

Calvo, G., A. Izquierdo, and E. Talvi. 2002. "Sudden Stops, the Real Exchange Rate, and Fiscal Sustainability: Argentina's Lessons." Mimeo. Washington: Inter-American Development Bank.

Calvo, G., L. Leiderman, and C. Reinhart. 1992. "Capital Inflows to Latin America: The 1980s and the 1990s." Working Paper 85. Washington: International Monetary Fund.

———. 1996. "Inflows of Capital to Developing Countries in the 1990s." *Journal of Economic Perspectives* 10 (2): 123–39.

Céspedes, L., R. Chang, and A. Velasco. 2004. "Balance Sheets and Exchange Rate Policy." *American Economic Review* 94 (4): 1183–93.

Cumby, R. E., and S. van Wijnbergen. 1989. "Financial Policy and Speculative Runs with a Crawling Peg: Argentina 1979–1981." *Journal of International Economics* 27 (1–2): 111–27.

D'Amato, L., E. Grubisic, and A. Powell. 1997. "Contagion, Bank Fundamentals or Macroeconomic Shocks? An Empirical Analysis of the Argentine 1995 Banking Problems." Paper prepared for the 1997 Latin American and Caribbean Economic Association meeting. Bogota, Colombia, October 2–4.

De la Torre, A., E. Levy Yeyati, and S. L. Schmukler. 2002. "Argentina's Financial Crisis: Floating Money, Sinking Banking." Washington: World Bank.

Di Tella, G., and R. Dornbusch, eds. 1989. *The Political Economy of Argentina, 1946–1983.* University of Pittsburgh Press.

Dornbusch, R., and J. C. de Pablo. 1989. "Debt and Macroeconomic Instability in Argentina." In *Developing Country Debt and the World Economy,* edited by J. Sachs, pp. 37–56. University of Chicago Press.

Drazen, A., and P. Mason. 1994. "Credibility of Policies versus Credibility of Policymakers." *Quarterly Journal of Economics* 109 (3): 735–54.

Drhymes, P. 1974. *Econometrics: Statistical Foundations and Applications.* New York: Springer Verlag.

Edwards, S. 2002a. "The Argentine Debt crisis of 2001–2002: A Chronology and Some Key Policy Issues." Mimeo. University of California at Los Angeles.

———. 2002b. "The Great Exchange Rate Debate after Argentina." Working Paper 9257. Cambridge, Mass.: National Bureau of Economic Research.

Eichengreen, B., A. Rose, and C. Wyplosz. 1996. "Speculative Attacks on Pegged Exchange Rates: An Empirical Exploration with Special Reference to the European

Monetary System." In *The New Transatlantic Economy,* edited by M. Canzoneri, P. Masson, and V. Grilli, pp. 191–235. Cambridge University Press.

Ericsson, N., and S. Kamin. 1993. "Dollarization in Argentina." International Finance Discussion Paper 460. Federal Reserve, Board of Governors.

Giorgio, L., and S. Sagari. 1996. "Argentina's Financial Crises and Restructuring in the 1980s." In *Bank Restructuring: Lessons from the 1980s,* edited by A. Sherg. Washington: World Bank.

Hausman, R., and A. Velasco. 2002. "The Argentine Collapse: Hard Money's Soft Underbelly." Mimeo. Harvard University (April).

International Monetary Fund. 2004a. "Lessons from the Crisis in Argentina." Occasional Paper 236. Washington.

———. Independent Evaluation Office. 2004b. "The IMF and Argentina, 1991–2001." Washington.

Kaminsky, G. 2009. "Two Hundred Years of Financial Integration: Latin America since Independence" (http://home.gwu.edu/~graciela/HOME-PAGE/RESEARCH-WORK/WORKING-PAPERS/LA-200-years.pdf).

Kaminsky, G., R. Lyons, and S. Schmukler. 2004. "Managers, Investors, and Crises: Investment Strategies of Mutual Funds." *Journal of International Economics* 64 (1): 113–34.

Kaminsky, G., and C. Reinhart. 2000. "On Crises, Contagion, and Confusion." *Journal of International Economics* 51 (1): 145–68.

Kiguel, M. 1989. "Inflation in Argentina: Stop and Go Since the Austral Plan." Policy, Planning, and Research Working Paper 162. Washington: World Bank (March).

Kiguel, M., and P. Neumeyer. 1995. "Seigniorage and Inflation: The Case of Argentina." *Journal of Money, Credit, and Banking* 27 (3): 672–82.

Krugman, P. 1979. "A Model of Balance of Payments Crises." *Journal of Money, Credit and Banking* 11 (3): 311–25.

Machinea, J., and J. Fanelli. 1988. "Stopping Hyperinflation: The Case of the Austral Plan in Argentina, 1985–87." In *Inflation Stabilization: The Experience of Israel, Argentina, Brazil, Bolivia, and Mexico,* edited by M. Bruno and others, pp. 111–52. MIT Press.

Montanaro, E. 1990. "The Banking and Financial System in Argentina: The History of a Crisis." In *The Future of Financial Systems and Services,* edited by E. Gardener. New York: St. Martin's Press.

Mussa, M. 2002. *Argentina and the Fund: From Triumph to Tragedy.* Washington: Peterson Institute for International Economics.

Perry, G., and L. Servén. 2002. "The Anatomy of a Multiple Crisis: Why Was Argentina Special and What Can We Learn From It?" Mimeo. Washington: World Bank (May).

Reinhart, C., and C. Végh. 2002. "Do Exchange Rate-Based Stabilizations Carry the Seeds of Their Own Destruction?" Mimeo. University of Maryland.

Rodriguez, C. 1994. "Argentina: Fiscal Disequilibria Leading to Hyperinflation." In *Public Sector Deficits and Macroeconomic Performance,* edited by W. Easterly, C. A. Rodriguez, and K. Schmidt-Hebbel, pp. 101–66. Oxford University Press.