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**Monetary Impact of a Banking Crisis and the Conduct of Monetary Policy**

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**Abstract**

The experiences of seven countries that have undergone banking crises show that crises have significant implications for the short-run stability of the demand for money, the money multiplier, the transmission mechanism, and the signal variables of monetary policy. Monetary and credit instability, coupled with changes in the nature of the monetary and credit aggregates, complicate monetary management. These findings may require redesigning monetary instruments in favor of faster-reacting instruments, such as open market operations, and introducing additional indicators of the monetary stance, such as asset price and exchange rate movements. More frequent reviews of monetary programs may also be necessary.

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## SUMMARY

The paper analyzes the experience of seven countries that have undergone banking crises (three Latin American countries, the Baltics, and the Philippines) to assess the monetary impact of those episodes and the factors that determine their impact. It also reviews the monetary policy response to the crises, including the use of monetary instruments and changes in monetary targets.

The impact of banking crises on monetary and credit aggregates, and eventually on inflation, appears to depend on the origin of the crisis and on the country's underlying characteristics prior to the crisis, such as the exchange rate regime, the degree of dollarization, and the stability of money demand. The structure of the banking system and related institutional characteristics—for example, the deposit insurance scheme and the lender-of-last-resort mechanism in place—also play a role in determining the effects of a banking crisis.

Monetary and credit instability, coupled with changes in the nature of monetary aggregates, complicate monetary management. Monetary instruments may need to be redesigned in light of this instability, in favor of faster-reacting instruments such as open market operations. Additional indicators of the monetary stance, such as asset price and exchange rate movements, may need to be introduced. If a crisis is systemic, monetary targets will probably need to be set and reviewed more frequently.

## I. INTRODUCTION

While the impact of banking crises on monetary management is difficult to predict with certainty, some lessons can be drawn from country experiences. A group of seven countries having undergone banking crises has been analyzed. Six of the countries chosen, three transition economies (Estonia, Latvia and Lithuania) and three Latin American countries (Argentina, Paraguay and Venezuela), experienced banking crises in the 1990s.<sup>3</sup> Some of them, especially Paraguay and Lithuania have not fully recovered from their respective crises yet. The Philippines' banking crisis in the 1980s has been included as a benchmark, to compare the monetary impact of banking crises in the 1980s and the 1990s. Among the 1980s banking crisis, the Philippines' case appeared particularly interesting since it came on the heels of large capital outflows and a currency crisis, which can make it comparable to the Argentine's crisis in 1995.

## II. FACTORS AFFECTING THE IMPACT OF BANKING CRISES ON MONETARY POLICY

The impact of banking crises on monetary and credit aggregates, and eventually on inflation, will depend on the origin of the crises, and consequently, on the scope of the crisis itself, in terms of the number of banks affected and their share of deposits. The country's underlying characteristics prior to the crisis such as the exchange rate regime, the degree of dollarization and the stability of money demand will also influence the monetary impact of banking crises. Other factors that play a role are the structure of the banking system and related institutional characteristics, such as deposit insurance scheme and the lender-of-last-resort mechanism in place.

### A. Origin of the Crisis

The monetary impact of banking crises depends in part on the origin of bank problems. The bank problems of all countries reviewed, except for Argentina and Paraguay, were due to a balanced combination of macroeconomic and microeconomic reasons.

The Venezuelan banking crisis was caused by extremely high real interest rates and large amounts of bad loans. High real interest rates were a consequence of an unbalanced adjustment program in which fiscal policy was too lax and monetary policy became overburdened. Bad loans were a consequence of a poor regulatory and legal framework, weak supervision, bank mismanagement and fraud. Bad loans also played a role in the increase in real interest rates, since it was necessary to cover the losses stemming from them through large interest rates. A similar situation was experienced in the Baltics, although the role played by bad loans in the determination of the high real interest rates was larger than that of an overburdened monetary policy. Financial and capital account liberalization in the absence of an

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<sup>3</sup>For a more detailed review of the three Latin American countries, see García-Herrero (1997).

effective regulatory framework also set the stage for the Baltic's banking crises. In the case of Latvia, too rapid capital inflows into the banking system, attracted by financial and capital account liberalization clearly contributed to the banking crisis. A very similar case occurred in the Philippines in the early 1980s; capital inflows, which could not be fully sterilized, allowed banks to obtain large resources to lend even if they lacked the skills in credit and risk management necessary to intermediate capital flows. The Philippines' experience had already shown that loan quality tends to suffer when credit grows too quickly, and that it becomes particularly worrisome when there are weaknesses in the banking system. The same story was basically repeated in the Baltics.

The origin of the Argentine banking crisis is quite similar to the Philippines' one since both crises came on the heels of large capital outflows and a currency crisis. However, large differences exist as regards the situation of the banking system and the degree of financial and capital account liberalization. The Philippines had just liberalized the financial system and the capital account previous to the crisis, without strengthening bank regulation and supervision. This increased the degree of bank distress. Argentina, in turn, had improved bank regulation and supervision and consolidated the banking system through the privatization of several government-owned banks. Although, the process had not been completed when the 1995 banking crisis erupted, the Argentine banking system was in a more solid situation than it would have been had the crisis burst out before.<sup>4</sup> As a consequence of the above, the Argentine banking crisis may need to be classified in a different group as the countries previously analyzed (all but Paraguay). Relatively to them, the Argentine crisis is more of a macroeconomic origin, both in terms of an external shock (the Mexican crisis) and the weakening of macroeconomic policies, especially fiscal policy. Finally, the Paraguayan banking crisis was mainly due to financial liberalization accompanied by weak supervision, as well as bank mismanagement and outright fraud.

The crises stemming from both macroeconomic and bank-specific reasons had a larger monetary impact than that of Paraguay, which was originated only from bank-specific problems. Also, the Argentine banking crisis, mainly caused by an external shock, as well as weaker macroeconomic fundamentals, had a smaller monetary impact, in terms of money demand instability and inflation. However, if one looked at the impact of the crisis on the credit to the private sector and, eventually, on the real sector, the conclusions would differ somewhat. In fact, the crisis impact was relatively large in Argentina and Paraguay. This may be related to the structure of their banking systems, as will be explained later. Table 1 summarizes the causes of the banking crises reviewed.

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<sup>4</sup>Notwithstanding their improvement, the situation of several provincial banks was still very weak in early 1995.

Table 1: Main Causes of Banking Crises

Countries	External Macroeconomic Shocks and Other Macroeconomic Causes	Structural Changes	Specific Bank Related Issues
ARG	Mexican crisis; withdrawal of foreign investors from emerging markets. Weakening of domestic macroeconomic policies, especially fiscal stance.	Sharp changes in relative prices due to the introduction of the currency board arrangement.	Inefficiencies in the Argentine banking system, still in a period of consolidation. Deficient bank management and internal control.
EST	Collapse of the Soviet Union. Freezing of deposits abroad. Introduction of macroeconomic adjustment program.	Financial liberalization. Liberal licensing requirements allowed for bank proliferation.	Poor bank management. Large spreads and large amounts of nonperforming loans. Government withdrawals of deposits from Soviet Bank.
LAT	Collapse of the Soviet Union. <sup>1</sup> Introduction of macroeconomic adjustment program. Freezing of deposits abroad. Large capital inflows into the banking system during 1993-94.	Financial liberalization. Changes in bank and enterprise ownership mainly through privatization. Introduction of provisioning requirements.	Poor bank management, related party lending and fraud. Lax prudential regulation.
LITH	Collapse of the Soviet Union. <sup>1</sup> Introduction of macroeconomic adjustment program. Freezing of deposits abroad.	Financial liberalization. Introduction of provisioning requirements.	Poor bank management, poor credit policies, connected lending and fraud. Lax prudential regulation.
PAR		Financial liberalization without strengthening bank supervision. Liberal licensing requirements for bank proliferation.	Poor supervision and regulation; fraud.
PHIL	Increase in oil price and international interest rates. Deterioration of terms of trade. External debt crises and recession.	Financial liberalization without adequate strengthening of regulatory and accounting framework. No improvement in banking supervision.	Lending to related parties and politically motivated loans. Shortcomings in banking supervision, and regulatory and accounting framework, deficient bank management, lack of internal controls, and high operating costs.
VEN	Deterioration of the terms of trade. Introduction of macroeconomic adjustment program with excessive burden on monetary policy.	Financial liberalization; (interest rate liberalization and indirect instruments adopted) without adequate regulatory and accounting framework. No improvement in banking supervision.	Major portfolio weaknesses, built up prior to 1989 when direct controls severely distorted credit allocation. Very weak banking regulation and supervision. New laws to strengthen banking supervision became effective only in late 1993 (with three years delay). Connected lending and fraud.

Source: Fund and World Bank documents.

<sup>1</sup>Although the Latvian and Lithuanian banking crises occurred well after the collapse of the Soviet Union, the dramatic changes in the economic structure clearly affected banks' balance sheets directly, through the sharp increase in nonperforming loans and lower savings deposits, and indirectly, through reduced public's confidence in the banking system.

## B. Scope of the Crisis

Although the scope of a banking crisis will only be known *ex post* and, thus, cannot be of help to determine the monetary impact of an ongoing crisis, some lessons can be learned from analyzing the scope of past banking crises to determine the monetary impact of future crises.

The general conclusions from the countries reviewed is that the larger the crisis' scope in terms of deposits and number of banks affected, the larger the instability in the monetary aggregates and the more difficult monetary management will be. Venezuela and the Philippines are good examples of this.

In turn, the public cost of banking crises is less related to their monetary impact and more to the actual restructuring strategy followed in each case. Some banking crises can, therefore, be very costly for the government but may not have a large monetary impact in terms of money demand instability and inflation (Table 2).

## C. Exchange Rate Regime

A country's exchange rate regime may also influence the impact of a bank crisis on monetary policy. For a country under a fixed exchange rate, the theory would suggest that a banking crisis should lead to a worsened situation of the balance of payments, resulting in a decline in the domestic money supply and an increase in domestic interest rates. Both the decline in money supply, through the reduction of credit that accompanies it, and the higher interest rates could make it more difficult for borrowers to service their debts to the banking system. The countries reviewed under a fixed exchange rate regime (Argentina, Estonia and Lithuania) did follow this pattern, with a large decline in the monetary aggregates and increases in interest rates. Interest rates did not increase as much in the Baltics since they were already at very high levels in real terms before the crises erupted (Figure 1 and 2).<sup>5</sup> Despite the similarities in the developments on monetary aggregates and interest rates for countries under a fixed exchange rate, it is difficult to determine whether these developments were due exclusively to the exchange rate regime in place or rather to similarities in the countries' institutional characteristics supporting the exchange rate regime. In fact, the three countries had a Currency Board Arrangement (CBA) in place and two of them (Estonia and Lithuania) had a similar structure of the banking system (Table 3).

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<sup>5</sup>In the case of Lithuania, though, real interest rates were high well before the crisis.

Table 2: Direct Fiscal Impact of Authorities' Response to a Banking Crisis

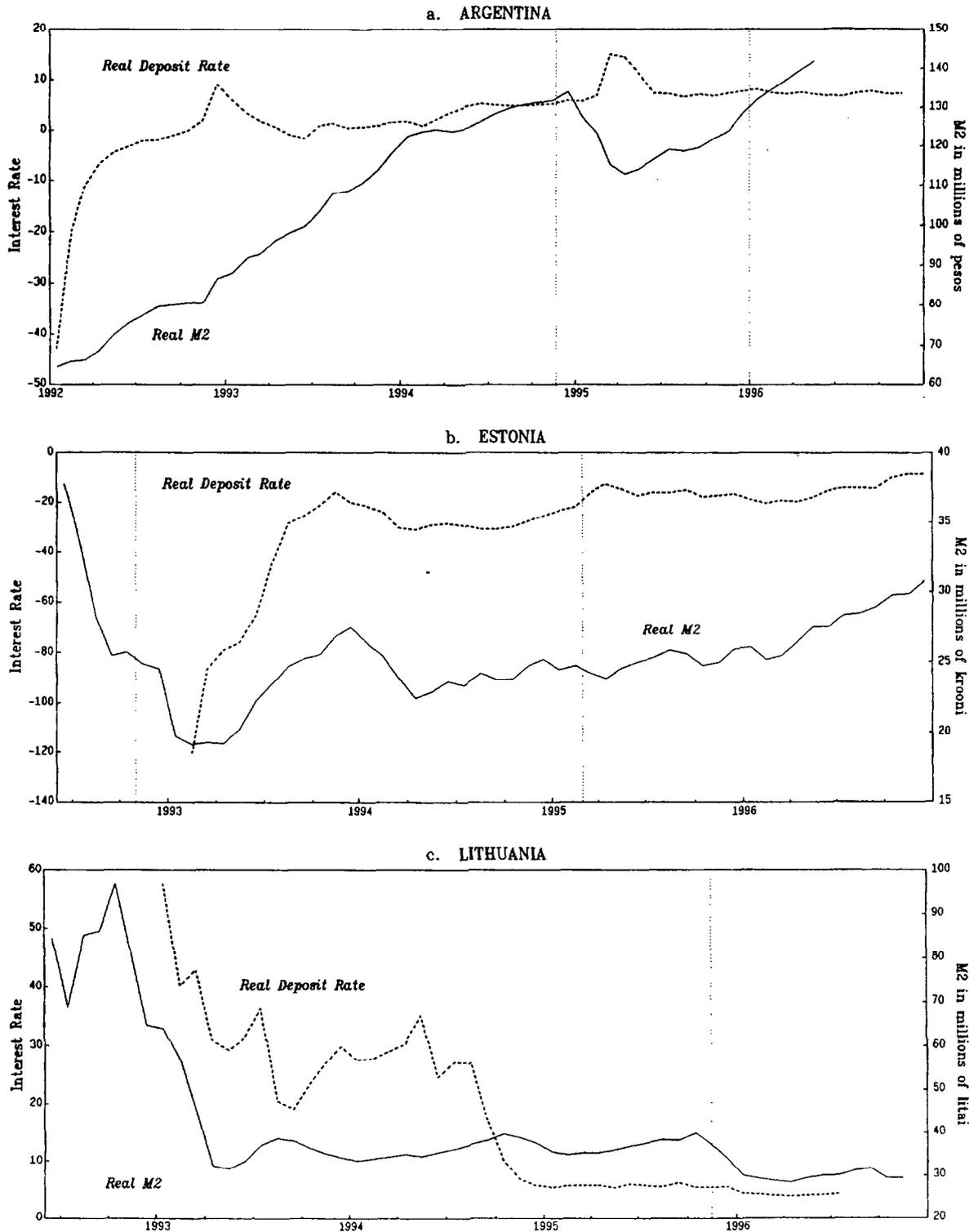
Countries	Scope of the Crisis	Estimate of Public Costs
ARG	Suspension of 8 banks and collapse of 3 banks.	0.3 percent of GDP <sup>6</sup>
EST	1992: assets in insolvent banks accounted for 41 percent of financial system assets; 1994: Social Bank affected, which controlled 10 percent of financial system assets.	Recapitalization outlays for new entity cost 1.4 percent of GDP.
LAT	Largest bank and 9 other banks together accounting for 40 percent of total banking system assets.	N.A.
LITH	Largest private bank and one mid-size private bank suspended; two smaller banks intervened.	N.A.
PAR	Two interconnected banks intervened; also intervention of 2 other banks and 6 related financial houses accounting for 10 percent of financial system deposits.	N.A.
PHIL	2 public banks affected (50 percent of banking system assets); also 6 private banks (12 percent of banking system assets); 32 thrift banks (53.2 percent of thrift banking assets); and 128 rural banks.	4 percent of GDP
VEN	19 banks were either closed or bailed in four waves of bank runs (about 50 percent of the deposits in the commercial banking system).	14 percent of GDP in 1994 and 3 percent of GDP in 1995 <sup>7</sup>

Source: Fund and World Bank documents.

<sup>6</sup>It does not include the cost of Trust Funds for private and provincial banks, being externally financed.

<sup>7</sup>This does not include the indirect costs that the Central Bank had to incur through the sterilization of the funds injected in the banking system. The same applies for all the other countries.

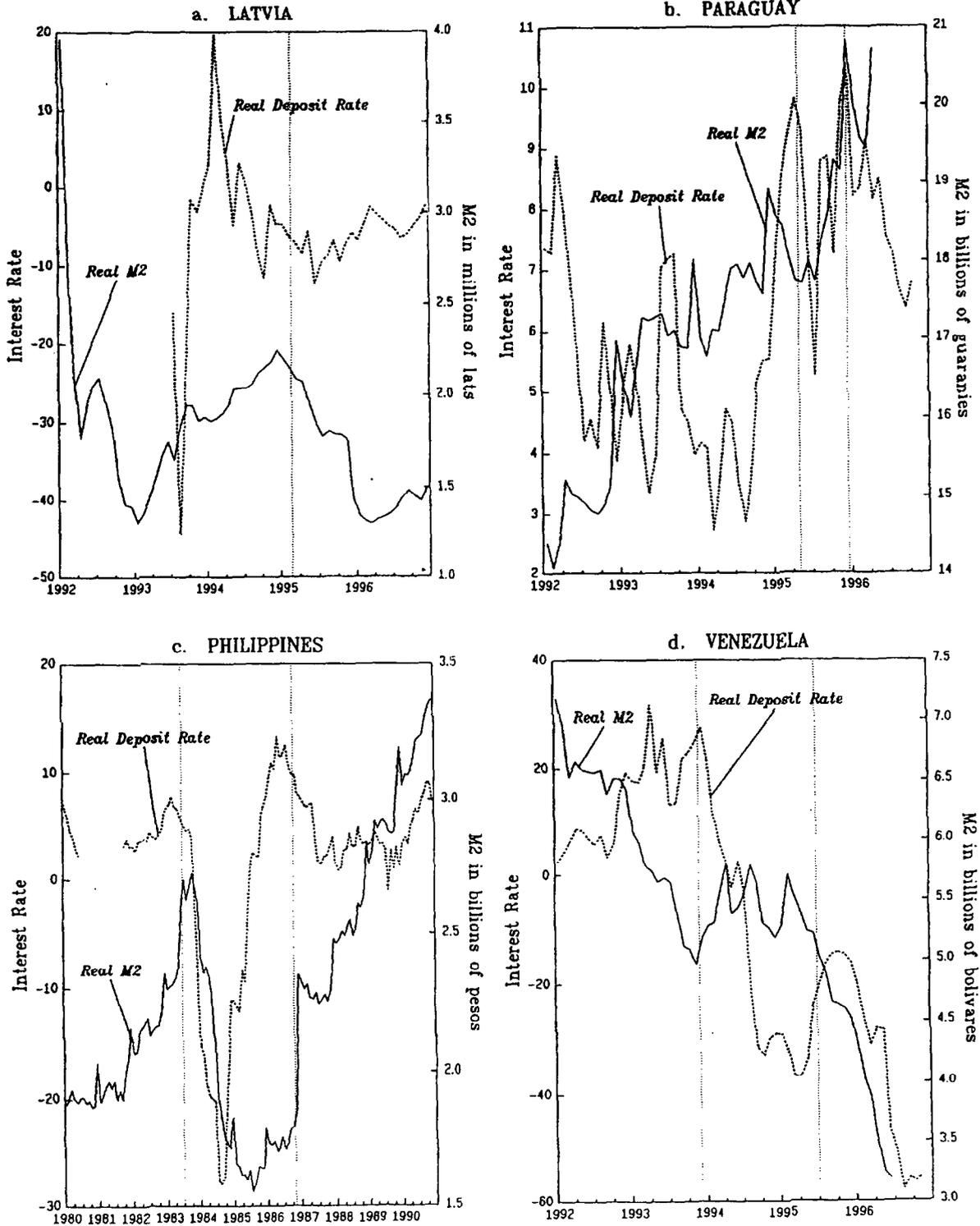
FIGURE 1: Countries under a Fixed Exchange Rate  
Developments in Real M2 and Real Interest Rates 1/



Source: International Financial Statistics.

1/ The definition of M2 taken for all countries except Venezuela includes foreign currency deposits. The Venezuelan foreign-currency deposits in the domestic banking system are practically nonexistent.

FIGURE 2: Countries under a Flexible or Managed Exchange Rate 1/  
Developments in Real M2 and Real Interest Rates



Source: International Financial Statistics.

1/ The Philippines and Venezuela moved from a flexible to a fixed exchange rate and back to a flexible exchange rate again after the crisis.

Table 3: Exchange Rate Regimes

Countries	Exchange Regime Before the Banking Crisis	Changes in the Exchange Regime During or After the Banking Crisis	Developments in the Exchange Rate
ARG	Pegged to the U.S. dollar (CBA)	None	Constant
EST	Pegged to the DMark (CBA)	None	Constant
LAT	Managed float (the facto pegged to the SDR)	None	Practically constant
LITH	Pegged to the U.S. dollar (CBA)	None	Constant
PAR	Independently floating	None	Slight depreciation
PHIL	Managed float in 1980-81, then pegged to a currency composition for 6 months and, managed float again	Move to more flexible exchange rate regime, to allow for sharp depreciation	Sharp depreciation
VEN	Independently floating	Fixed exchange rate, pegged to the U.S. dollar	Sharp depreciation, then stable for over a year and sharp depreciation again

Source: Fund and World Bank documents, and Exchange Arrangements and Exchange Restrictions Annual Reports.

In the case of a country under a flexible exchange regime, a banking crisis should generally lead to a contraction in the demand for money, which would tend to depreciate the currency and raise domestic prices, thus reducing the demand for real money balances. This would reduce the real value of bank loans, facilitating loan repayment. At the same time, the real value of bank liabilities would fall, helping banks to maintain bank solvency. The experiences of the countries reviewed under flexible exchange regimes is generally in line with economic theory. The exchange rate depreciated sharply in the Philippines and to a lesser extent in Paraguay. In Venezuela exchange rate depreciation was stopped by a regime shift, to a fixed exchange rate, and the introduction of capital controls, until the exchange rate was allowed to float and controls were lifted in April 1996. The impact of the crisis on inflation was even higher than in countries that allowed the exchange rate to depreciate from the beginning.

### D. Degree of Dollarization

The monetary impact of bank crises not only depends on the exchange rate regime but also on the country's degree of dollarization. Except for the case of full dollarization,<sup>8</sup> exchange rate depreciation, and especially a devaluation in the case of a fixed exchange regime, makes it difficult for borrowers indebted in dollars to pay back their debts if they do not have sufficient income in dollars. This clearly deteriorate banks' loan portfolios. Furthermore, a highly dollarized economy under a fixed exchange rate may have accumulated a large share of private and public debt denominated in dollars, which would make an exchange rate adjustment particularly devastating for the country in general but particularly for banks since they usually intermediate a large share of the dollar-denominated debt through the concession of loans. Given the substantial increase in the liabilities of the public and private sectors that would occur through an exchange rate devaluation, the possibility of using such tool to shrink banks' balance sheets in real terms practically disappears in countries with a large share of dollar-denominated debt. This was clearly the case in Argentina, where, the possibility of using exchange rate devaluation as a tool to shrink banks' balance sheets, and thus end the banking crisis, was hardly taken into account. This was not only due to the likely loss of credibility linked to a devaluation but also to the potential increased value of the country's dollar-denominated debt. Table 4 reviews the countries' degree of dollarization at the time of the crisis.

Table 4: Degree of Dollarization

Countries	Foreign Currency (Deposits as Percentage of Broad Money M2)*		Foreign Currency Used for Domestic Transactions
	Before the Crisis	Increase After Crisis	
ARG	42	yes	yes
EST	14	yes	yes
LAT	35	yes	yes
LITH	10	yes	yes
PAR	36	yes	no
PHIL	35	no	yes
VEN	2	no	no

Source: Fund documents and author's estimates.

\*The broadest monetary indicator available has been employed for all countries, including, therefore, foreign currency deposits, and has been called M2 for simplicity.

<sup>8</sup>If a country is fully dollarized, a devaluation would not impact the real value of financial assets and liabilities.

Dollarization may not only reduce the probability of using inflation as a tool to shrink banks' balance sheets, but can also be useful if confidence in the domestic currency diminishes during a banking crisis. The cases of Argentina and the Baltics (especially Latvia) clearly show that the possibility to hold dollar deposits within the banking system helped banks, at least temporarily, in their efforts to maintain their deposit base, making the demand for broad money more stable.<sup>9</sup> This conclusion can be further strengthened when comparing the dollarized countries reviewed to Venezuela. In Venezuela, the lack of foreign currency deposits within the domestic banking system contributed to the development of off-shore banks. This sort of "external dollarization" facilitated the flight of deposits from the domestic to the off-shore banking system, thereby increasing the instability of the deposit base during the crisis.

### **E. Instability of the Demand for Money**

If a country has a stable demand for money during a fairly long period prior to a banking crisis, this will facilitate the conduct of monetary policy during the banking crisis since it will be easier to determine that movements in monetary aggregates are a consequence of the banking crisis and not of other events.

As for the long-run stability of money demand, countries experiencing a consumption boom will tend to have a more unstable demand for money, compared to countries that had an output boom. This is because money demand tends to be better correlated with expenditure than with output or income,<sup>10</sup> so unsustainable levels of expenditure are bound to bring about an unsustainable expansion of monetary aggregates, assuming that the monetary authorities have accommodated changes in the demand for money. This was arguably what happened in the Philippines in the early 1980s, compared to Argentina in the early 1990s. The Philippines' Central Bank was forced to increase domestic credit in order to prevent a banking crisis, leading to substantial losses of international reserves. Eventually, a balance of payments crisis occurred in October 1983, leading to a sharp fall in monetary aggregates.

Table 5 briefly summarizes some of the studies on the stability of money demand that have been conducted for four of the countries reviewed.<sup>11</sup> While a long-run stable relationship was found in the case of Argentina, no such evidence exists in the case of the Philippines.

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<sup>9</sup>In Argentina, this practice held except for a short period after the first months of the crisis, when the public temporarily lost confidence in the authorities' macroeconomic program and in the soundness of the banking system as a whole.

<sup>10</sup>See Ericsson and Campos (1988).

<sup>11</sup>To the best of my knowledge no such studies have been conducted for the Baltics.

Table 5: Results of Empirical Studies on Money Demand Stability

Countries	Empirical Studies
ARG	Ahumada (1992): A stable relationship for the demand for currency was found from 1978-1989, even during major policy changes from July 1985 to 1988. Yet, the constant relationship found for money holdings cannot be used to derive models of inflation and interest rates. Choudhry (1995): A stable relationship of the demand of narrow and broad money was found from the mid-1970s to late 1980s. The cointegrating vector includes real money balances, real income, the rate of inflation, and the rate of change of the exchange rate.
PAR	Banco Central de Paraguay (1996): There was a stable relation between prices, M1 and the exchange rate. The log of the CP was the dependent variable and the logs of M1 and the exchange rate the independent variables.
PHIL	Tseng and Corker (1991): A stable money demand equation was not found between 1973 and 1989, either for the narrow or broad monetary aggregates and interest or inflation rates, unless an ad-hoc adjustment for the turbulence in the mid-1980s was added. Also, money illusion (i.e., absence of price homogeneity) needs to be imposed in the short run to find a reasonable error correction model. In any event, the equation parameters are not stable, suggesting that it is not possible to explain the high degree of velocity volatility in the 1980s and, in particular, the spike in velocity in the mid-1980s.
VEN	Sánchez (1995): Long-run stability of narrow money demand was found. The cointegrating vector is composed of real narrow money, real output, exchange rate, interest rate and acceleration in inflation.

## F. Structure of the Financial Sector and Other Institutional Issues

The structure of the financial sector also influences the monetary impact of a banking crisis. The experience of Argentina and Paraguay shows that the existence of foreign banks able to hold a large share of deposits will give depositors the opportunity to “flee to quality,” rather than leave the system, and thus will limit the reduction of the deposit base during a crisis. The same may happen if government-owned banks, perceived as reliable because of their implicit government guarantee, hold a large share of deposits, as in the Philippines.<sup>12</sup>

In the case of Argentina, the evidence was mixed: while some national government-owned banks were perceived as safe havens by depositors, depositors fled banks owned by the provincial governments. The restructuring and privatization program that the authorities had started for provincial banks before the crisis probably changed the public’s perception as to

<sup>12</sup>This was only the case during the first stages of the Philippines’ banking crisis, until the government financial institutions started to experience problems themselves, having given large amounts of assistance to distressed banks.

whether an implicit government guarantee existed for provincial banks. In the case of Venezuela, although flight to quality to foreign and public banks took place, these banks' share of total deposits was too small to be able to absorb all the deposits fleeing out of the distressed banks.

The underdevelopment of a country's capital markets also tends to intensify the monetary impact of a banking crisis. The absence of other channels for the intermediation of savings, as was clearly the case for the Baltic countries, tends to increase the volatility of the demand for money. In several cases, the demand for domestic currency or for foreign currency will surge, as it did in Estonia and Latvia. In the same vein, credit to the private sector will suffer a larger reduction when banks are the only institutions that offers credit.

The existence of a well-funded deposit insurance scheme (DIS) is another important institutional characteristic that needs to be taken into account when assessing the monetary impact of a banking crisis (Table 6). From the countries reviewed, the Philippines and Venezuela had a formal DIS in place; the Paraguayan banking system was perceived to have a full government guarantee; and Lithuania had a full guarantee for state-owned banks' deposits under its Civil Code. Although the existence of a DIS probably limited the deposit runs in these countries, it was not sufficient to stop them. The positive impact of a DIS on the deposit base was limited by the insolvency of certain DIS and the large scope of some of the crises. Indeed, the DIS proved more confidence-enhancing when explicit and separate funds were available and the crisis was not systemic. As the Venezuelan experience shows, an underfunded DIS in a situation of systemic crisis might even have a perverse impact on the stability of the deposit base since the public will perceive it as insufficient for its contingent liabilities.

### **III. MONETARY IMPACT OF BANKING CRISES AND DIFFICULTIES IN MONETARY MANAGEMENT**

Since the relationship between money and inflation is an important component of the operational framework of monetary policy,<sup>13</sup> movements in monetary variables will have significant implications for monetary policy. Banking crises may cause variations in bank reserve holdings and in public preferences for cash, which will destabilize benchmark relations such as the money multiplier. The monetary transmission mechanism will also be affected by bank unsoundness. Apart from the difficulties in monetary management related to the instability of the different aggregates, monetary policy may be further complicated by the changes in the definition and composition of monetary and credit aggregates that may occur

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<sup>13</sup>This is especially the case for countries where money is the central bank's intermediate monetary target. Most of the countries reviewed used a money target as operational target, notwithstanding the choice of a credit target for Fund purposes (see Capriolo, 1995).

Table 6: Structure of the Banking System and DIS Before the Crises

Countries	Structure of the Banking System	DIS
ARG	205 banks as of end-1994: 26 percent of total assets held by public national banks, 29 percent by provincial banks, 29 percent by private domestic banks and 16 percent by foreign banks; highly segmented banking system	Practically nonexistent <sup>14</sup>
EST	43 banks, as of end-1992; extremely concentrated with 5 largest banks holding 80 percent of total deposits; 18 state banks holding 60 percent of the deposit base; practically no foreign banks operating before the crisis	None <sup>15</sup>
LAT	55 banks as of December 1994; highly concentrated system with the 5 largest banks holding 53 percent of total deposits; only 2 state banks, holding 15 percent of deposits; practically no foreign banks	None <sup>14</sup>
LITH	27 banks as of December 1994; very highly concentrated banking system with the 5 largest banks holding 77 percent of total deposits; 3 state banks holding 54 percent of deposits; practically no foreign banks	None, but Civil Code fully guaranteed deposits at state-owned banks <sup>16</sup>
PAR	34 banks; 43 percent of the deposits held by foreign banks and 12 percent by public banks; many banks active in the off-shore market	No DIS in place but implicit guarantee
PHIL	1,222 banks, 1,040 rural banks, 144 thrifts, and 33 commercial banks; 13 government-owned and 4 foreign-owned	In place
VEN	45 banks (most of them private); 90 percent of the deposits held by private banks, and less than 1 percent by foreign banks; many banks active in the off-shore market	In place <sup>17</sup>

Source: Fund and World Bank documents.

<sup>14</sup>Argentina's DIS at the time of the crisis only covered small peso-denominated deposit accounts and the participation was voluntary. Many banks did not participate in the DIS; thus, the scheme suffered from severe underfunding. A mandatory and fully privately funded DIS was created in April 1995. Unlike the old scheme, the Central Bank's Charter prohibits its involvement in the new DIS.

<sup>15</sup>At the time this paper was written, final draft laws for the establishment of a DIS had been prepared in Estonia and Latvia, but the authorities were reluctant to introduce them until their banking systems became stronger.

<sup>16</sup>A new DIS was introduced at end-1995 in the form of a Deposit Protection Law with the objective of covering all deposits up to a limited amount. The authorities also decided to change the Civil Code to eliminate the full deposit protection at state-owned banks. Because there were no insurance funds at the time the DIS was created, the law effectively placed the Government as the ultimate insurer of small individual depositors of the 13 banks that were liquidated.

<sup>17</sup>The limit on the DIS was increased several times during the crisis.

during a crisis. All these factors will complicate monetary programming, thus reducing the probability of achieving the intermediate monetary target and, eventually, the inflation target.

Another factor to take into account, aside from the difficulties in achieving monetary and inflation targets, is the reduced knowledge of what the appropriate monetary stance is during a banking crisis. Because of the higher vulnerability of the real and financial sectors, a very cautious assessment of the monetary stance will be required. Yet, such assessment will be hindered by the lack of reliable indicators of the monetary stance due to the instability and noise introduced in the monetary aggregates and signal variables. In the case of Venezuela, the recession in the real sector during and after the banking crisis was associated with an expansion rather than a contraction, in the monetary supply. This was because the weakness of the real and financial sectors made it very difficult to tighten monetary policy and the instability of the money demand complicated the interpretation of monetary developments.

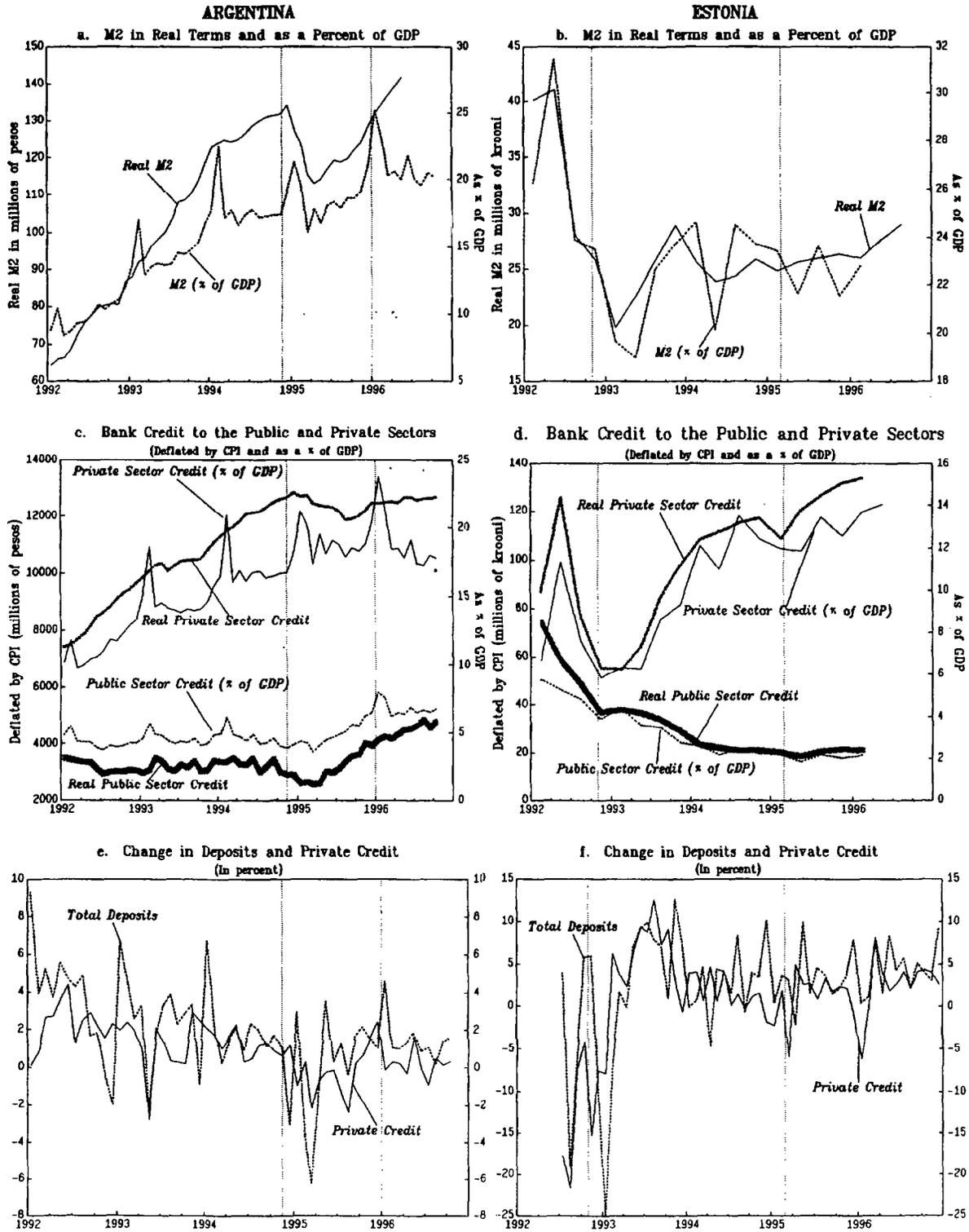
#### **A. Money and Credit Developments**

Monetary and credit aggregates usually continue to grow until a crisis erupts (Figures 3-6) . This is especially true for countries having gone through financial or capital account liberalization without strengthening bank regulation and supervision. The cases of Argentina, Latvia, Lithuania, the Philippines and Venezuela show that deposit and credit growth can continue even during periods of bank unsoundness until the crisis erupts, and does not need to be balanced. For example, Lithuania experienced a growth in credit which in some instances exceeded deposit growth since it was financed with accumulated excess reserves (Figure 4.f). In Venezuela in turn, deposit growth accelerated compared to credit growth prior to the crisis (Figure 5.f).

When a banking crisis starts, credit and deposit growth slows down and sometimes falls dramatically depending on the country's and the banking system's institutional characteristics. The case of Venezuela, compared to Argentina, shows that the fall in deposits may be more pronounced in countries where the share of foreign banks and reliable government-owned banks is very small, independently of the existence of a DIS. This is particularly true in the case of Venezuela which had a small share of foreign and government-owned banks compared to Argentina and suffered a larger fall in monetary and credit aggregates. This occurred despite the fact that Venezuela had a DIS in place, whose insurance ceiling continued to be raised, while Argentina did not. As mentioned before, an explanation for the limited impact of the DIS on the stability of the deposit base in the case of Venezuela is related to its precarious funding, as well as the systemic characteristics of the crisis.

FIGURE 3

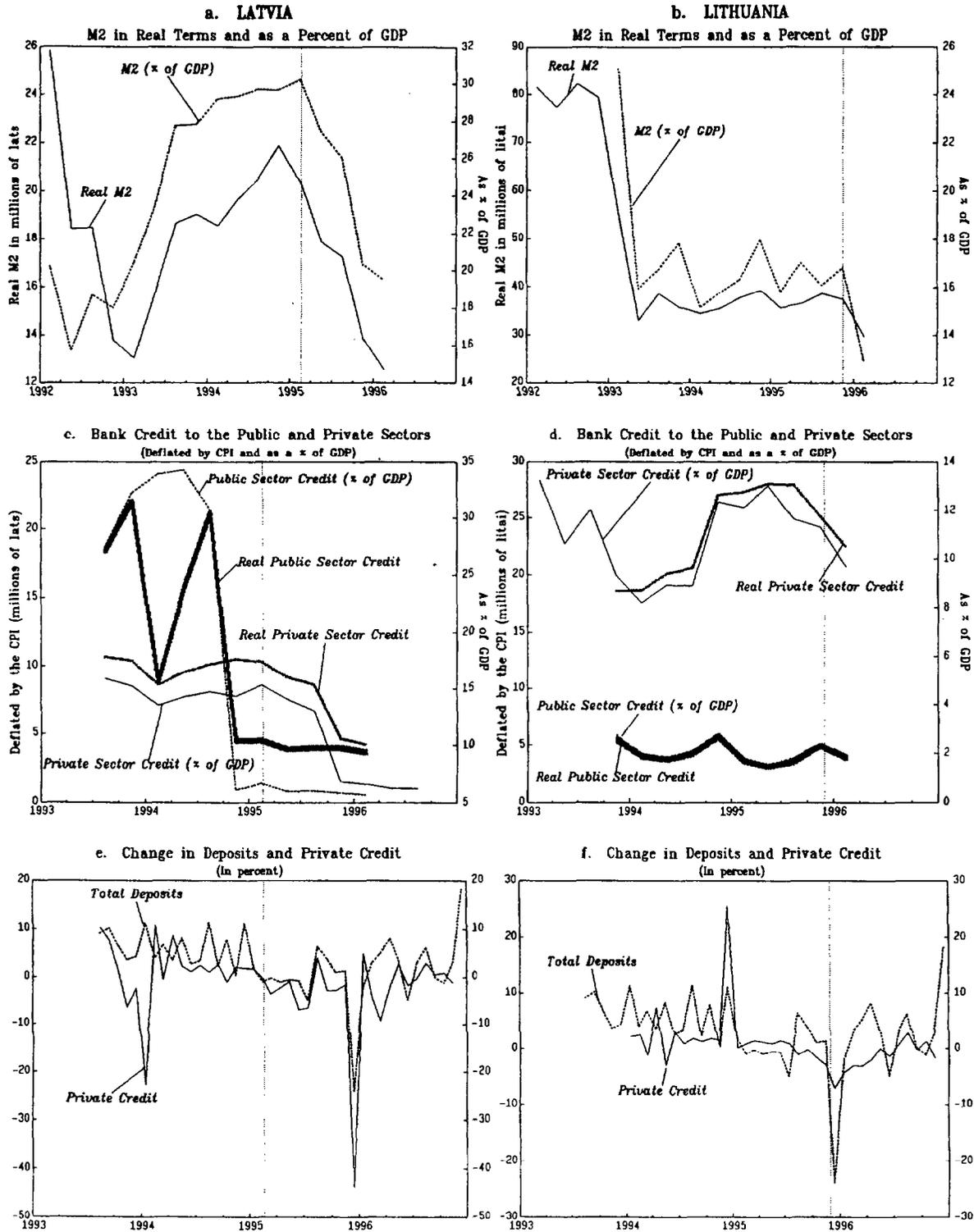
ARGENTINA AND ESTONIA: Developments in Monetary and Credit Aggregates



Source: International Financial Statistics and staff estimates.

FIGURE 4

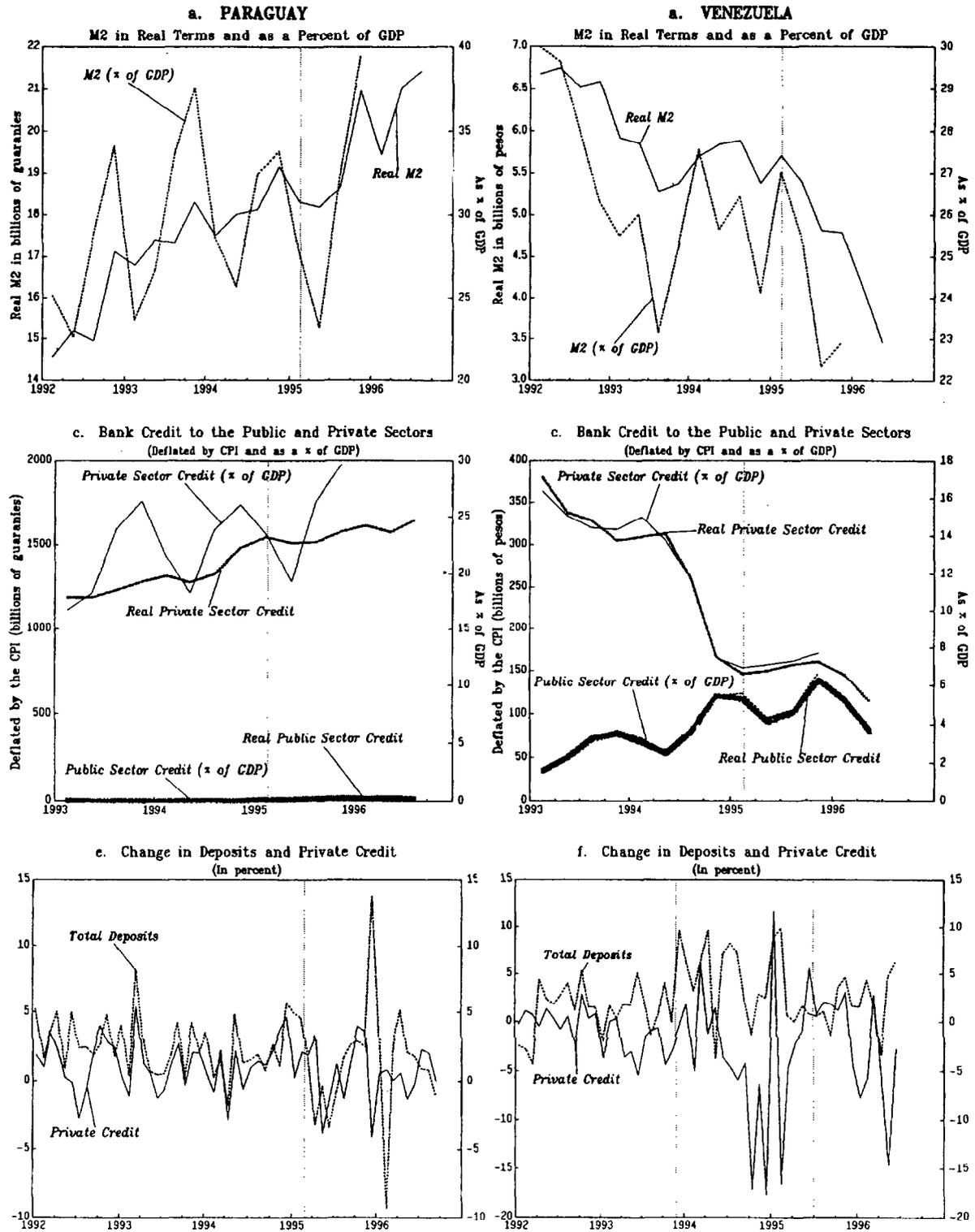
LATVIA AND LITHUANIA: Developments in Monetary and Credit Aggregates



Source: International Financial Statistics and staff estimates.

FIGURE 5

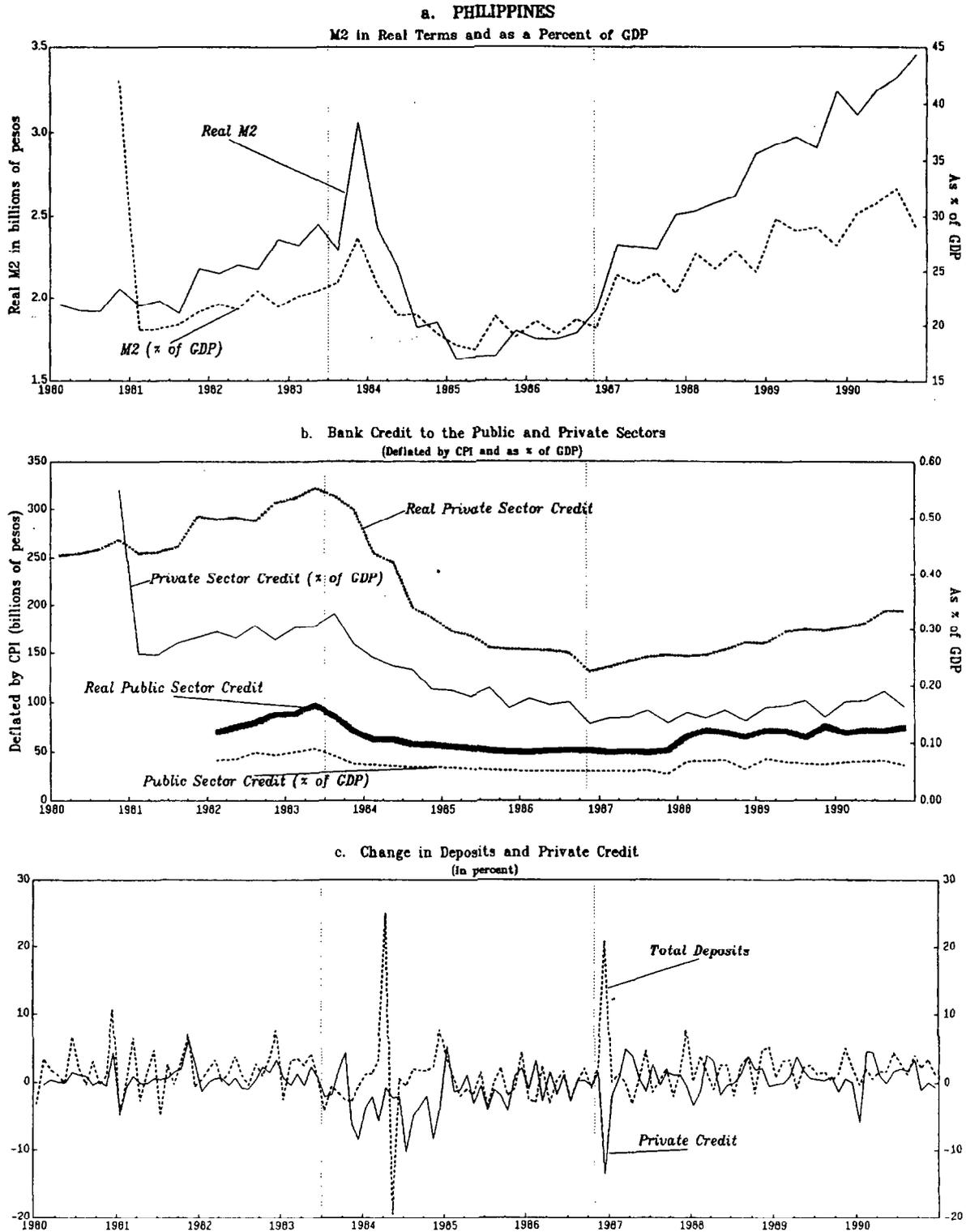
PARAGUAY AND VENEZUELA: Developments in Monetary and Credit Aggregates



Sources: International Financial Statistics and staff estimates.

FIGURE 6

PHILIPPINES: Developments in Monetary and Credit Aggregates



Sources: International Financial Statistics and country authorities.

Substantial movements in the different components of monetary aggregates occurred in all countries reviewed during the crisis period. In several of the dollarized countries (Argentina, Latvia, and the Philippines), foreign currency deposits increased sharply, cushioning part of the reduction in the demand for domestic currency (Figures 7-8). This is clearly the case when comparing these countries to Venezuela, where restrictions existed against holding dollar-denominated deposits in the domestic banking system. In Venezuela, the reduction of money demand was actually intensified by the flight to dollar-denominated deposits in the off-shore banking system. In Argentina, Latvia, and the Philippines, depositors used the available option of shifting to foreign currency within the domestic banking system. This reduced the instability of the broader monetary aggregates but monetary management was complicated by the increase in currency substitution. In Argentina, foreign-currency deposits eventually fell substantially when confidence in the country's macroeconomic situation was lost.

In most of the countries reviewed, there was also a shift from time to demand deposits in several countries, particularly in Latvia and Venezuela. In this case, demand deposits served as automatic stabilizers of the demand for broad money but, at the same time, the volatility of banks' balance sheets increased. The Philippines was a special case in this regard, since time deposits surged at the beginning of the crisis.

#### **B. Income Velocity**

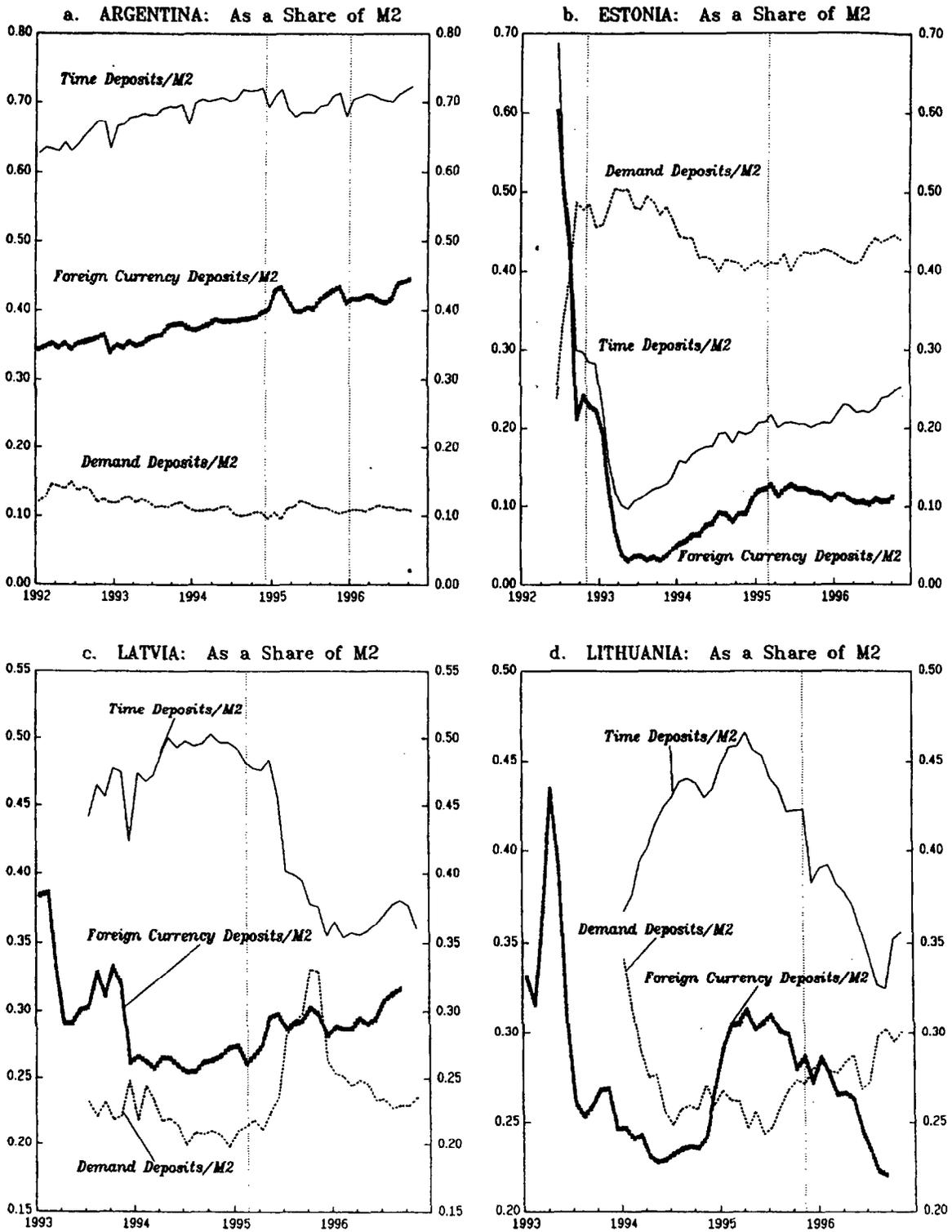
Although developments largely vary from country to country, velocity tends to fall before a crisis and to increase somewhat thereafter, but rarely to previous levels. Velocity increased in Estonia and Lithuania prior to the crisis, whereas in the Philippines and Venezuela it increased during the crisis. In most countries reviewed (except for Latvia and Paraguay) nominal interest rates continued to move in the same direction as velocity during the crisis period (Figures 9 and 10).<sup>18</sup>

Notwithstanding changes in velocity, long-run stability of the demand for money does not seem to be at stake. Econometric tests were run based on the Johansen procedure for the seven countries reviewed and cointegrating vectors were found for narrow and broad money

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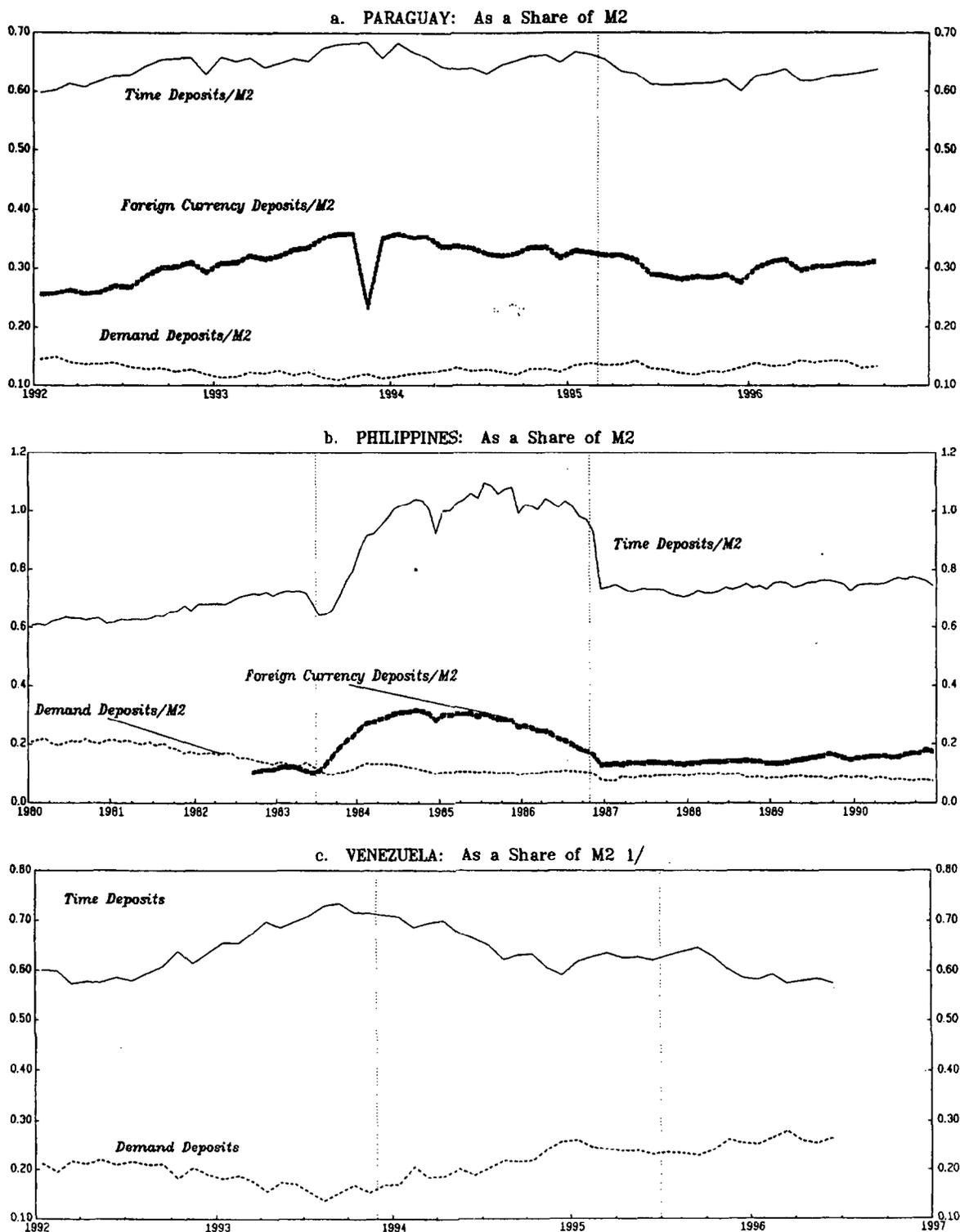
<sup>18</sup>The co-movement between nominal interest rates and velocity is the one we should expect in normal times, since an increase in interest rates for a given income should reduce money for a given income and, thus, increase velocity. Hence, only in Latvia and Paraguay was such regular co-movement broken during the crisis.

FIGURE 7  
Changes in the Composition of Banks' Deposits I



Source: International Financial Statistics, staff estimates, and country authorities.

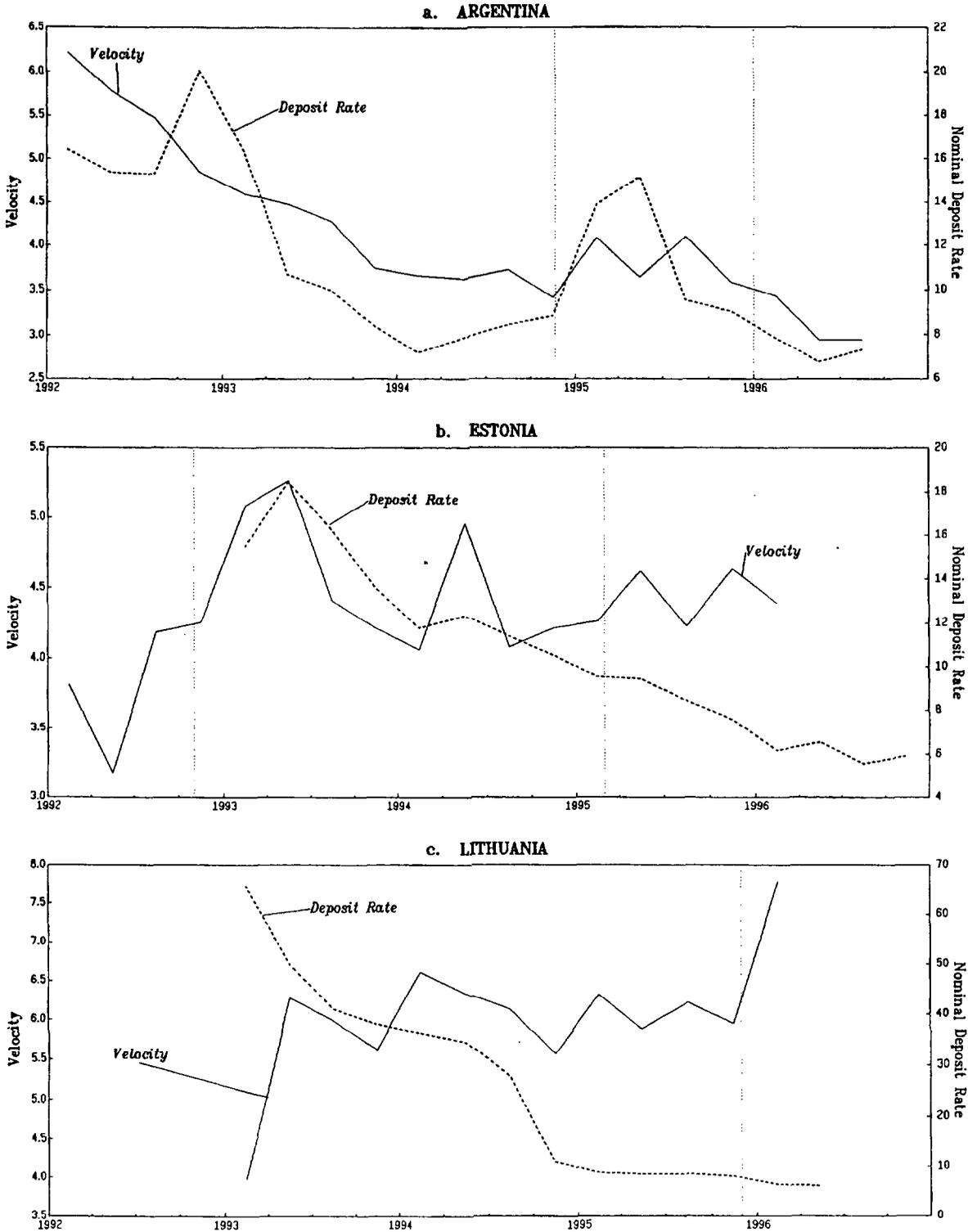
FIGURE 8  
Changes in the Composition of Banks' Deposits II



Source: International Financial Statistics, staff estimates, and country authorities.

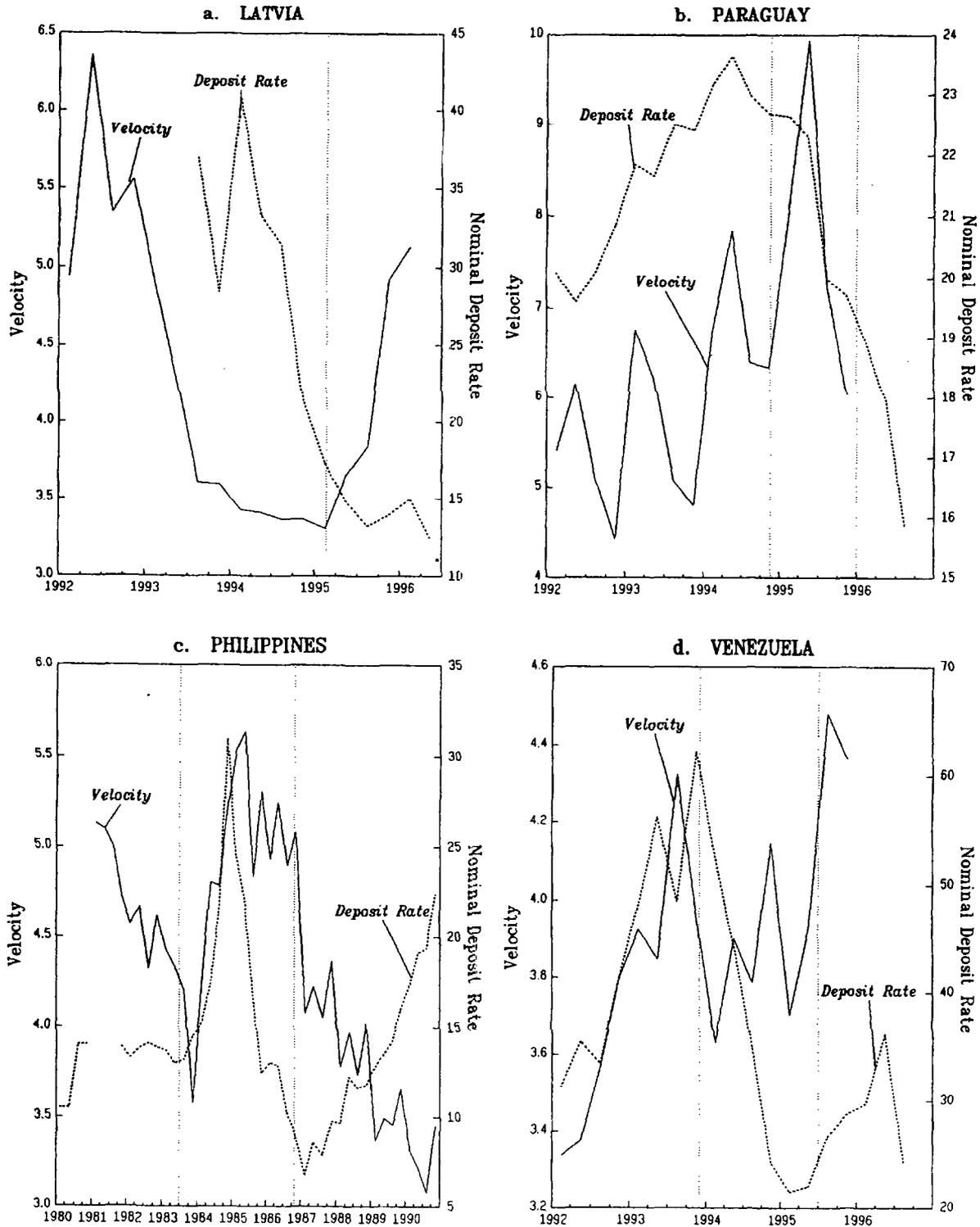
1/ Venezuelan foreign currency deposits are not included because they are an extremely low share of total deposits.

FIGURE 9: Countries Under a Fixed Exchange Rate  
Relation Between Velocity and Nominal Interest Rates



Sources: International Financial Statistics and staff estimates.

FIGURE 10: Countries Under a Flexible or Managed Exchange Rate  
Relation Between Velocity and Nominal Interest Rates



Source: International Financial Statistics and staff estimates.

in all cases, indicating that long-run stability of the demand for money may exist for all countries reviewed.<sup>19</sup> These tests, though, should be taken with care, especially for the Baltics where only four-year time span monthly observations were available to conduct the cointegration tests (see Appendix I).

Also, for Paraguay, there are significant measurement inaccuracies of monetary aggregates, due to the large pool of unregistered deposits, particularly prior to the 1995 crisis. The fact that cointegrating vectors were found for all countries, although at different levels of significance, is only a necessary condition for the specification of a well-defined money demand equation with constant long-run parameters. Additional tests, such as weak exogeneity and price homogeneity tests, would be necessary for a complete Error Correction specification of the demand for money but this goes beyond the scope of the paper. Subject to these caveats, nevertheless, the Johansen-type cointegration analysis suggests that the long-run stability of money demand may be maintained even in countries that have undergone a banking crisis. However, the components of the cointegrating vector vary from country to country. Inflation appeared in most countries' vectors, but in certain cases the interest rate or the exchange rate contributed more than inflation to finding a stable long-run relation between the components of money demand.

Apart from the long-run analysis, Chow tests were conducted to determine the degree of instability of money demand in the short run.<sup>20</sup> One step-up Chow tests were carried out for narrow and broad money demand under the long-run specification found to be most stable in the previously conducted tests for cointegration (Figures 11-17). The critical value for a structural break was set at 1 percent but also a more general graph of the Chow test was carried out showing whether the standard errors move within a  $2\pm$  standard errors limit. Major structural breaks should show in this latest graph as well, especially if the demand for money was generally constant in other periods (and thus the standard errors of the residuals were very small). This is the case for Lithuania's broad money demand during the crisis period, and the narrow money demand for Estonia, Lithuania, and Paraguay. For all countries but Latvia and Lithuania, broad money demand appeared to be more stable than narrow money, which confirms the previous findings of sharper movements among components of broad money.<sup>21</sup>

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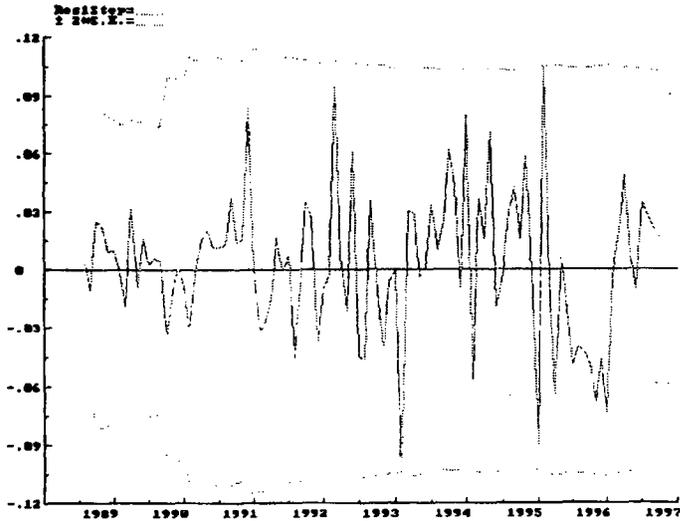
<sup>19</sup>In the case of the Philippines, this result contrasts somewhat with Tseng and Corker's findings (1991). There are several explanations for this: first, the time framework is different, in the two studies. Second, Tseng and Corker go through a full-fledged error correction analysis while this study is only based on the Johansen procedure for cointegration.

<sup>20</sup>All Chow tests were conducted taking real money as the dependent variable and inflation and real output as independent variables.

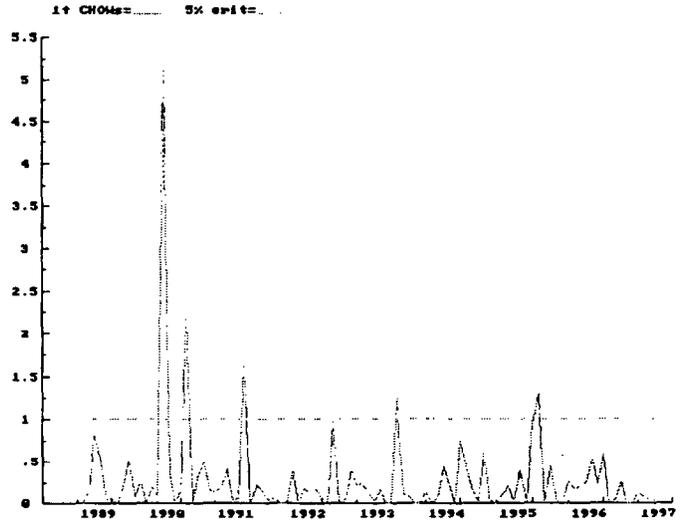
<sup>21</sup>Note that for the sake of simplicity M2 refers to broad money but it includes foreign-currency-denominated deposits.

FIGURE 11  
ARGENTINA

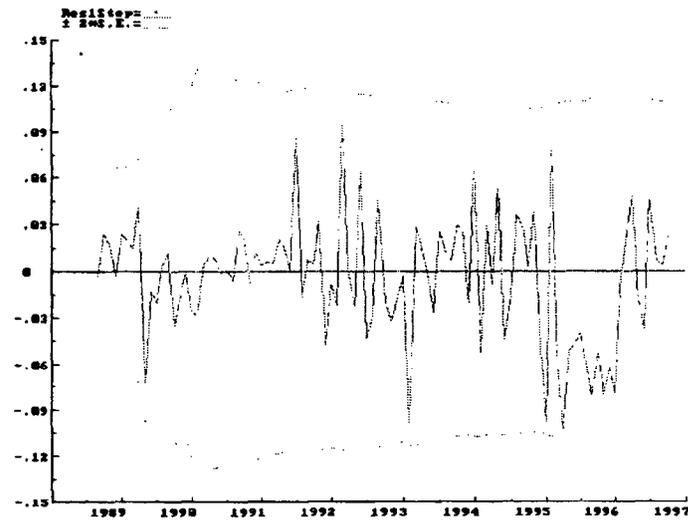
a. Chow Test for Real M1, Output, and Inflation  
(2+/- standard error)



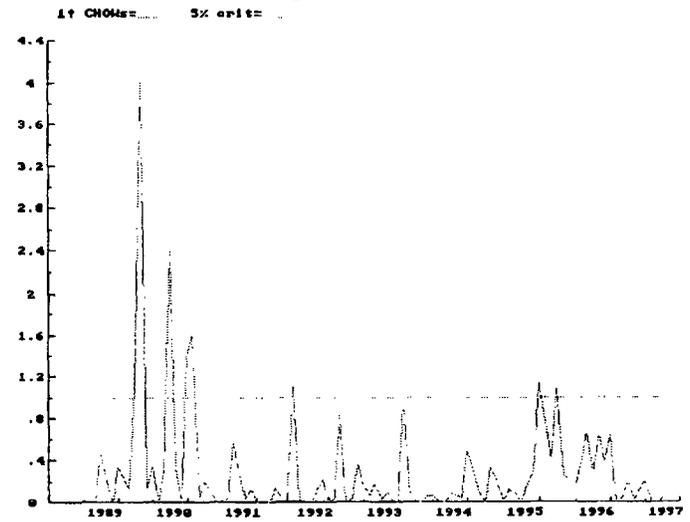
b. Chow Test for Real M1, Output, and Inflation  
(1 step-up Chow test)



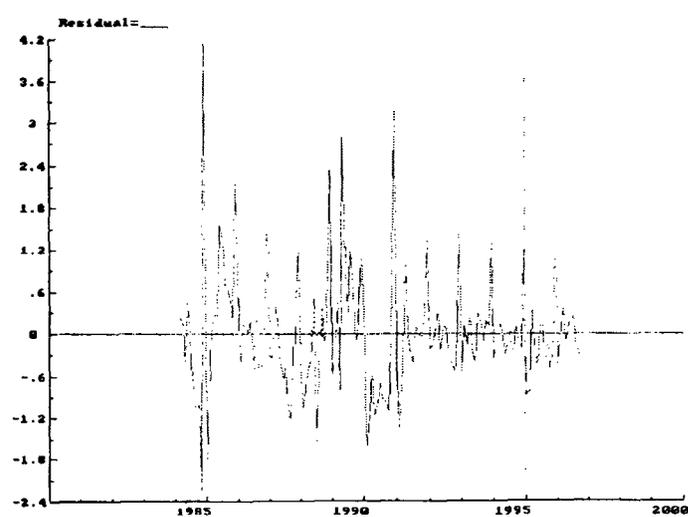
c. Chow Test for Real M2, Output, and Inflation  
(2+/- standard error)



d. Chow Test for Real M2, Output, and Inflation  
(1 step-up Chow test)



e. Forecast Residuals of Demand for Narrow Money



f. Forecast Residuals of Demand for Broad Money

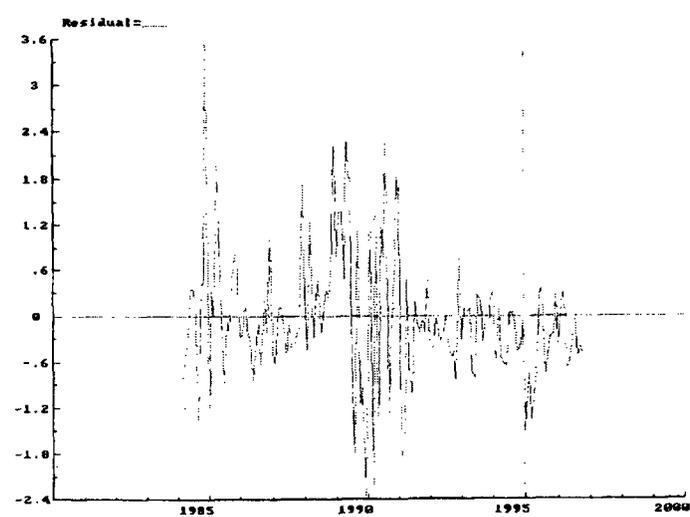
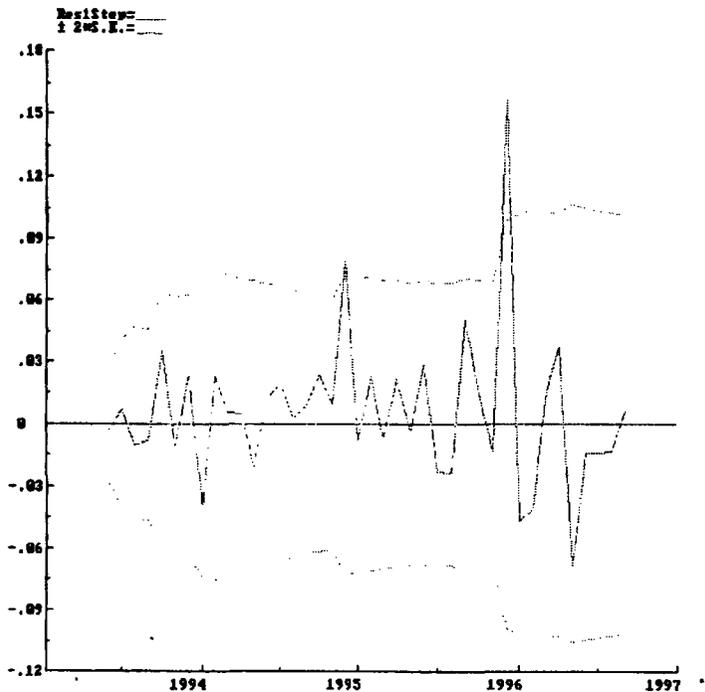
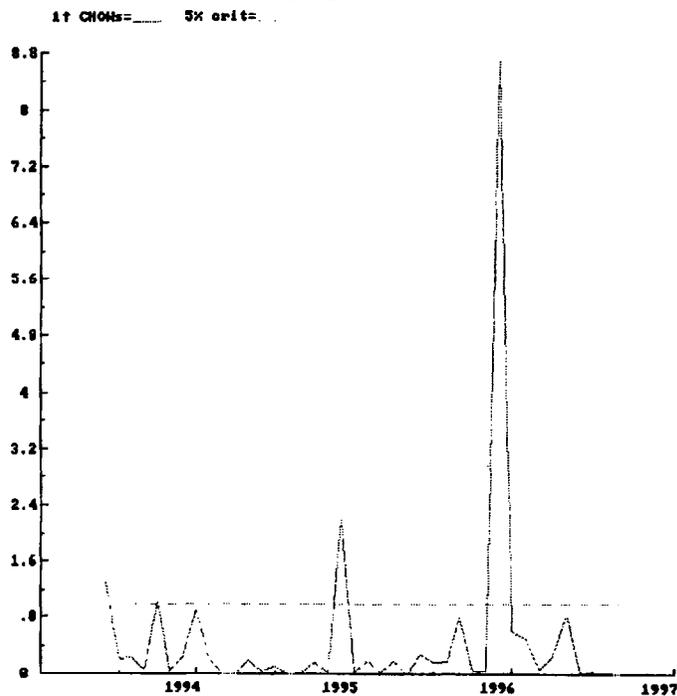


FIGURE 12  
ESTONIA

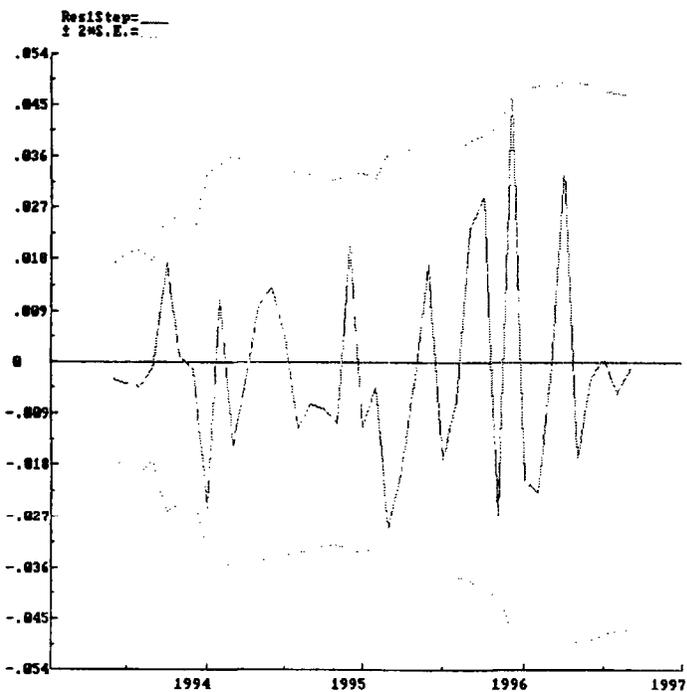
a. Chow Test for Real M1, Output, and Inflation  
(2+/- standard error)



b. Chow Test for Real M1, Output, and Inflation  
(1 step-up Chow test)



c. Chow Test for Real M2, Output, and Inflation  
(2+/- standard error)



d. Chow Test for Real M2, Output, and Inflation  
(1 step-up Chow test)

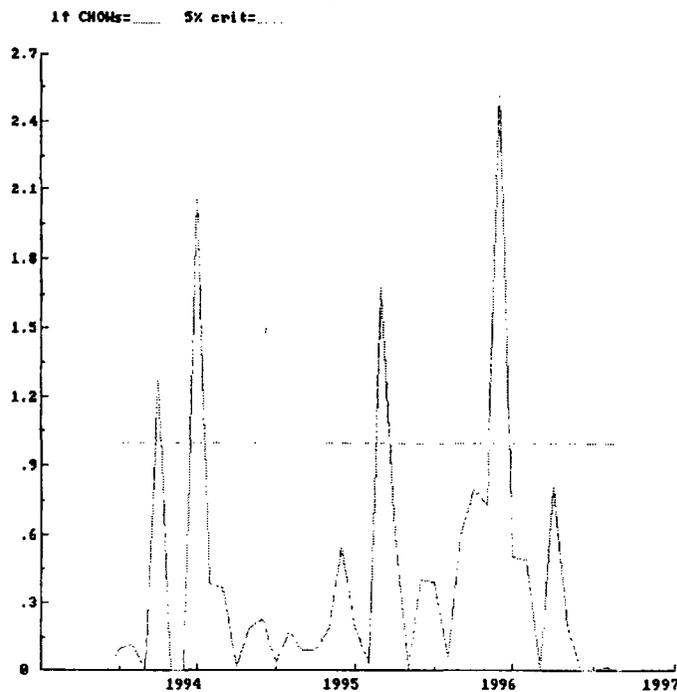
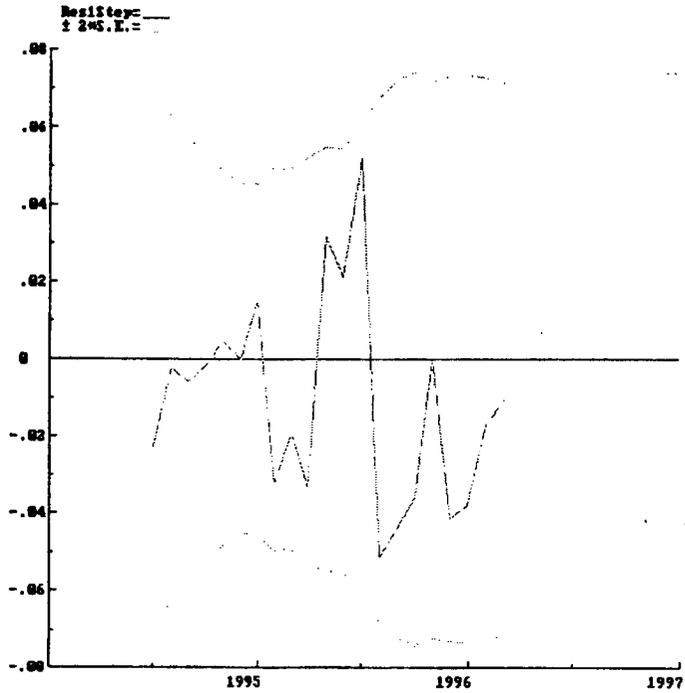
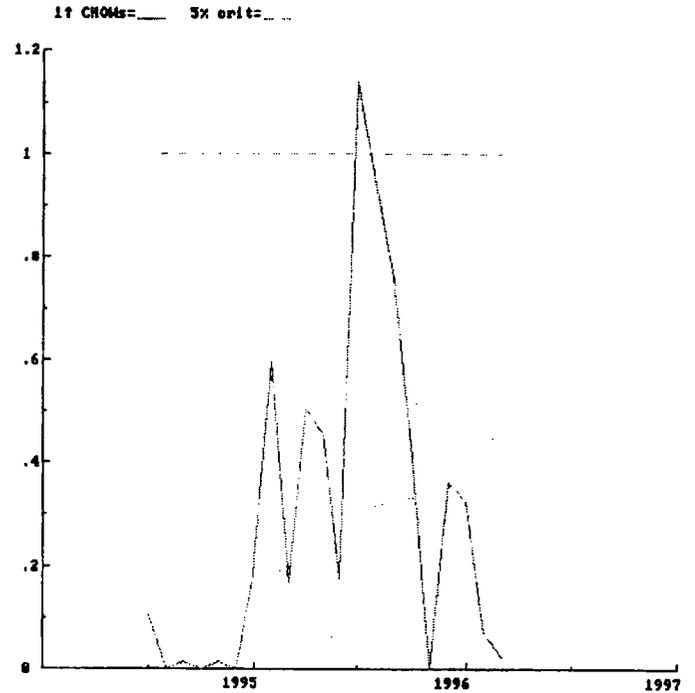


FIGURE 13  
LATVIA

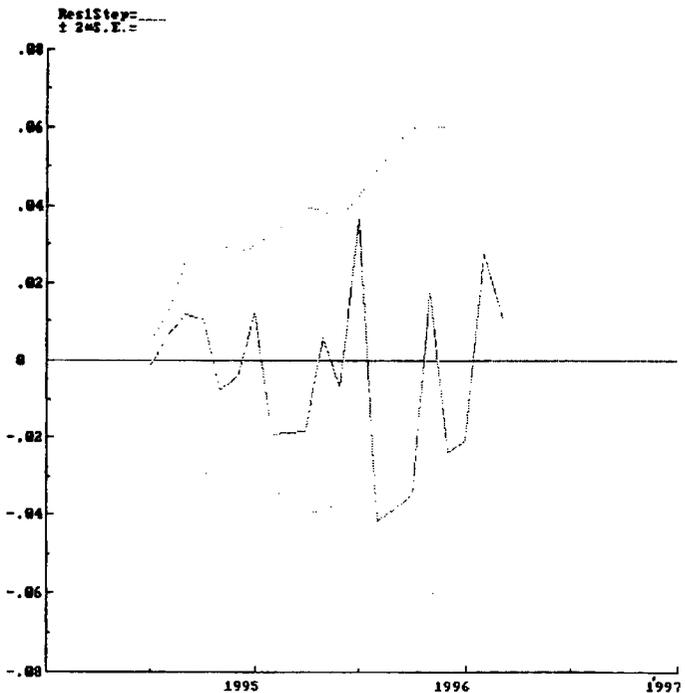
a. Chow Test for Real M1, Output, and Inflation  
(2+/- standard error)



b. Chow Test for Real M1, Output, and Inflation  
(1 step-up Chow test)



c. Chow Test for Real M2, Output, and Inflation  
(2+/- standard error)



d. Chow Test for Real M2, Output, and Inflation  
(1 step-up Chow test)

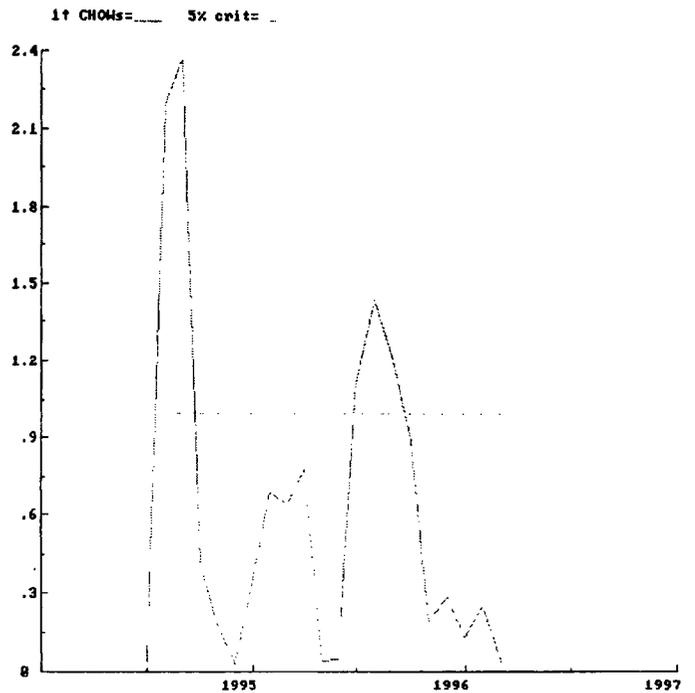
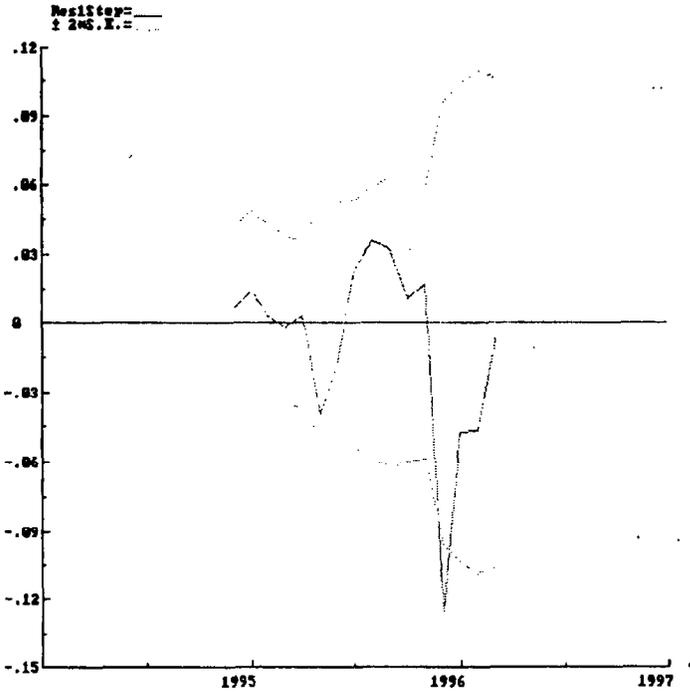
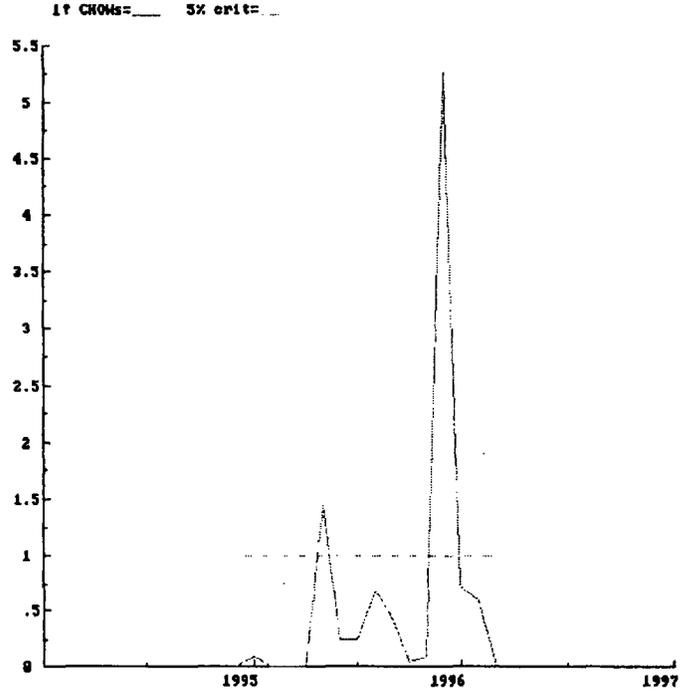


FIGURE 14  
LITHUANIA

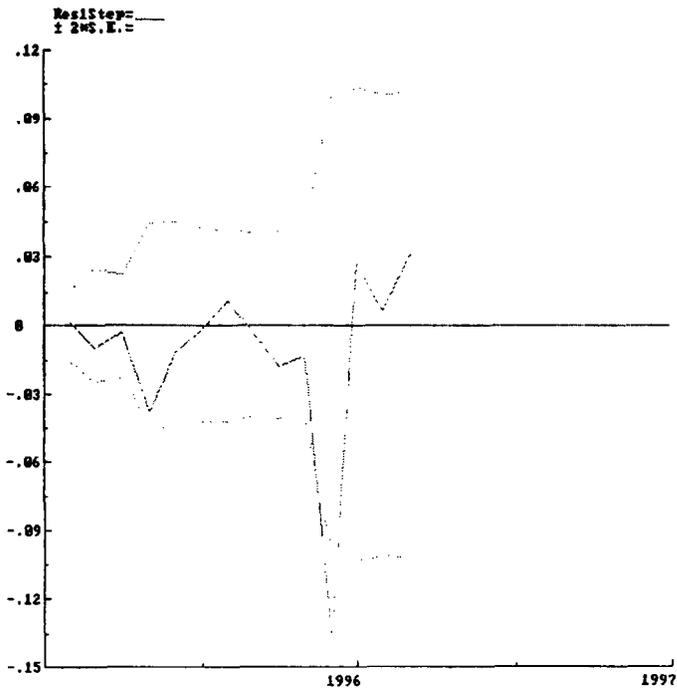
a. Chow Test for Real M1, Output, and Inflation  
(2+/- standard error)



b. Chow Test for Real M1, Output, and Inflation  
(1 step-up Chow test)



c. Chow Test for Real M2, Output, and Inflation  
(2+/- standard error)



d. Chow Test for Real M2, Output, and Inflation  
(1 step-up Chow test)

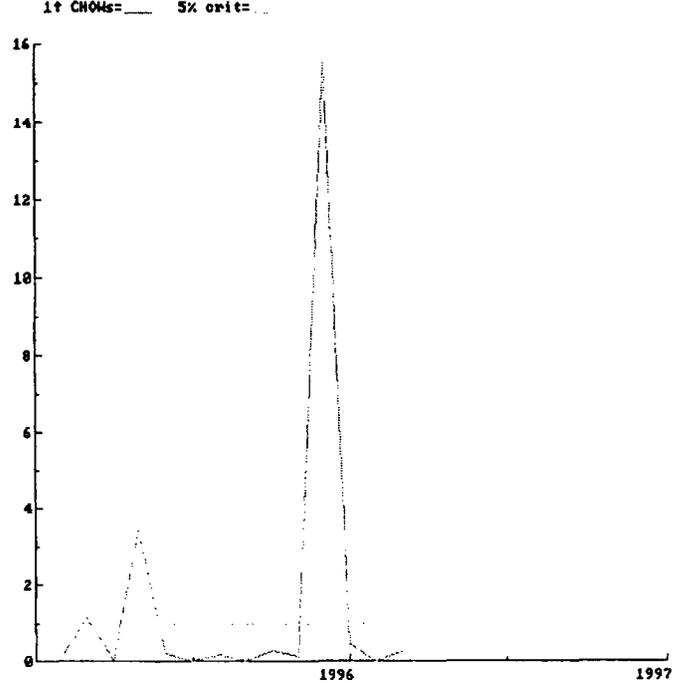
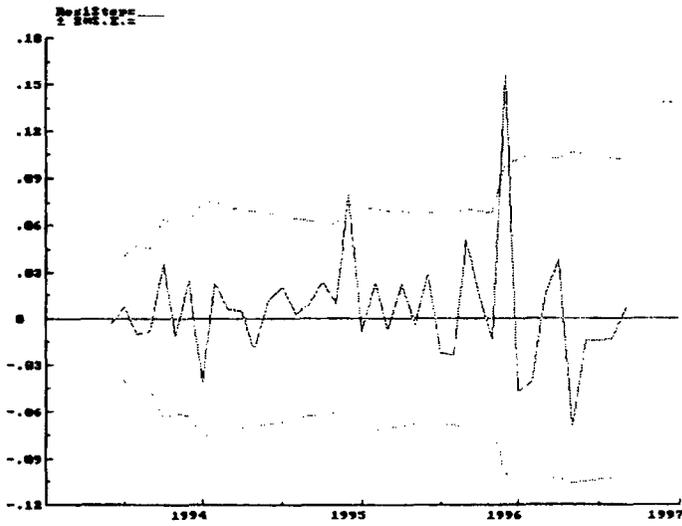
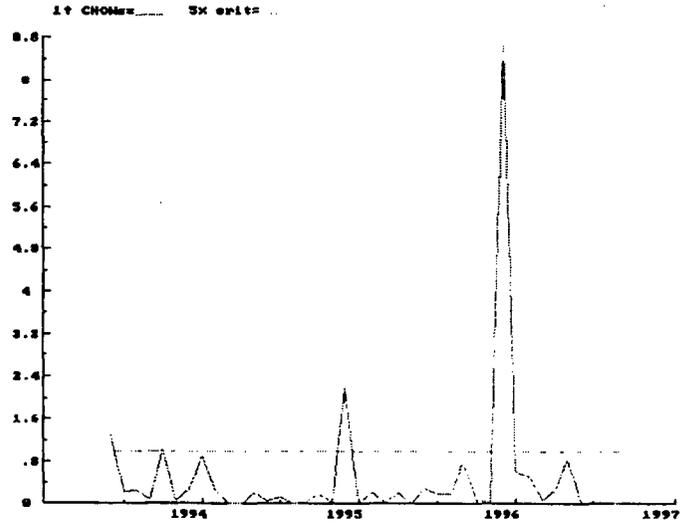


FIGURE 15  
PARAGUAY

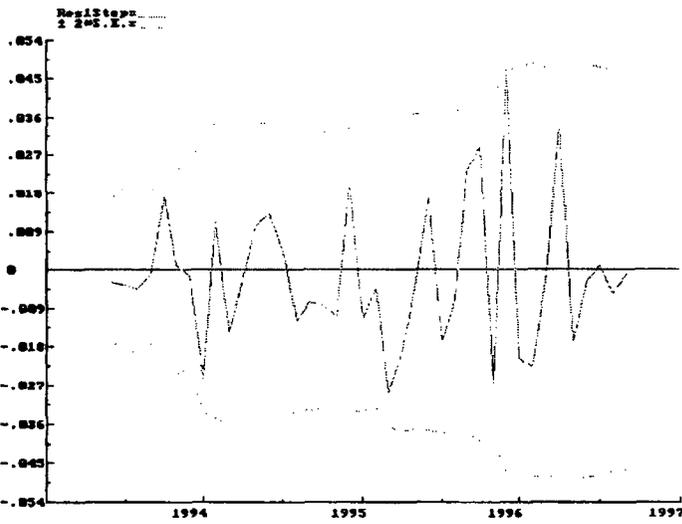
a. Chow Test for Real M1, Output, and Inflation  
(2+/- standard error)



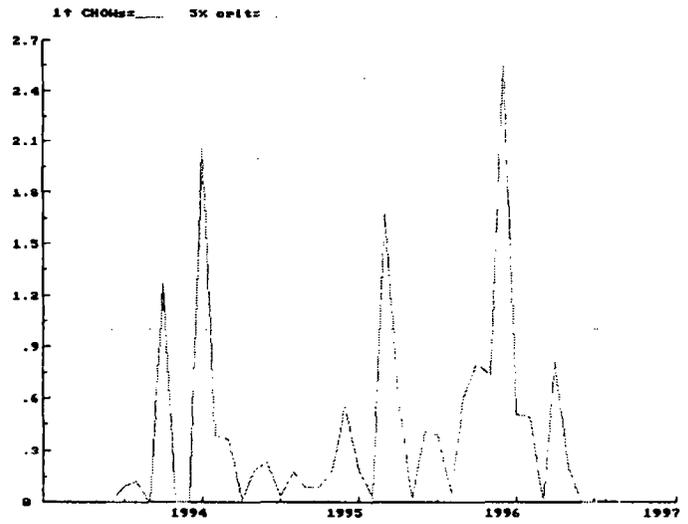
b. Chow Test for Real M1, Output, and Inflation  
(1 step-up Chow test)



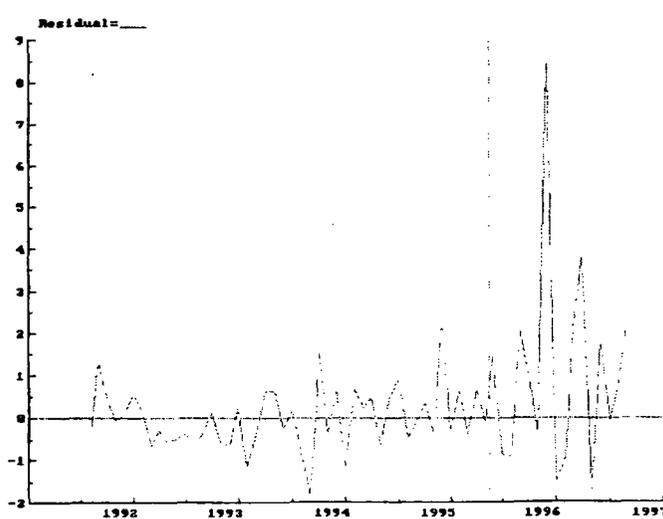
c. Chow Test for Real M2, Output, and Inflation  
(2+/- standard error)



d. Chow Test for Real M2, Output, and Inflation  
(1 step-up Chow test)



e. Forecast Residuals of Demand for Narrow Money



f. Forecast Residuals of Demand for Broad Money

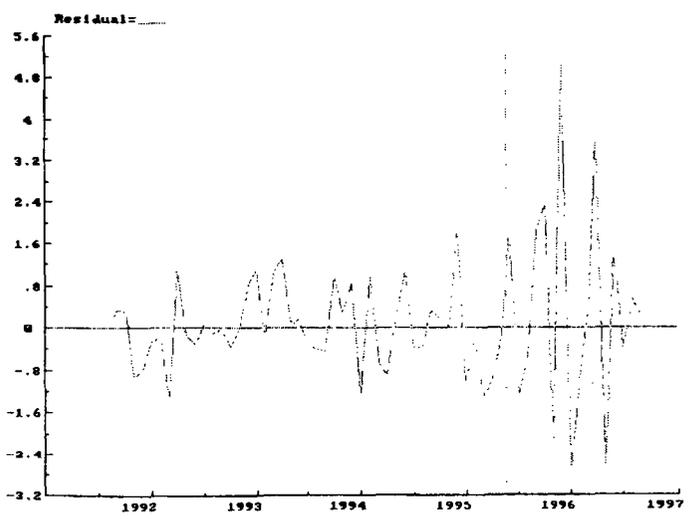
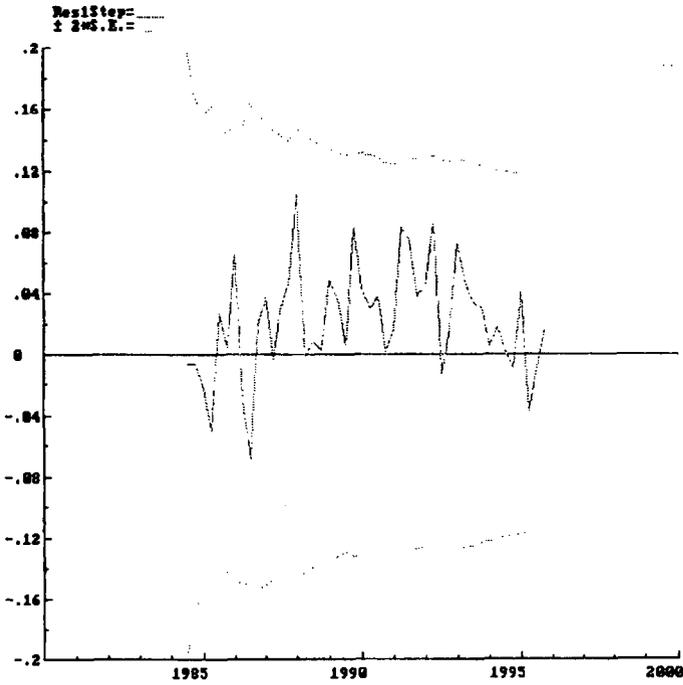
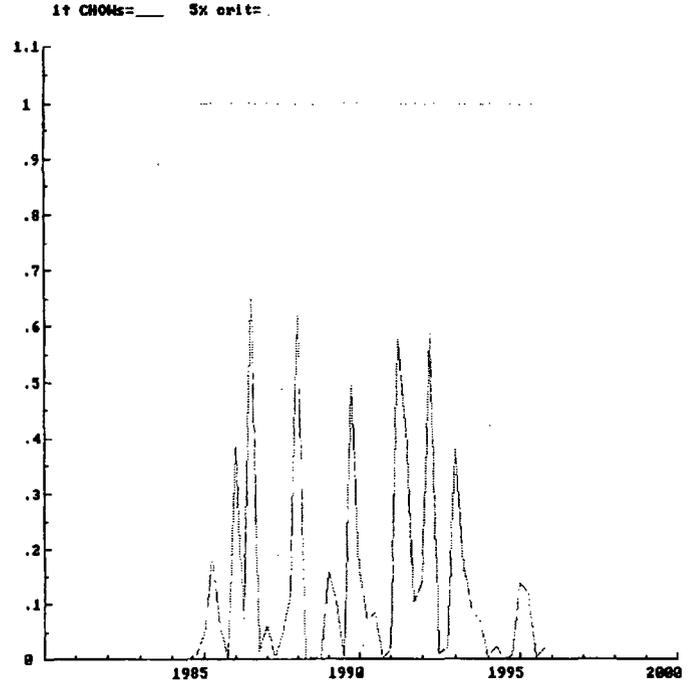


FIGURE 16  
PHILIPPINES

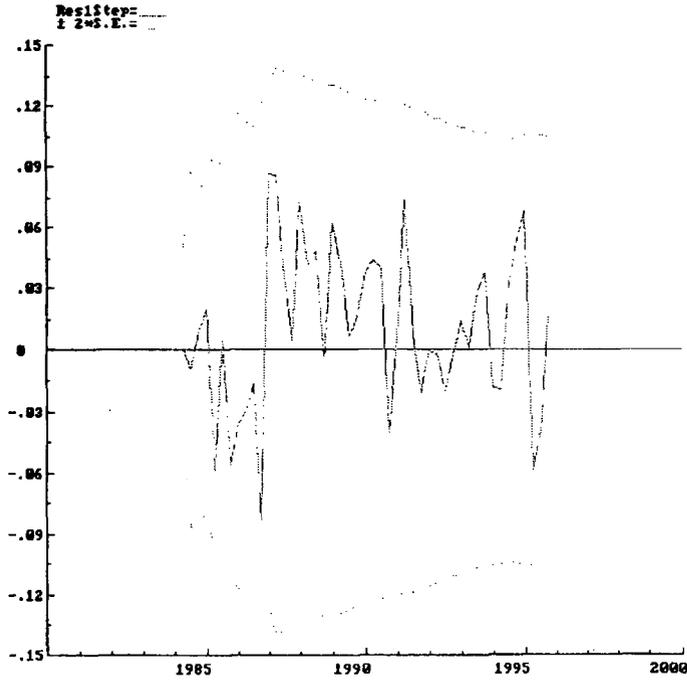
a. Chow Test for Real M1, Output, and Inflation  
(2+/- standard error)



b. Chow Test for Real M1, Output, and Inflation  
(1 step-up Chow test)



c. Chow Test for Real M2, Output, and Inflation  
(2+/- standard error)



d. Chow Test for Real M2, Output, and Inflation  
(1 step-up Chow test)

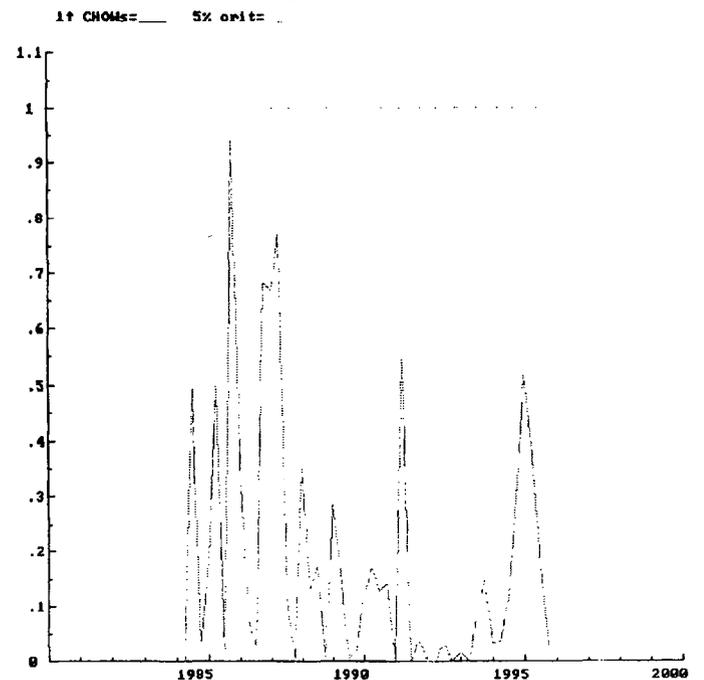
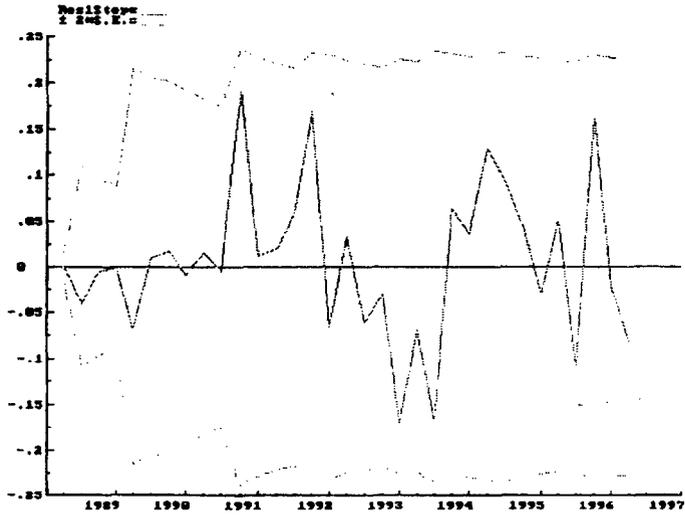
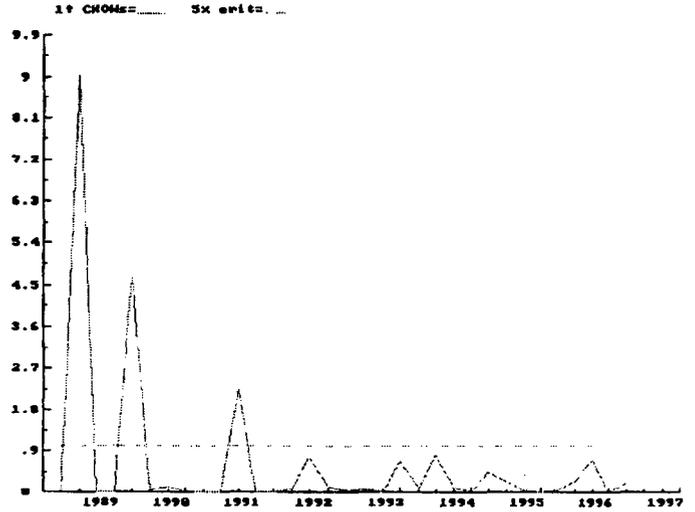


FIGURE 17  
VENEZUELA

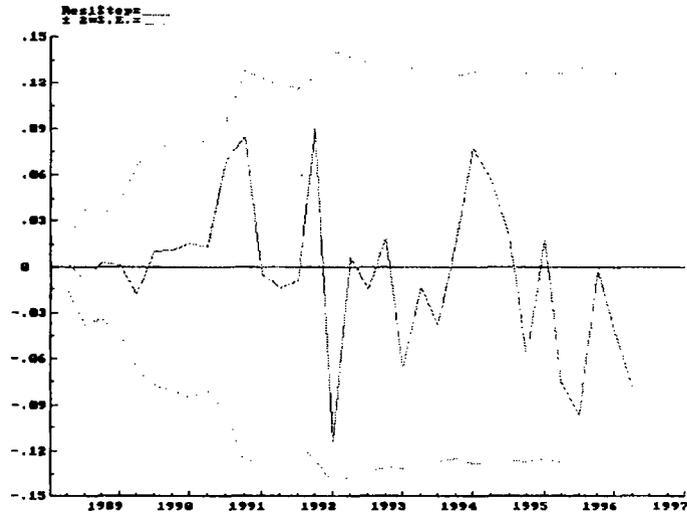
a. Chow Test for Real M1, Output, and Inflation  
(2+/- standard error)



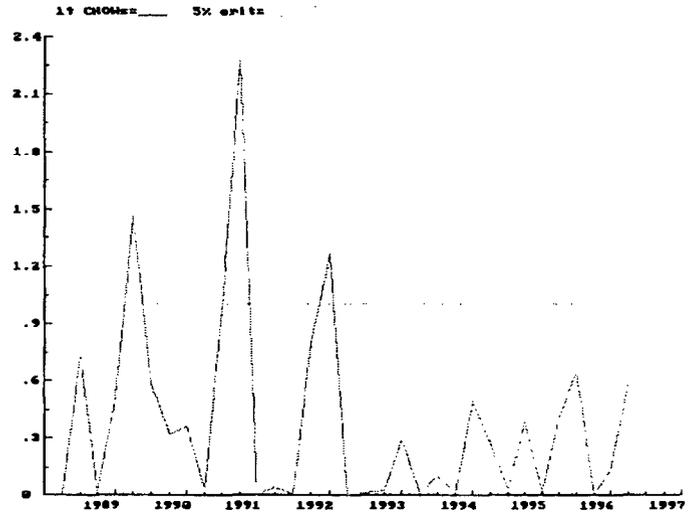
b. Chow Test for Real M1, Output, and Inflation  
(1 step-up Chow test)



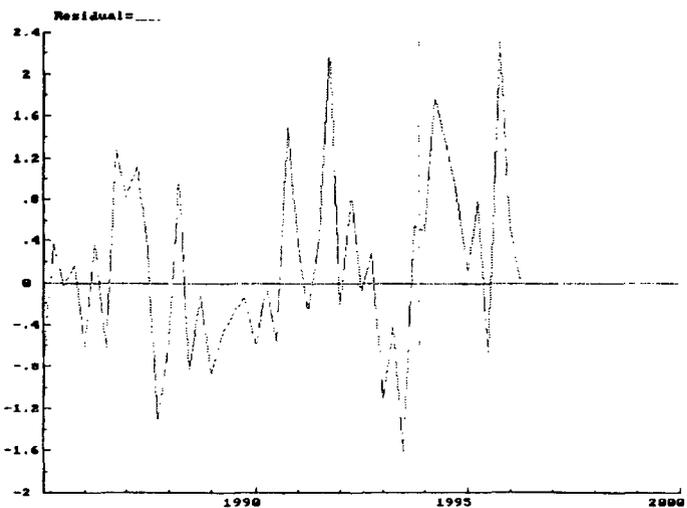
c. Chow Test for Real M2, Output, and Inflation  
(2+/- standard error)



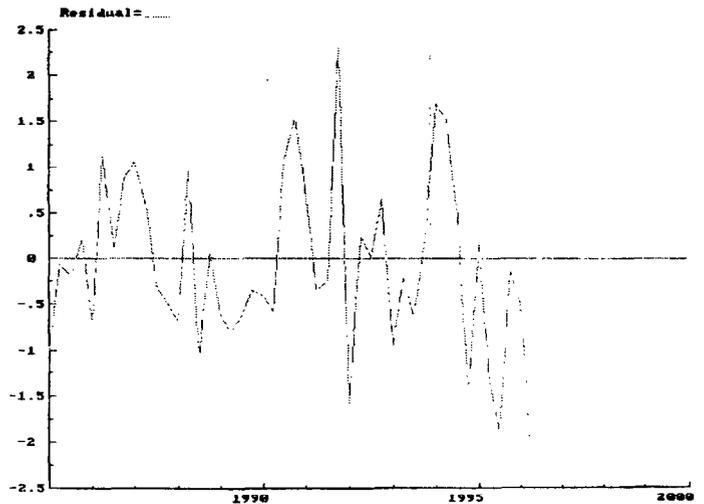
d. Chow Test for Real M2, Output, and Inflation  
(1 step-up Chow test)



e. Forecast Residuals of Demand for Narrow Money



f. Forecast Residuals of Demand for Broad Money



The one step-up Chow tests indicate that a large structural break occurred during the 1989 Argentine banking crisis, both for M1 and M2, but not during the 1995 crisis (Figures 11.b and d). In fact, forecast residuals from the beginning of the 1995 crisis have a lower standard deviation (Figures 11.e and f) than residuals during the 1989 crisis. In the case of the Baltics, one step-up Chow tests showed several periods of non parameter constancy for broad money. This point to several stages of the crisis in Estonia and Latvia (Figures 12 and 13b and d). The single and sharpest structural break was found for Lithuania's broad money, which coincides with the substantial drop in the deposit base at the onset of the crisis (Figures 14.d and 6.f). The one step-up Chow test conducted for Paraguay also indicates lack of a stable money demand relation during the crisis period (Figures 15. b and d). For the Philippines, standard errors of the residuals of broad and money demand equations decreased after the peak of the crisis and, thus, no structural break could be found in the aftermath of the crisis (Figure 16).<sup>22</sup> In the case of Venezuela, the period from 1989 to 1991 was one of major instability of the demand for money, particularly for the narrow aggregate. This increased the standard errors of the residuals so as not to be able to pick up the instability of money demand during the banking crisis, notwithstanding the sharp fall in real money (Figure 17).<sup>23</sup>

### C. Money Multiplier

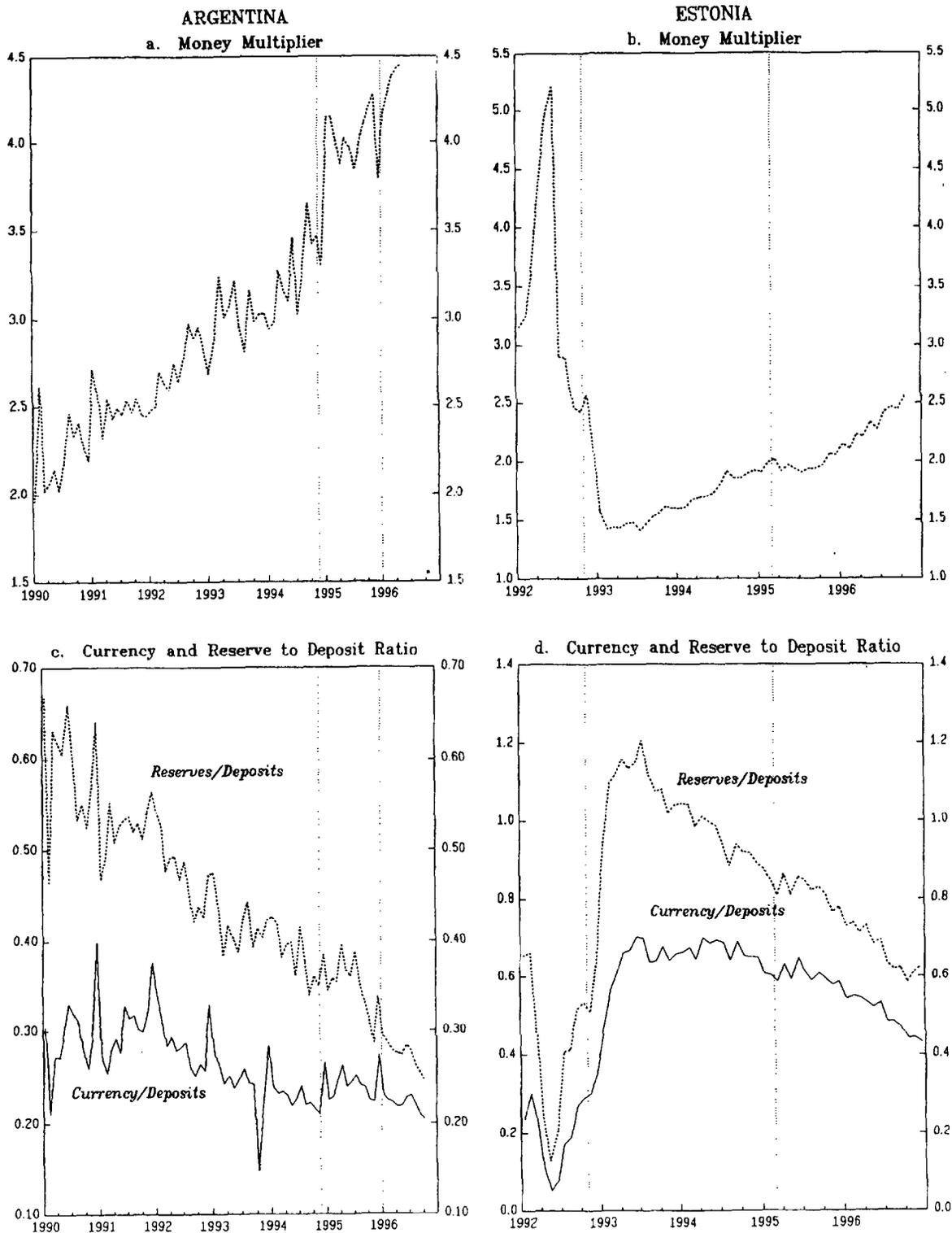
The money multiplier was affected by the banking crises in the countries reviewed. Argentina's multiplier increased prior to the crisis, mainly due to reductions in reserve requirements. After a sharp surge at the onset of the crisis, the multiplier stood at high levels and, in August 1995, another sharp increase occurred due to the substitution of reserve requirements with liquidity asset ratios (Figure 18.a). In the Baltics, particularly in Estonia, the money multiplier also rose prior to the crisis mainly because of the decline in the demand for cash after a successful stabilization and the reduction in banks' excess reserves to finance the rapid growth of credit (Figure 18.b). In Latvia and Lithuania, the rise in the multiplier prior to the bank problems was smaller than in Estonia because of the persistence of high currency holdings notwithstanding the successful price stabilization (Figures 19.a and b). The reduction in the money multiplier thereafter comes both from the increase in the demand for cash, given the perceived unsoundness of the banking system, and the accumulation of excess reserves in the banks' balance sheets because of more stringent prudential regulations on lending. As

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<sup>22</sup>For the Philippines, available data starts in 1981, right at the on-set of the crisis. Because some of the observations at the beginning of the sample are lost to conduct recursive estimates, the first residuals from the Chow test coincide with the peak of the crisis. For this reason, the standard deviations of the errors at the beginning of the test are large, precluding the finding of any structural break (Figure 16).

<sup>23</sup>It should be noted that the Chow tests conducted for Venezuela were based on lower frequency data (quarterly rather than monthly), which may not have allowed to pick up all the short-run instability of money demand during the crisis. The same thing would apply for the Philippines.

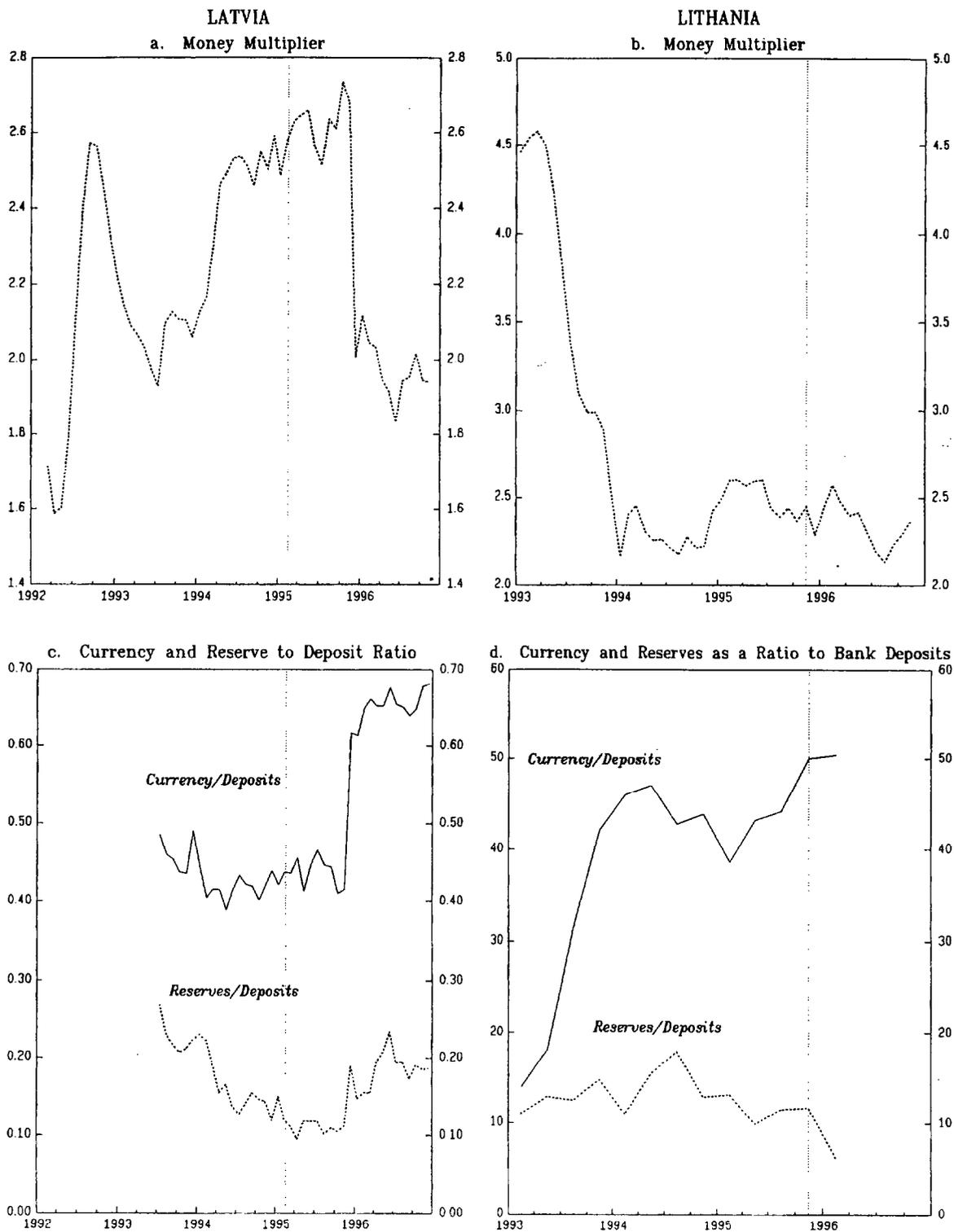
FIGURE 18  
ARGENTINA AND ESTONIA: Developments in the Money Multiplier



Source: International Financial Statistics.

FIGURE 19

LATVIA AND LITHUANIA: Developments in the Money Multiplier



Source: International Financial Statistics.

occurred with the Baltics, Paraguay, the Philippines, and Venezuela also experienced a decline in the multiplier during the crisis (Figures 20.a and b., and 21.a).

In the countries reviewed (except for Estonia) the money multiplier tended to move in the opposite direction of broad and narrow money even during the crises periods but it was less pronounced in the Philippines and Venezuela (Figures 22-23). The sharpest movements in the money multiplier occurred in Estonia.

### **Currency to deposit ratio**

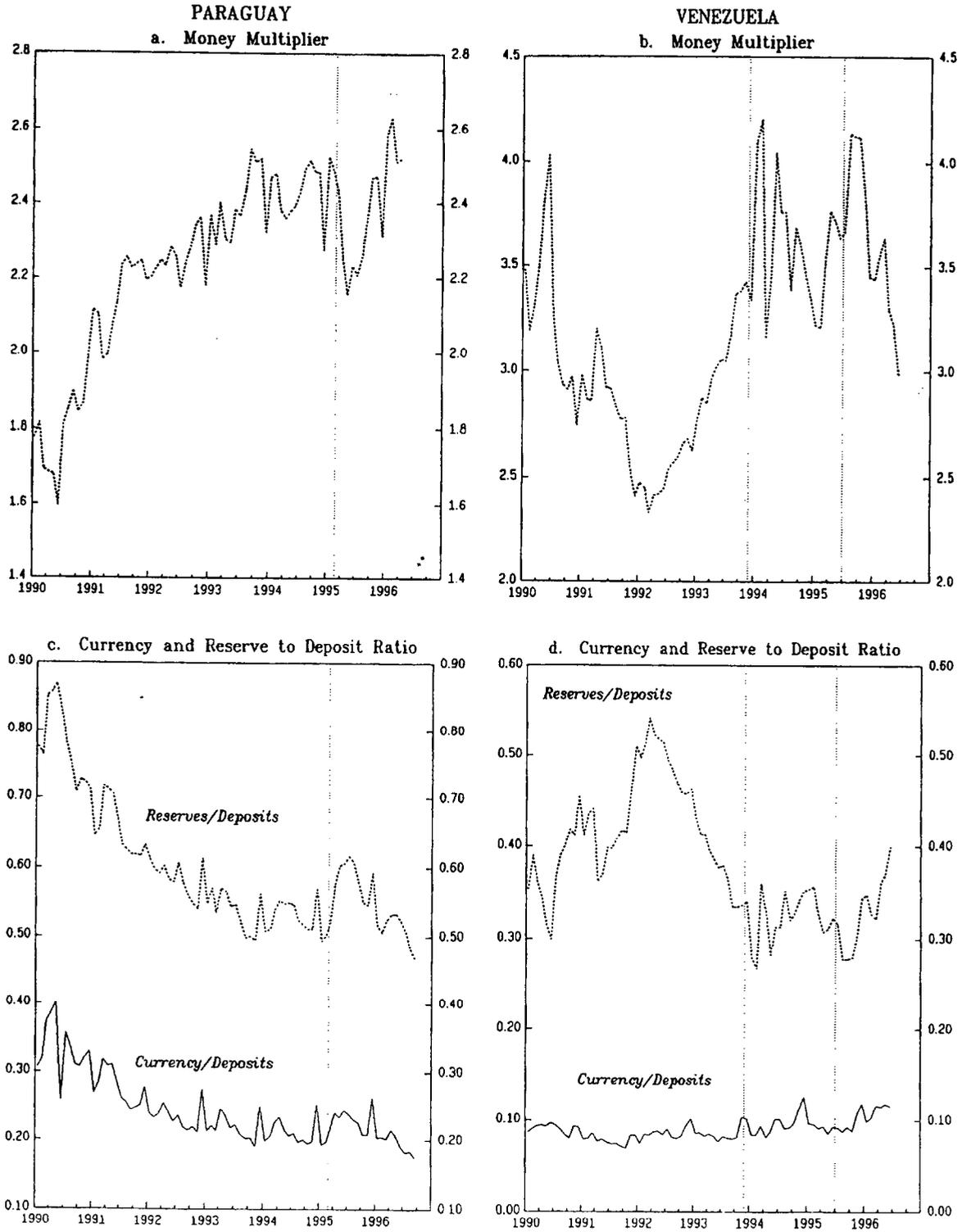
An increase in the currency to deposit ratio should be expected during a crisis as a sign of the lack of confidence in the banking system. The Baltics and the Philippines experienced a surge in that ratio. In Estonia, it rose sharply just after the bank problems started and during the major crisis developments because of the "flight out of the system," and did not return to previous levels (Figure 18.d). In Latvia, the currency to deposit ratio started to increase prior to the crisis and shot up at end-1995, after the largest commercial bank was suspended (Figure 19.c). In Lithuania, this ratio rose sharply beginning in early 1993 along with the deteriorating situation of the banking system and increased again at end-1995 with the suspension of the largest and third largest banks (Figure 19.d). The sustained rise in the ratio might reflect increased criminal activity operating mainly in cash. Apart from the precarious situation of their banking system, the surge in the Baltics' currency to deposit ratio was mainly due to these countries' adjustment to the ruble shortage that was occurring at that time.

In the Philippines the demand for currency surged on several occasions during the crisis years, particularly in mid-1983 during the balance of payments crisis (Figure 21.b). In the Latin American countries reviewed, the currency to deposit ratio remained fairly stable compared to the Baltics, which may be related to the smaller share of currency to deposits of the Latin American countries analyzed (Figures 18.c and 20.c and d). The currency to deposit ratio was even more stable than their broadest monetary aggregates, particularly in the case of Venezuela. However, the underlying reasons behind the stability of this ratio were not the same in the three countries analyzed. In Argentina, the existence of a large share of sound banks, and the substantial flight to quality, rather than flight out of the system, helped maintain the demand for currency fairly constant. In Venezuela, the demand for currency remained practically stable, not only because of the flight to quality but also because the opportunity cost of holding money rose sharply with the acceleration in inflation. In Paraguay, the crisis was never perceived as systemic by the public, hence the demand for currency followed previous years' movements.

### **Reserve to deposit ratio**

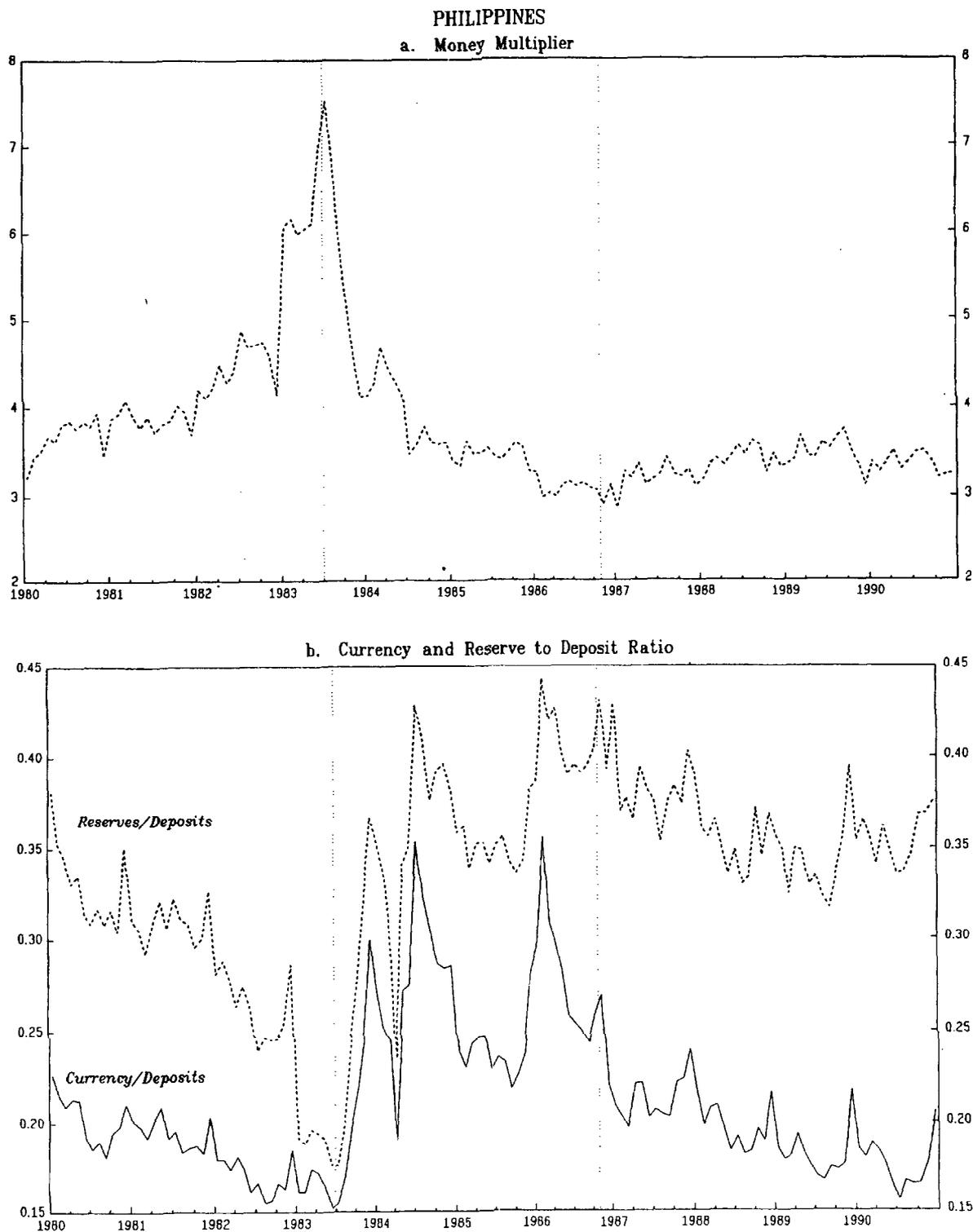
The reserve to deposit ratio shows how banks react to a crisis in terms of liquidity holdings, and also how the authorities react to a crisis in terms of the level of required reserves they consider necessary to maintain monetary control in a period of bank unsoundness. Assuming

FIGURE 20  
PARAGUAY AND VENEZUELA: Developments in the Money Multiplier



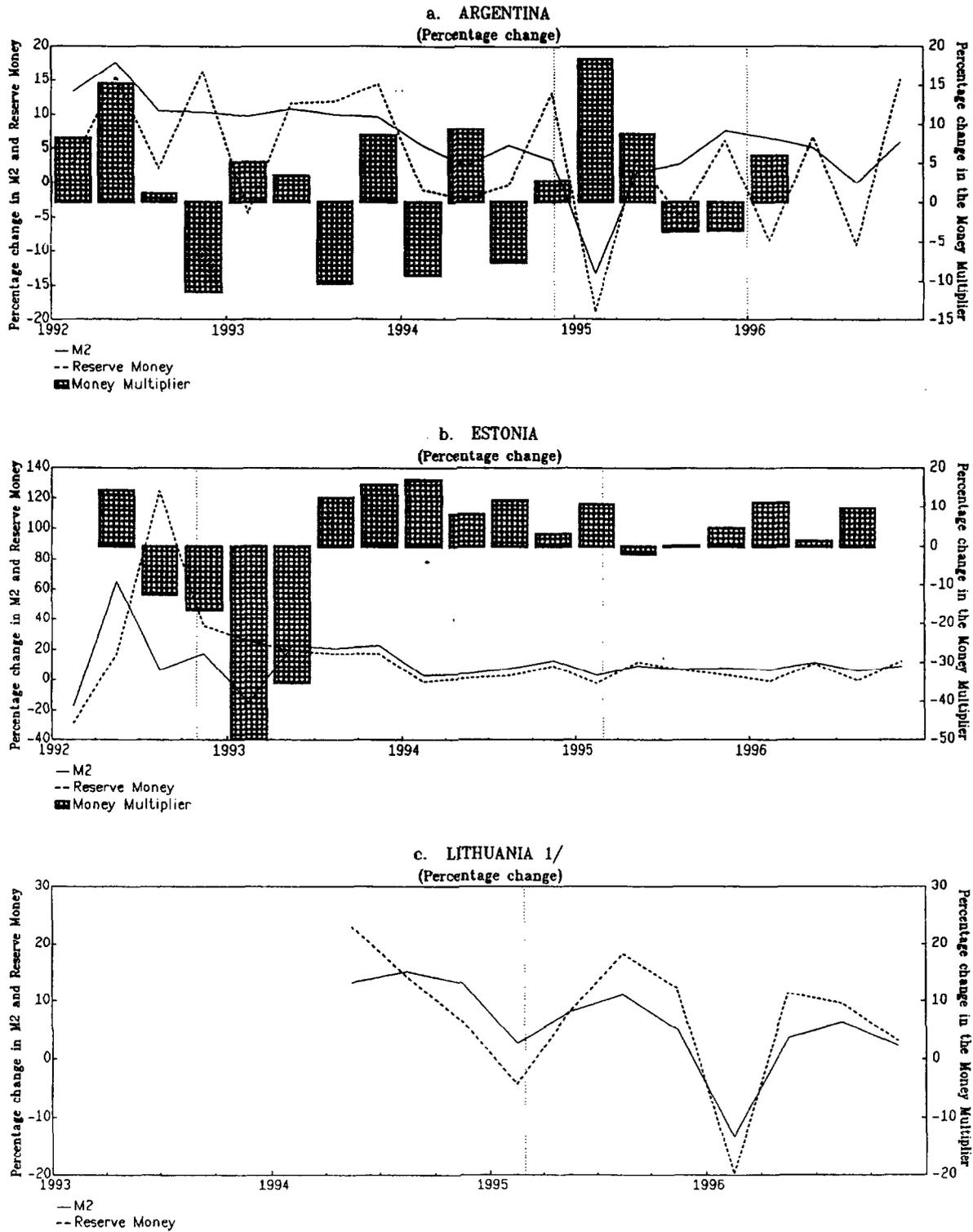
Source: International Financial Statistics.

FIGURE 21  
PHILIPPINES: Developments in the Money Multiplier



Source: International Financial Statistics.

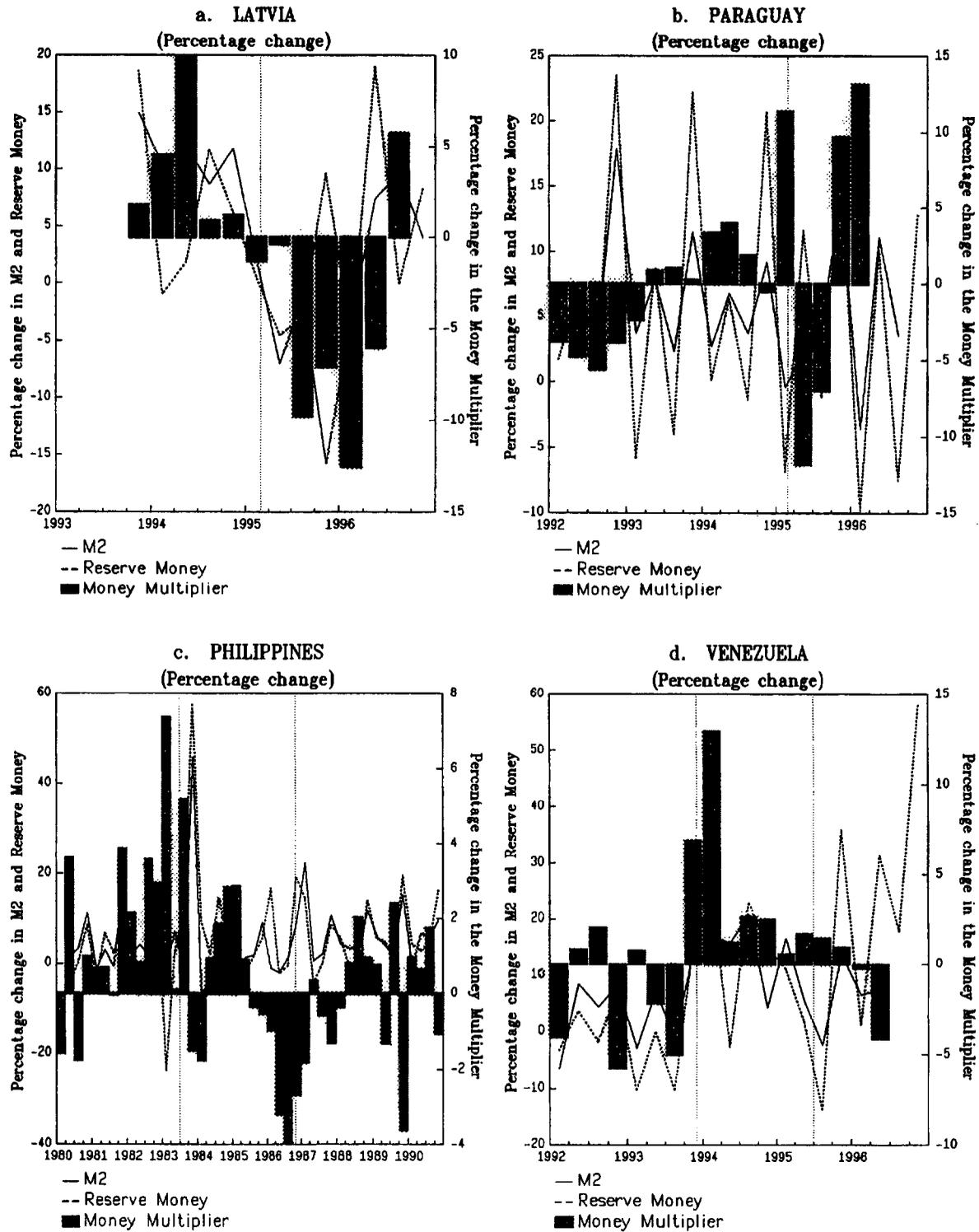
FIGURE 22: Countries under a Fixed Exchange Rate  
Liquidity, Reserve Money, and the Multiplier



Source: International Financial Statistics.

1/ The money multiplier could not be calculated for Lithuania because data for currency outside deposit money banks was unavailable.

FIGURE 23: Countries under a Flexible or Managed Exchange Rate  
Liquidity, Reserve Money, and the Money Multiplier



Source: International Financial Statistics and country authorities.

that the required level of reserves remain constant, an increasing reserve to deposit ratio would indicate banks' uncertainty, since banks have a preference to hold excess reserves in order to be able to meet potential deposit withdrawals.

In Argentina, Estonia and Latvia, the reserve to deposit ratio declined steadily during the crisis period (Figures 18.c and d, and 19.c). Argentina's decline was mainly due to reductions in the reserve requirement ratio, which was eventually replaced with liquidity requirements. In Estonia, the reserve to deposit ratio fell sharply before the crisis, probably due to the need to provision nonperforming loans, and increased again with the first signs of deposit runs. Although it is hard to tell without disaggregated data, this trend may reflect market segmentation in the holdings of reserves. The reserve to asset ratio fell steadily throughout the period of deposit runs and bank closures, in good part due to the reduction in reserve requirements. In Latvia, the reserve to deposit ratio fell when bank problems started to emerge, increasing sharply at end-1995.

In Lithuania and Paraguay, the reserve to deposit ratio remained more or less constant, although the reserves of unsound banks fell below statutory levels (Figures 19.d and 20.c). In the Philippines, this ratio rose steadily due to continuous increases in the reserve requirement ratio, which was the main tool for monetary control (Figures 21.b). In Venezuela, the reserve to deposit ratio declined substantially before the crisis and fell more sharply in December 1993 when deposit runs started (Figure 20.d). After the closure of the first bank, the reserve to asset ratio rose quickly because of the increase in excess reserves of the haven banks where funds were being deposited and the huge amounts of liquidity injected into the distressed banks. Finally, the drop in the reserve to deposit ratio in early 1995 was due to the waiver of reserve requirements given to the banks nationalized during the crisis.<sup>24</sup>

#### **D. Transmission Mechanism: Distortions in Credit and Interest Rate Channels**

Bank problems will influence both the credit and interest rate channels of monetary policy. The credit channel for policy transmission will be less effective as the demand for credit becomes price-inelastic in view of the fact that borrowers have nothing to lose and will take whatever they can be lent.<sup>25</sup> Such developments may be originated by investment or consumption booms that usually accompany financial liberalization, capital account liberalization, macroeconomic stabilization, or by the moral hazard problems stemming from a large number of nonperforming loans on the banks' balance sheets. During a period of bank

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<sup>24</sup>This occurred as a consequence of the transfer of deposits without hardly any counterpart from the banks that were nationalized during the crisis to those that were closed. The only counterpart that nationalized banks received was a promise by the government that performing assets would be transferred to those banks. Given the nationalized banks' distress situation, the central bank allowed them to ignore reserve requirements on a temporary basis.

<sup>25</sup>See Stiglitz-Weiss (1992).

unsoundness credit availability will be more dependent on bank capitalization, because of the difficulties of obtaining resources in the interbank market, and less responsive to policy instruments.

The interest rate channel will be hampered by distressed banks because of their inability to adjust their lending in response to monetary policy actions, and by the reduced sensitivity to, and predictability of, responses to interest rates by banks' customers. Credit demand and bank lending also become less sensitive to interest rates when banks permit borrowers to capitalize interest payments or when borrowers do not expect to repay loans.

The transmission mechanism is bound to change further as a consequence of the banking crisis itself. First, banking crises will bring about changes in the country's financial structure, in terms of the number of banks and share of total assets and deposits. This happened in all countries reviewed but in a larger proportion in Estonia, Latvia, the Philippines and Venezuela. Second, banking crises tend to increase the variability of interest rates, as was the case with the Latin American countries analyzed and the Philippines (Figures 24, 26, and 27). In such a situation, banks may look at quantity of credit demanded rather than at interest rates. On the supply side, loan consolidation, through the introduction of stricter provisioning requirements, and bank recapitalization may also complicate the understanding of the transmission mechanisms, since banks will become interest inelastic when providing credit.

### **Private credit developments**

In most of the countries reviewed private credit declined during the crises. In some cases, such as Argentina and Venezuela, private credit fell only when the banking crisis erupted, while in the Baltics and the Philippines, it started to fall before the crisis. The decline in private credit during a crisis may be related to deposit runs, which, if not offset by monetary policy, will force a contraction of total assets and total lending. Figures 3-6 show that sharp falls in the deposit base were usually accompanied by a similar reduction in credit. However, in Estonia, Latvia and Venezuela, there were times during the crisis when credit fell more steeply than deposits. Other reasons for the fall in credit were the tightening of capital requirements limits on banks' lending capacity, and the loss of credit information when banks were closed, as was the case in Argentina. In the latter regard, the Argentine experience also shows that the concentration of bank activity in the aftermath of a crisis, together with the reduction in consumer confidence, tends to reduce the availability of credit.<sup>26</sup>

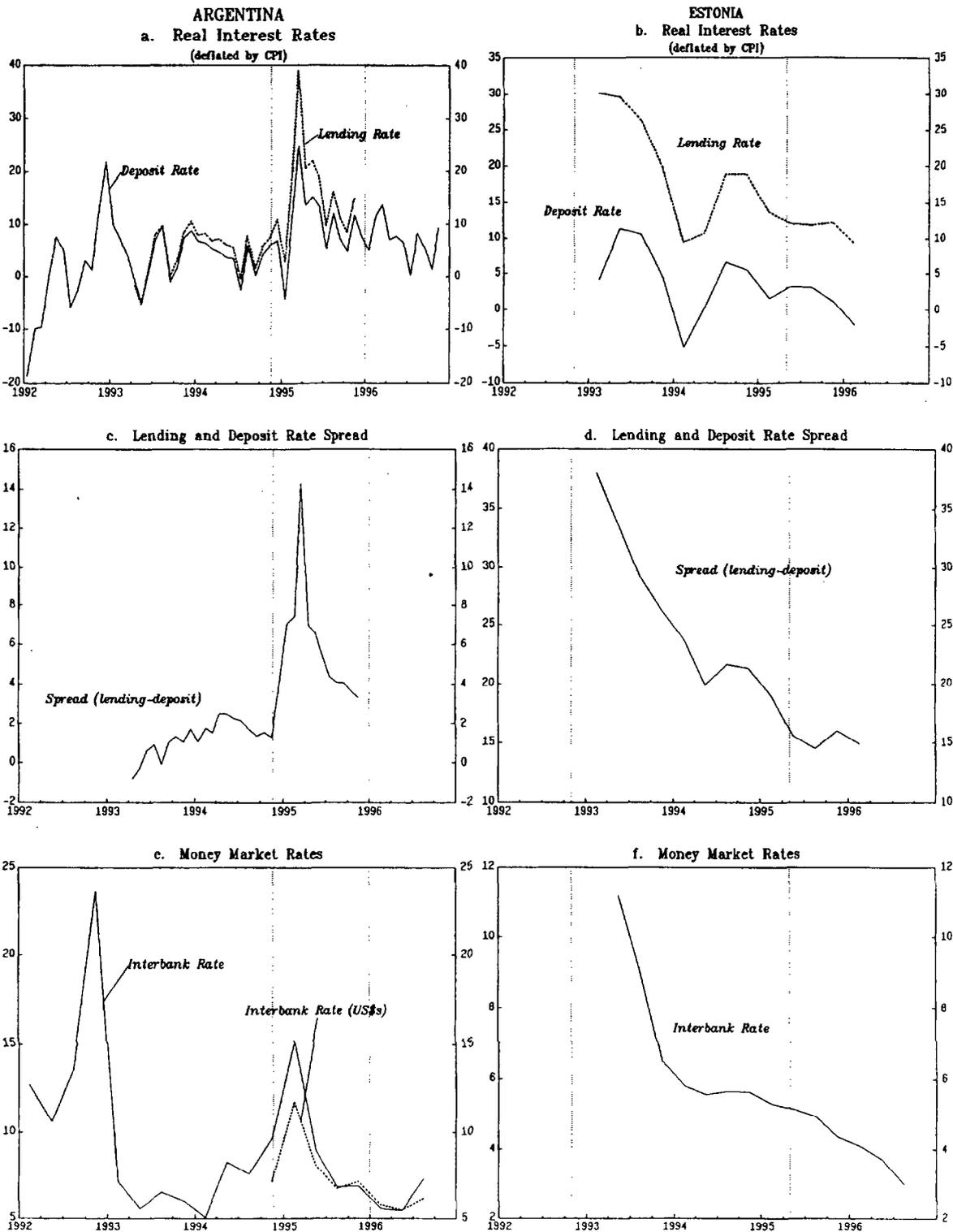
Credit will also fall in distressed banks as nonperforming loans mount and capital is being depleted. Sound banks will tend to become more conservative, thereby reducing the amount of credit offered. This is especially the case if banks have other investment possibilities, particularly government paper, as happened in Venezuela. Finally, the demand for credit may also fall temporarily if the banking crisis is accompanied by high real interest rates and

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<sup>26</sup> See, Catão (1996), Cañonero (1996) and Machinea (1995).

FIGURE 24

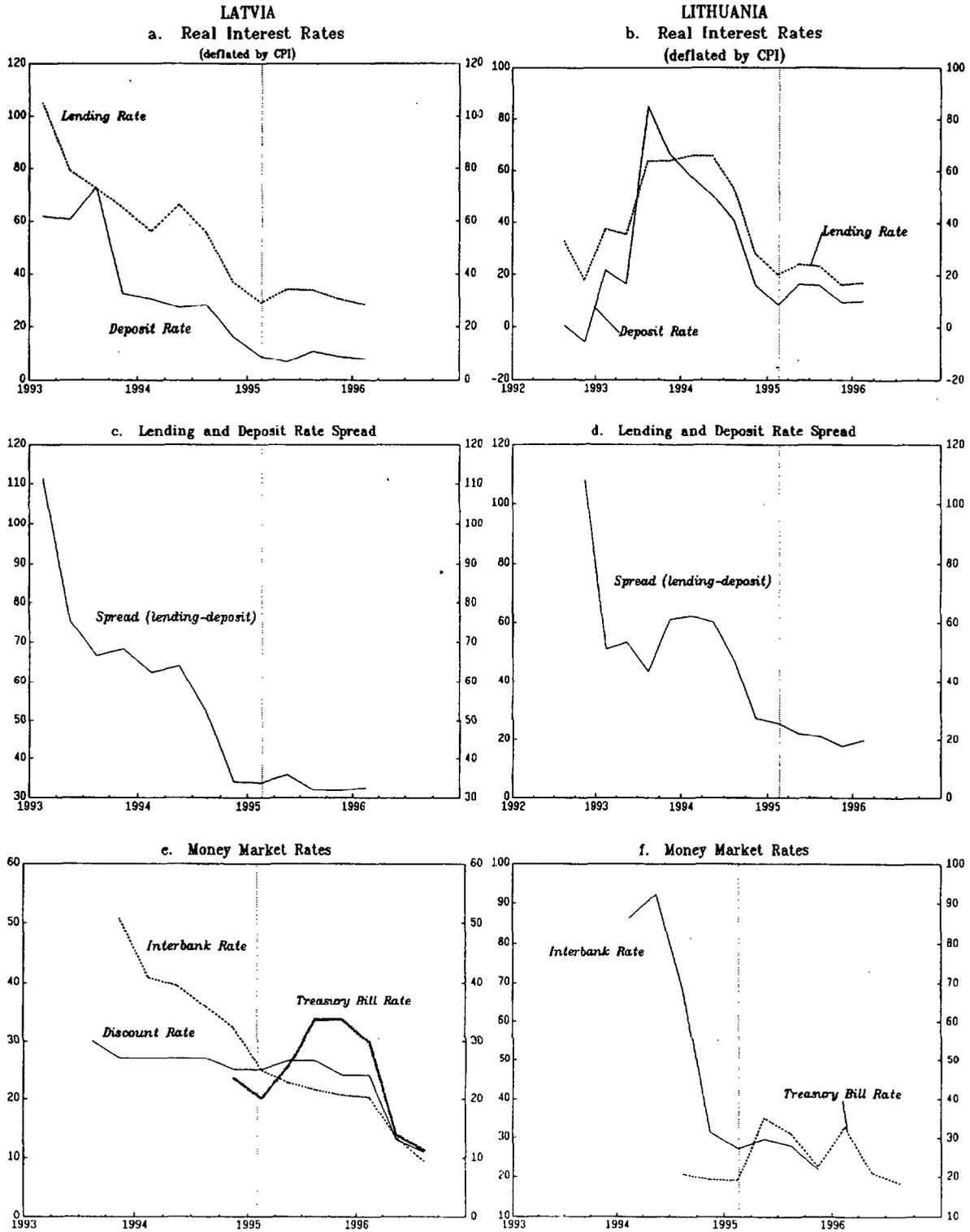
ARGENTINA AND ESTONIA: Interest Rate Developments



Sources: International Financial Statistics and staff estimates.

FIGURE 25

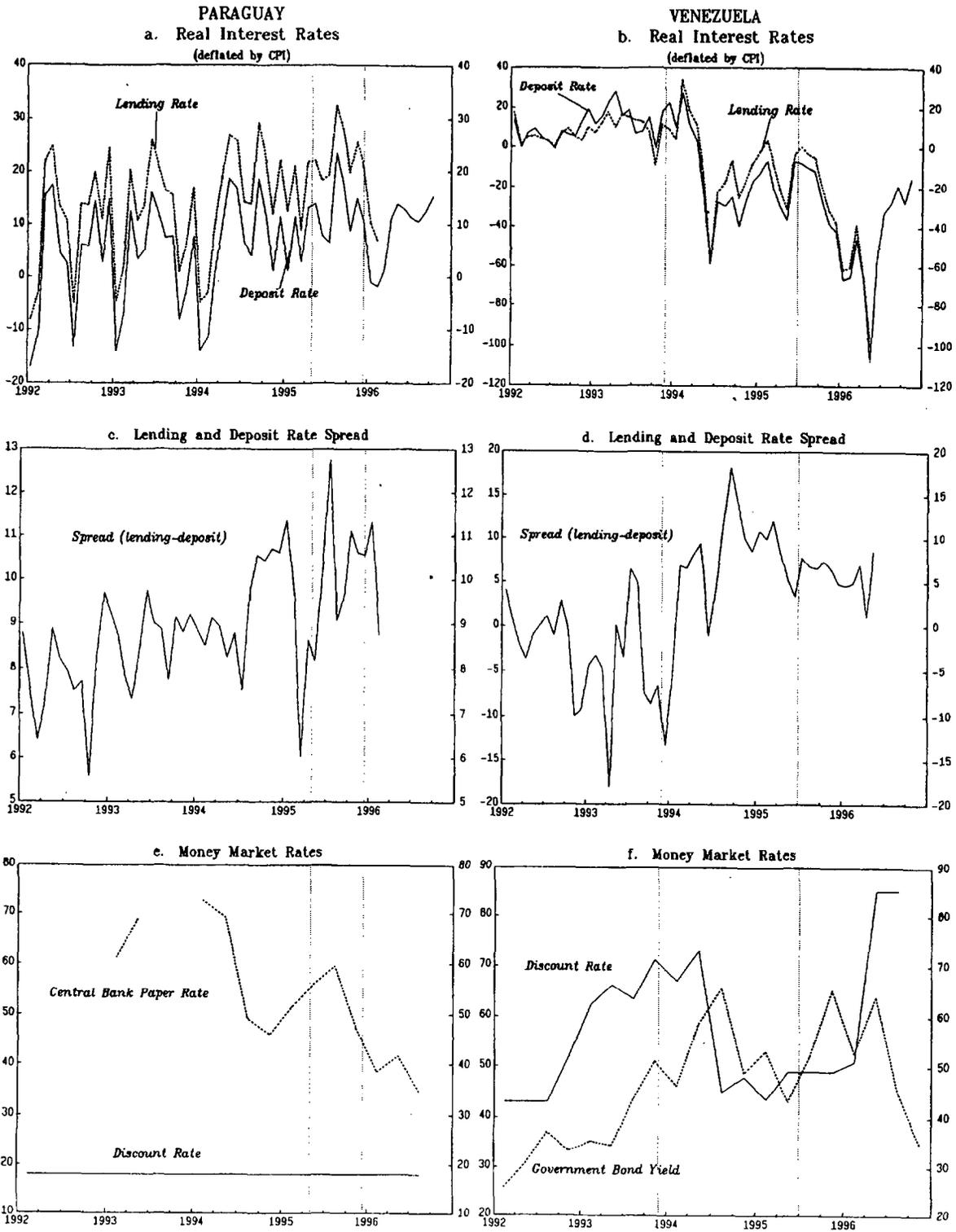
LATVIA AND LITHUANIA: Interest Rate Developments



Source: International Financial Statistics and staff estimates.

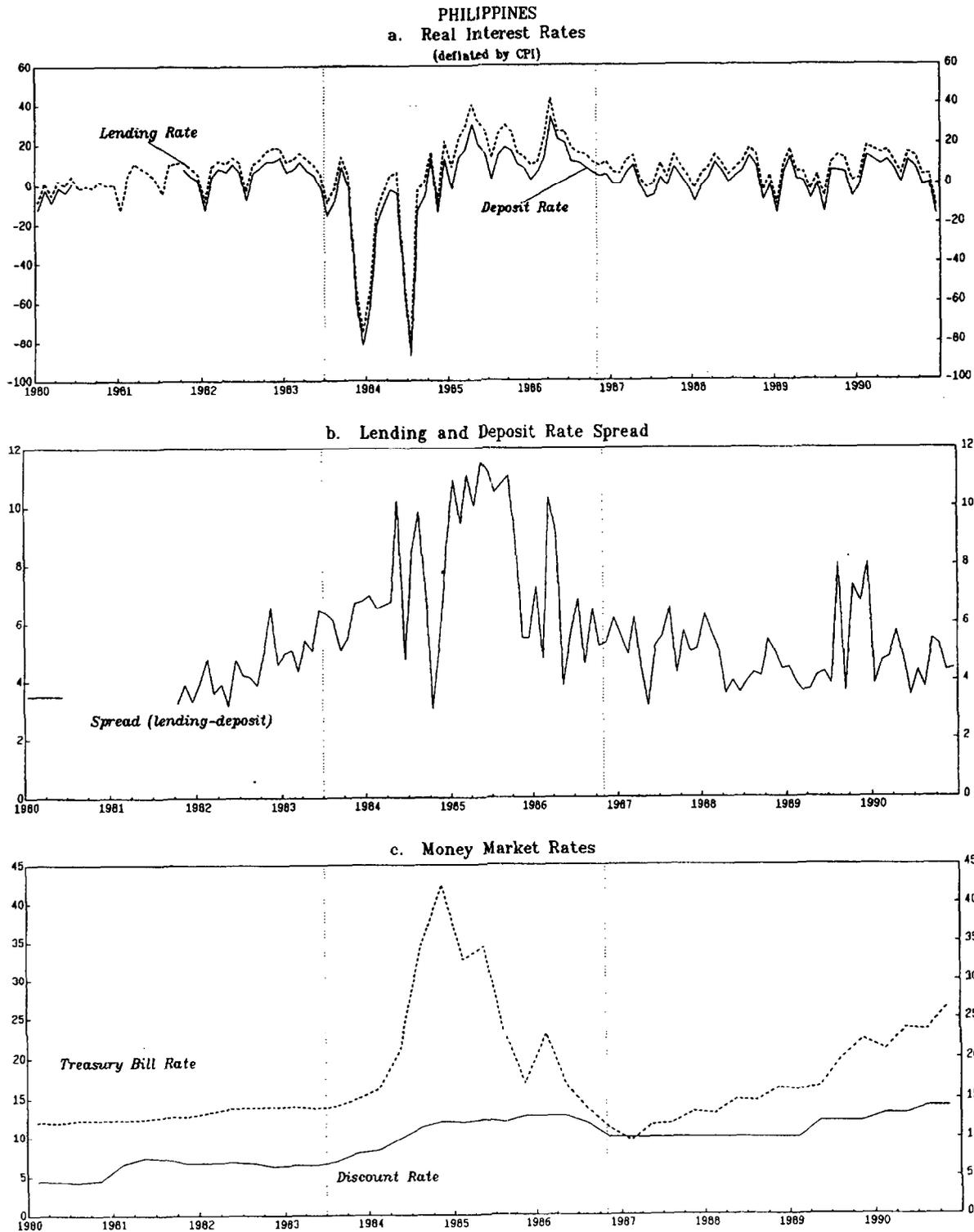
FIGURE 26

PARAGUAY AND VENEZUELA: Interest Rate Developments



Source: International Financial Statistics.

# FIGURE 27 PHILIPPINES: Interest Rate Developments



Source: International Financial Statistics.

economic recession. The decline in private credit in Argentina, the Philippines and Venezuela was more related to the banks' conservative behavior and the closure of a large number of institutions than to the stance of monetary policy.

### **Interest rate developments**

Real interest rate developments during banking crisis varied widely from country to country (Figures 24-27). In the Latin American countries, real interest rates increased sharply at the onset of the crisis and remained positive in real terms except for Venezuela. In that country, the large amounts of liquidity injected into the distressed banking system were not sterilized completely and allowed sound banks to push down real interest rates to very low levels. The sharp fall in real interest rates was also related to the surge in inflation that accompanied the banking crisis (Figure 26). The Baltics did not undergo an increase in real interest rates during the crisis, probably because they were coming down from very high levels before the crisis started (Figures 24 and 25). Interest rate spreads widened for all countries reviewed, except for the Baltics (Figures 24-27.c and d).<sup>27</sup> The reasons for the widening of the spread were generally a combination of increased risks of default, high operating costs, and a large stock of nonperforming assets in the banks' portfolios. In the Baltic countries, the strengthening of rules for loan-loss provisioning contributed to the still large, even if decreasing, spreads before the crisis. In the Latin American countries reviewed, where the banking systems were highly segmented, spreads varied largely between sound and unsound banks. Sound banks, flooded with new deposits, could widen their spreads by lowering the deposit rate. Problem banks instead, tended to raise deposit rates in order to attract more funds so that they could continue to operate.

#### **E. Signal Variables: Interbank Interest Rates and Level of Excess Reserves**

Market segmentation between sound and unsound banks makes interest rate price signals more difficult to interpret, since conditions in the interbank may reflect the distressed situation of certain banks rather than the overall stance of monetary policy. Also, differences in the institutional characteristics of the countries and their financial system will influence changes in signal variables.

The only country in the sample analyzed that operated under a currency board arrangement and had a relatively developed interbank market was Argentina which experienced sharp increases in interbank rates. Although the surge was higher in interbank rates in pesos, dollar rates increased also (Figure 24.e). These developments were to be expected because of the important role of interest rates under a CBA, as a natural mechanism to restore macroeconomic equilibrium after capital outflows. In the case of Estonia and Lithuania, the fact that the money markets were less developed, compared to Argentina, may have impeded

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<sup>27</sup> The latter is related to the extremely high spreads that existed before bank unsoundness specially in Latvia and Lithuania, where they hovered in a range of 40 to 60 percentage points.

such interest rate developments (Figures 24.f and 25.e and f). Interbank interest rates may also be distorted by the segmentation of the interbank market (Table 7). Such segmentation is more likely to occur in countries with a large share of foreign banks, such as Argentina and Paraguay, these banks typically will become safe havens. At the same time, these banks tend to be reluctant to lend to domestic distressed banks since they will be less dependent on the central bank's moral suasion.

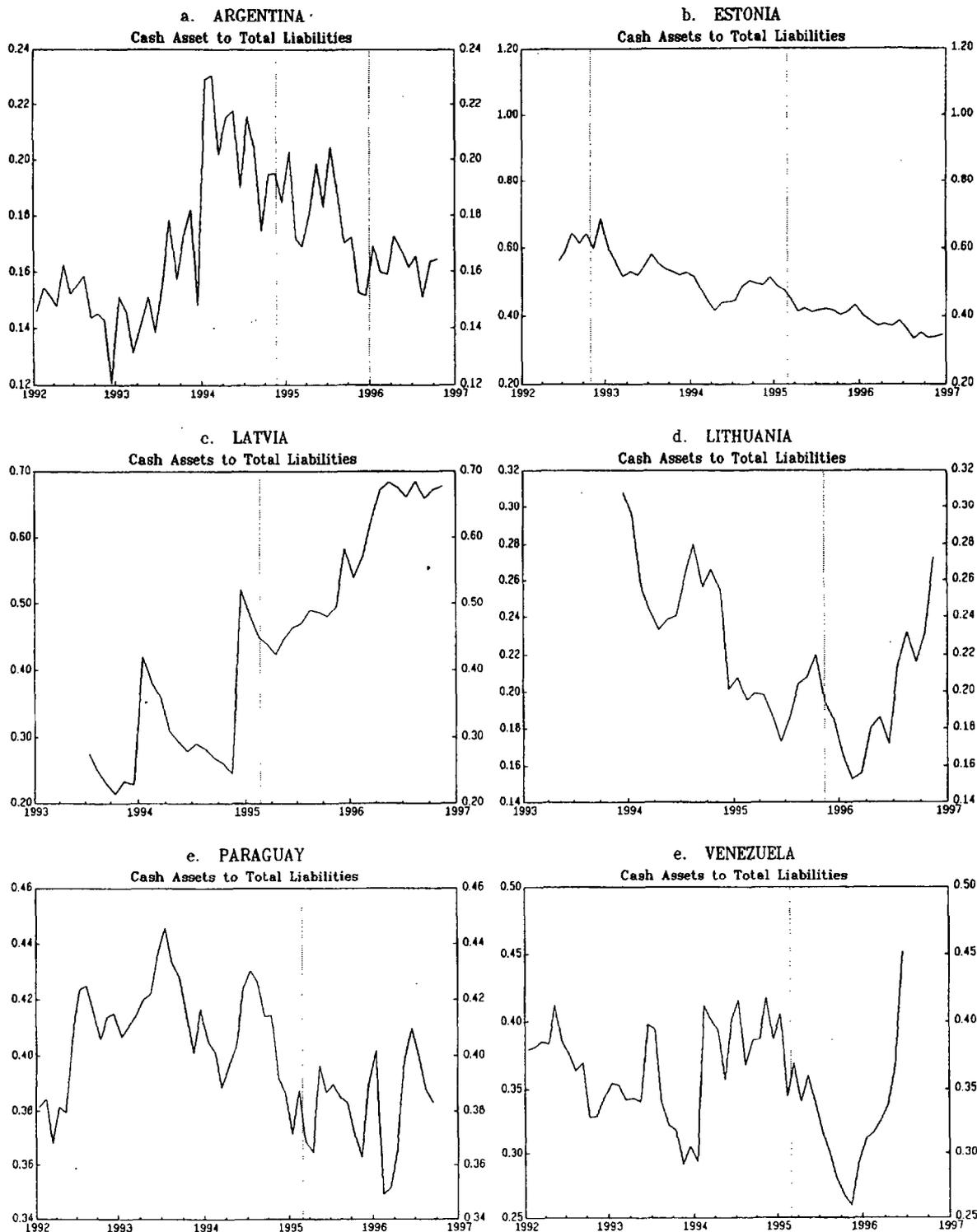
Table 7: Functioning of the Interbank and Level of Excess Reserves During the Crisis

Countries	Functioning of Interbank Market	Level of Excess Reserves
ARG	Relatively developed as regards the amount of transactions but segmented; extremely high interest rates during the crisis, collateralized	Low
EST	Practically nonexistent	High
LAT	Practically nonexistent	High
LITH	Practically nonexistent	Stable
PAR	Segmented	High
PHIL	Developed in terms of transactions but segmented	Low and then high
VEN	Segmented; relatively high interest rates at the outset of the crisis	Stable

Source: Fund documents and author's own assessment.

The level of excess reserves will also become erratic during a banking crisis, which complicates its use as signal variable to assess the stance of monetary policy. The level of excess reserves clearly depends on the smooth functioning of the interbank market, which may be hampered both because of its poor development, as in the Baltics, or because of its segmentation, as in Argentina and Venezuela. Lack of available collateral will further damage the functioning of the interbank, as was the case in the Baltics. Although disaggregated data would be necessary to analyze developments in excess reserves, Figure 28 shows the high levels of cash assets compared to total assets before the crisis, in Argentina and Latvia, and during the crisis, in Venezuela. In the case of Venezuela, the surge in cash assets was related to the excess reserves of sound banks that had sharply increased their deposit base due to flight to quality and that did not want to lend to distressed banks in the interbank market. In Argentina, flight to quality did not result in excess reserves because the authorities strongly encouraged the transfer of a large part of sound banks' excess reserves to distressed banks.

FIGURE 28  
Developments in Cash Assets



Source: International Financial Statistics.

1/ The Philippines was excluded because of a lack of data during the crisis period.

## **F. Payments System**

Disruptions in the payments system during periods of bank unsoundness will further complicate monetary policy. Such disruptions were experienced in several of the countries reviewed. In Paraguay, the loss of confidence in the commercial paper issued by banks and nonbank intermediaries nearly collapsed the payments system since such paper was an important medium of exchange in the country. In Estonia, the financial difficulties encountered by three major banks led to system-wide payment delays at end-1992. This system-wide disruption in the payments system may well have had real consequences, since the payment for goods was interrupted, delaying their delivery for the production process. Argentina allowed the temporary suspension of payments by some investment banks, as a last-resort measure to fend off bank runs. Because of the small size of the banks involved, this measure did not damage substantially the general functioning of the payment system.

## **G. Distortions to Monetary and Credit Data**

Apart from the changes in the monetary aggregates directly related to the banking crisis, the monetary and credit data is usually subject to substantial distortions. Data distortions will reduce the understanding of monetary and credit developments, further complicating monetary management.

### **Monetary data**

The monetary accounts may change sharply depending on the accounting principles that are followed when a bank is intervened or closed. In Paraguay, deposits at the banks that were intervened during the crisis, but that remained open to the public, were temporarily taken out from the monetary accounts. This resulted in an understatement of broad money growth. In Venezuela, deposits at banks that were intervened and closed, and for which deposit guarantees were paid, remained in the monetary accounts for several months. Because most depositors redeposited their deposit guarantee funds in other banks, these deposits were accounted for twice in the monetary accounts, resulting in an overstatement of broad money growth.

The "landing" of off-balance sheet deposits in the balance sheets of intervened banks, as occurred in Paraguay and Venezuela, sharply distorted the monetary accounts during the crisis period. Finally, the reduction in bank liabilities through the conversion of unsecured deposits in subordinated debt, equity or bonds, or the freeze of deposits, also had a substantial impact on the monetary accounts. Estonia and Venezuela, from the countries reviewed, opted for freezing deposits but just for a brief period of time.<sup>28</sup>

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<sup>28</sup> Better examples are the Argentine and Brazilian banking crises of the late 1980s.

## **Credit data**

Credit data tend to be unreliable during banking crises because loans are generally overvalued, nonperforming loans are routinely misclassified and improperly provisioned, and uncollected interest is frequently capitalized. Distortions in credit data were especially large in the case of the Baltics due to the larger share of nonperforming loans to total loans compared to the rest of the countries. This resulted in an overestimation of actual credit to the private sector. Also, the purchase of bad loans in exchange for government bonds, as occurred in Venezuela, had an impact on the composition of bank assets and, thus, on the amount of credit to the private and public sector.

### **H. Monetary Programming in IMF-Supported Programs**

The main components of monetary IMF-supported programming in Fund-supported programs will be affected by a banking crisis. Banking system losses will result in a change in Other Items Net (OIN) and net domestic credit (NDC) but net domestic assets (NDA) will remain unchanged. If the central bank incurs losses and there is no change in NDA of the central bank, the balance sheet identity requires an increase in currency in circulation or a reduction in net foreign assets (NFA) or net domestic credit (NDC). Focusing on NDA, rather than NDC, as did all countries reviewed will limit problems in programming under bank unsoundness because of opposite movements in OIN and NDC. Yet, difficulties will remain when programming credit to the private sector because of the distortions in the accounting of loans and accrued interests mentioned previously. This was especially the case for the Baltics because of the substantial amounts of bad loans on the banks' balance sheets.

## **IV. MONETARY MANAGEMENT**

During banking crises, normal relationships between monetary instruments and objectives become less predictable and may be perverse in some cases. In terms of objectives, a central bank whose main responsibility is to maintain monetary control will have to minimize the impact of a banking crisis on inflation. The negative impact of a banking crisis on inflation may stem from the previously mentioned difficulties in understanding monetary and credit aggregates and signal variables of the stance of monetary policy, but might also derive from the liquidity injected into distressed banks, given the central bank's additional responsibility of maintaining the stability of the financial and payments systems.

### **A. Support Indicators to Assess the Monetary Policy Stance**

The uncertainties arising from the noise in the signal variables during banking crises can lead to policy actions that may be inappropriately accommodating or too restrictive, which will further destabilize the already fragile real and financial sectors. To reduce uncertainty, it is often helpful to complement the usual signal variables with other short-term indicators in guiding policy. Developments in the exchange rate can be a good support indicator of the

monetary stance when the exchange rate is allowed to float. For countries with fixed exchange rate regimes, the amount of central bank dollar sales (or purchases) may also serve as a support indicator. These two indicators will become increasingly useful when the crisis becomes systemic since it will tend to cause large fluctuations in the exchange rate or the level of reserves through dollar sales. Another indicator that can complement the assessment of the monetary policy stance are asset prices. In countries where the stock market is not developed real estate prices can be a useful substitute or even a complement to it. In Argentina, the stock market plunged at the onset of the 1995 banking crisis while in Venezuela real estate prices would probably have given more information than the stock market about the systemic nature of the crisis, being the stock market less developed than in Argentina.

### **B. Monetary Instruments to Manage Liquidity**

Banking problems reduce the monetary authorities' capability to manage liquidity. While lender-of-last-resort mechanisms are generally extended as well as other forms of liquidity support in order to inject liquidity into problem banks, more general, monetary instruments tend to become ineffective during a crisis. This is because they have to absorb the large amounts of liquidity injected through the lender-of-last-resort mechanisms from an asymmetric banking system (with sound and unsound banks).

Indirect monetary instruments (in place in all countries reviewed but to a lesser degree in the Baltic countries) become less effective because of weaknesses in banks' portfolios and interbank market segmentation, which makes banks less responsive to price signals. On the other hand, direct monetary instruments, such as credit ceilings, can become ineffective as well, if banks roll over nonperforming loans and capitalize interests within the limits imposed by the credit ceilings.

The Latin American countries analyzed and the Philippines had indirect monetary instruments in place when their banking crises started and the Baltics were in the process of developing them. For all these countries, the absorption of liquidity was complicated further during the period of bank problems because of the interest rate inelasticity of high-risk borrowers. In fact, higher interest rates were probably needed to absorb the same amount of liquidity. Another related problem is that liquidity management tends to become asymmetric: it is generally easier to inject liquidity rather than to absorb it. For example, in the first half of 1994, the Venezuelan monetary authorities were under pressure not to increase interest rates because of the weaknesses of the banking system, and yet interest rates would have needed to rise further to absorb enough liquidity to forestall losses in foreign reserves.

Given the additional difficulties that countries appear to encounter to manage liquidity during a crisis, a shortening of the implementation lag of monetary policy may be warranted. This can be achieved by shifting toward instruments that react faster to prevailing conditions. Open market operations can be carried out much faster than other monetary instruments, such as changes in reserve requirements and should therefore be used as a tool to manage liquidity during a crisis. This does not mean that reserve requirements should be ruled out. As we shall

see later, a high level of reserve requirements can usefully serve as a cushion for deposit runs, but changes in the reserve requirement ratio are not so useful to manage liquidity in general. Table 8 briefly describes the monetary instruments available in the countries reviewed at the time of each country's respective crisis.

Table 8: Monetary Instruments During Bank Crises

Countries	Instruments to Manage Liquidity <sup>29</sup>
ARG	Repos and reverse repos in pesos or dollars. Rediscounts and swaps in dollars.
EST	Central Bank bills introduced in May 93 with a view to increasing collateral for banks to use in the interbank market. Drawdown of reserves, subject to penalties, to meet temporary liquidity needs.
LAT	Central Bank bills introduced in 1995 to stem capital inflows. Transactions with T-bills to regulate short-term liquidity. Noncollateralized credit auctions; replaced by repo auctions in October 1995.
LITH	Treasury bills introduced in July 19 94; one- and three-month maturity. Reduction over time of the stock of outstanding credits to banks. Government deposits at the central bank, fully backed by foreign exchange.
PAR	Central bank bills for open market operations (OMOs). Rediscount facilities.
PHIL	Central bank bills for OMOs. Swap operations and rediscount facilities.
VEN	Central bank bills for OMOs. Rediscount facilities.

Source: Fund documents.

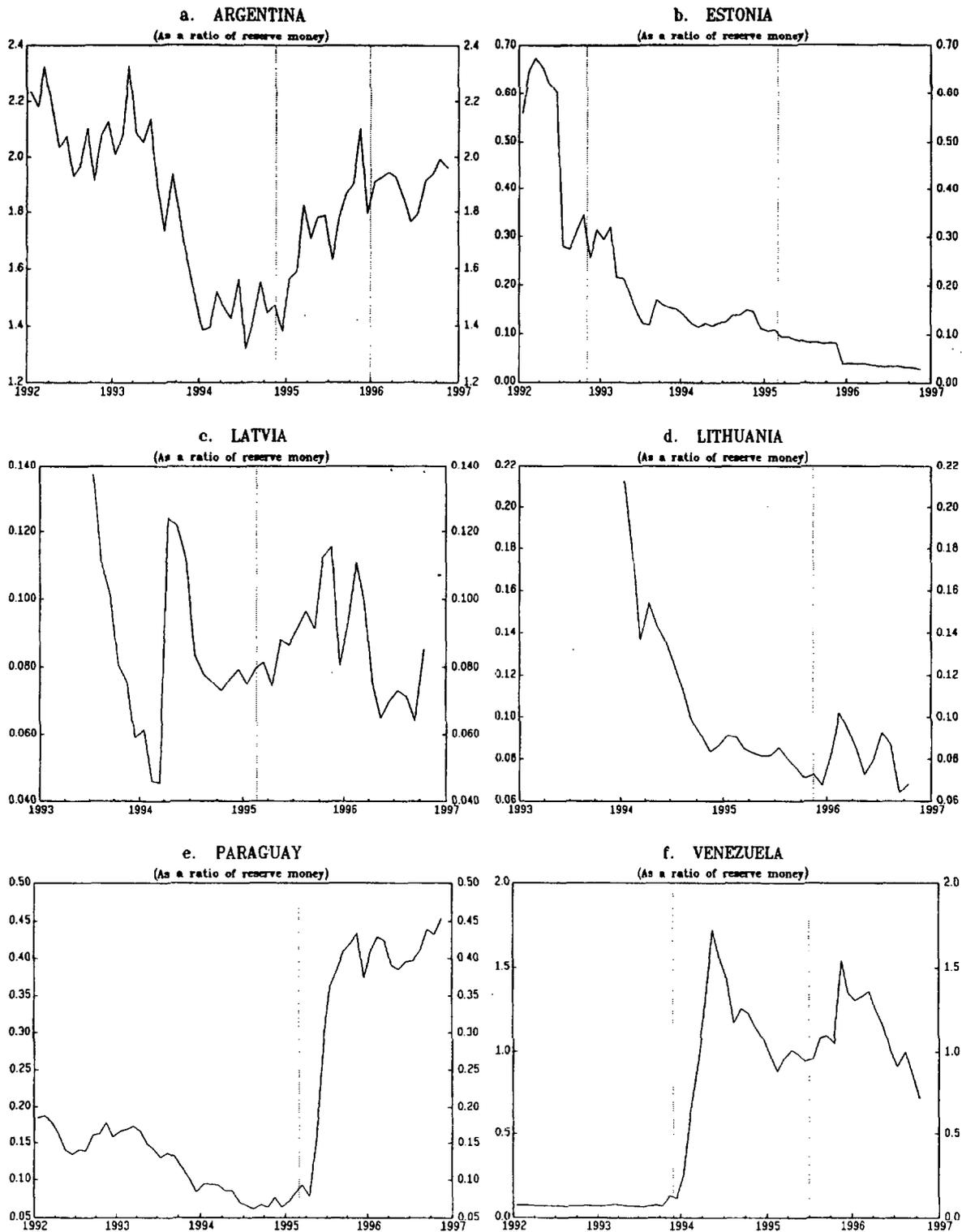
### Lender-of-last-resort (LLR)

LLR instruments are commonly used to provide liquidity to distressed banks. Apart from the difficulty of distinguishing between illiquid and insolvent banks, adverse selection and moral hazard problems may also be encountered. The massive use of LLR could make the monetary authorities lose monetary control, as was the case in Venezuela in 1994-95 (Figure 29.f). Also, in the case of the Paraguayan banking crisis in 1995, extensive extension of central bank credit to distressed banks led to an overshooting of the target on currency in circulation. Yet, the strong fiscal stance when the crisis erupted helped control inflationary pressures (Figures 29.e).

In the cases of the countries reviewed under a CBA, only limited LLR facilities were available, and had to be expanded during the banking crisis. This was particularly the case in Argentina, where the LLR facilities were expanded several times, and additional mechanisms were introduced to substitute for the limited possibility for the central bank to provide liquidity under the Convertibility Law. These mechanisms included the creation of several safety nets, outside the central bank, to give credit to distressed banks (Table 9).

<sup>29</sup>Instruments to absorb and inject liquidities are reviewed, except for LLR. For a review of LLR facilities, see Table 11.

FIGURE 29  
Central Bank Claims on the Financial Sector



Source: International Financial Statistics.

1/ The Philippines was excluded because of a lack of data during the crisis period.

Table 9: Changes in the LLR Resort Facilities

Countries	LLR Instruments at the Onset of the Crisis	Changes During the Crisis
ARG CBA since March 1991	No explicit LLR facility.	1995: LLR operations conducted by Banco de la Nación with funds transferred from sound banks. 1995: Use of (collateralized) rediscounts and swaps; also possibility to renew them for a prolonged period and provide for amounts in excess of the banks' capital.
EST CBA since June 1992	Emergency credit (constituted by excess foreign reserves held in the Banking Department of the Bank of Estonia (BE) to be used only in the case of systemic crisis).	1992: BE lent around 6 percent of the monetary base to the Social Bank even if in principle LLR was limited to the amount of foreign reserves in excess of the backing requirement. 1994: Banks that merged were granted loans by the BE.
LAT	No changes.	No changes.
LITH CBA since April 1994	Emergency credit as in Estonia. A target of at least 15 percent of total deposits was set for this LLR facility.	1994: Temporary waiver for compliance with reserve requirements for the Agriculture Bank.
PAR	Central bank overdraft.	Creation of a safety net for distressed banks. Expansion of central bank facilities to longer-term credit to distressed institutions, as a sort of emerging credit.
PHIL	Central bank overdraft.	Massive use of overdraft but also rediscount and exchange rate swap operations.
VEN	LLR facility which included the possibility of giving credit to the deposit insurance fund (FOGADE).	Massive credit given to FOGADE to support distressed banks.

Source: Fund documents.

The experience of the countries reviewed favors the use of LLR facilities, over ad-hoc forms of liquidity injection, to provide banks with liquidity in situations of systemic crisis but these LLR facilities should be fully collateralized or provided with a government guarantee. This would avoid huge central bank losses, as happened in Paraguay, the Philippines and Venezuela.

#### Other forms of liquidity injection

Central bank instruments for injecting liquidity, other than the LLR facilities, in most of the countries analyzed became less effective owing to the reduced interest rate elasticity stemming from adverse selection and moral hazard problems. The design of such instruments during a crises period should seek to limit access by unsound banks and promote collateralized transactions.

crises period should seek to limit access by unsound banks and promote collateralized transactions.

Some of the countries reviewed tried to use the interbank market as a vehicle to inject liquidity into distressed banks through the recycling of sound banks' excess reserves. In Argentina, the central bank transferred an amount equivalent to 2 percent of banks' required reserves to the state-owned bank Banco de la Nación so that it could give liquidity support to distressed banks. Also, sound banks were asked to place their excess reserves in a pool to support the rest of the banking system. In Venezuela, a similar measure was decreed but not implemented in 1994. These strategies for liquidity transfers through some sort of moral suasion by the central bank typically require official guarantees and may contaminate sound banks and ultimately prolong bank problems.

Other forms of liquidity support were actively used in Paraguay where a "safety net" ("Red the Seguridad Bancaria") was created to provide distressed banks with liquidity. This additional instrument was conceived at first to recycle liquidity through collateralized loans from those banks that were experiencing deposit increases to those that were losing deposits and the central bank was to act as a broker. Eventually, since sound institutions were reluctant to lend to distressed banks, the central bank had to provide liquidity itself, which made the "safety net" a sort of extension of the LLR instruments available to the central bank. In the Paraguayan case, the extension of the liquidity support to distressed banks outside the LLR instruments increased the monetary impact of the crisis. The reason is that such new mechanism followed laxer rules in terms of collateralization of the loans under which liquidity was injected. Furthermore, this ad-hoc mechanism for liquidity injection was asymmetric since it was not designed for the liquidity management of the whole banking system but only for additional provision of liquidity to distressed banks.

### **Reserve requirements**

From the experience of the seven countries analyzed, a high level of bank liquidity—implemented for instance through reserve requirements, if accompanied by strong bank supervision, may be a useful tool to limit the expansion of risky credit and, eventually, cope with deposit runs in case a banking crisis occurs. This was the case in Argentina where high reserve requirements were steadily reduced, serving as a buffer for deposit withdrawals.

However, an excessively high reserve requirements ratio, along with weak supervision, may foster disintermediation, as happened in Paraguay, through the development of unrecorded operations, as well as off-shore banking activities. This increased the inefficiency of the Paraguayan banking system, as well as bank mismanagement and fraud.

Too high reserve requirements can also damage the situation of the banking system while a crisis takes place. In the Philippines and Venezuela, weak state-owned banks did not comply with reserve requirements in certain periods of time and did not even pay the penalties imposed by the central bank. This clearly complicated monetary management since the reserve

requirement ratio would have needed to be increased further to maintain the same monetary stance. Such an increase, though, would have damaged the banks complying with reserve requirements, probably the soundest ones. This is what happened in the Philippines while Venezuela opted for a laxer monetary policy, reducing reserve requirements.

Another disadvantage of using high reserve requirements is that since unsound banks may not comply with them (as happened in the Philippines and Venezuela), they may not even serve to limit the riskiest credit expansion. An additional increase of the reserve requirement ratio to maintain the monetary stance, as in the Philippines, may even lead to a credit crunch.

Finally, reserve requirements are particularly inadequate to manage short-term liquidity during a banking crisis. Too frequent changes in different directions in the reserve requirement ratio will destabilize banks' balance sheets. In none of the countries reviewed were reserve requirements used for fine-tuning but rather to inject liquidity (in all countries but in the Philippines where they were used to absorb it).

As a conclusion, although, high reserve requirements may prove useful as a buffer to deposit runs they can have negative consequences on the banking system (increased disintermediation and worsened situation of sound banks if unsound ones do not comply with reserve requirements). It may, thus, be better to substitute part of the reserve requirement ratio, especially in countries where it stands at very high levels, by a liquidity ratio, as was done in Argentina. This will reduce the cost of reserve requirements for banks, while maintaining the same monetary stance. As regards, short-term liquidity management, more flexible instruments will clearly be preferred.

### **Open market operations**

The experience of the countries analyzed, especially that of Argentina, shows that open market operations (OMO), including repos and reverse repos, have a distinct advantage compared to other monetary instruments in terms of speed of impact, a factor that becomes even more important during banking crises. Yet, OMO can become blunted when the banking system is unsound because of the reduction in the interest rate elasticity of banks. In this context and for liquidity absorption, the authorities will generally have to offer a higher interest rate to absorb a given amount of funds, unless there is excess liquidity in the system, as was the case in Venezuela. For countries under CBAs, monetary management will be complicated by the monetary authorities' limited ability to influence liquidity. A pure CBA relies on capital inflows to regulate liquidity, which increases interest rate volatility. Capital outflows under a CBA will also be more costly in terms of higher interest rates than what would have been necessary in a country conducting sterilization to stop such outflows.

When OMO are used to inject liquidity, the monetary authorities will face the problem of asymmetry in trying to distribute liquidity across the system. Unsound banks will probably have no government or central bank paper that they can sell or pledge in exchange of liquidity, so only sound banks will obtain liquidity from OMO operations, as occurred in the Philippines.

Notwithstanding these problems, there are still better chances of injecting liquidity to all banks in need (sound and unsound banks) through OMO operations (and eventually LLR facilities for the latter) than through ad-hoc mentioned forms of liquidity injection, created when the crisis erupts.

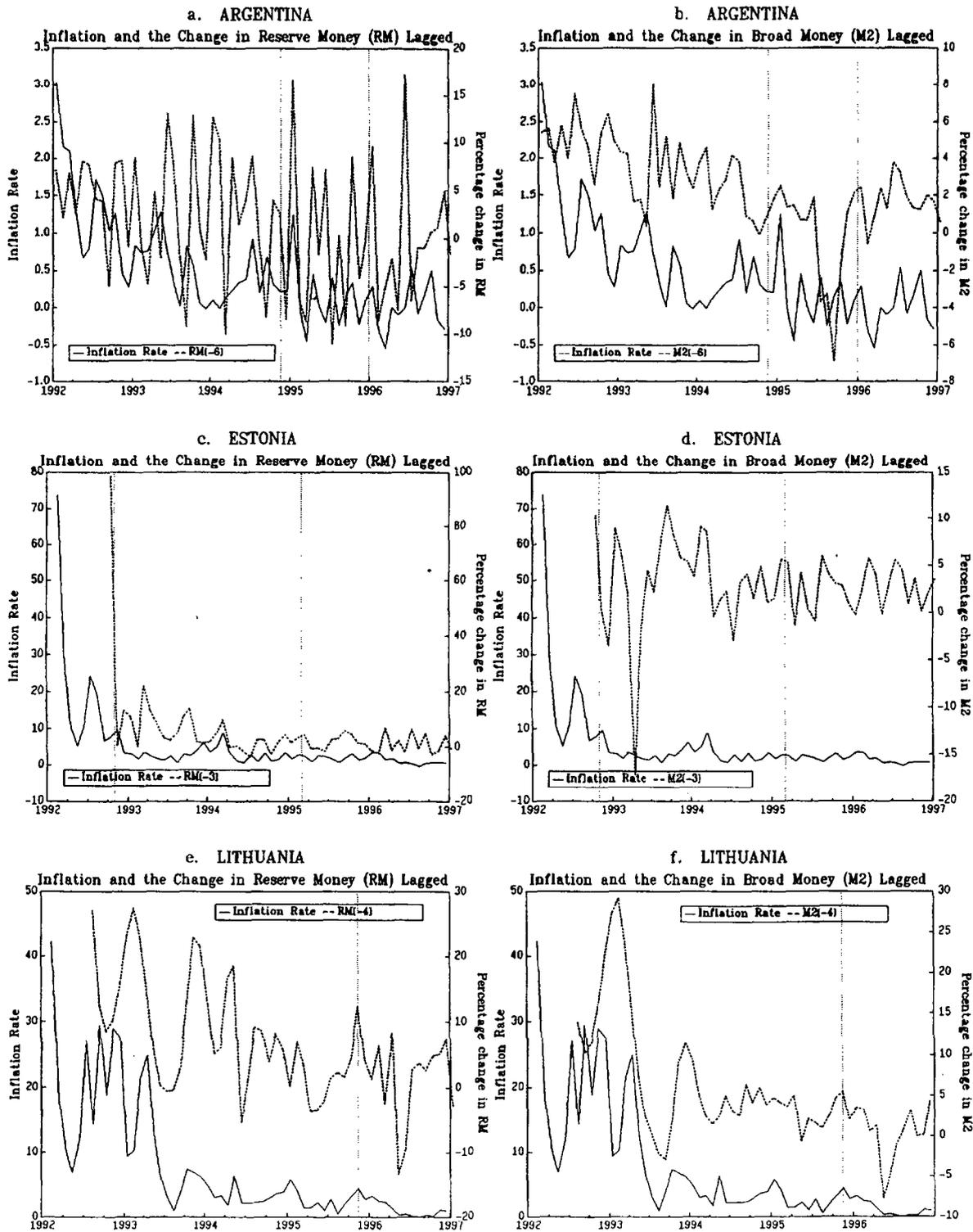
### **C. Monetary Targets**

The instability of monetary and credit aggregates and the difficulties in monetary management given the monetary instruments at a country's disposal during a banking crisis will make intermediate monetary or credit targets more difficult to attain. This will reduce the probability of achieving an inflation objective. Furthermore, the link between the intermediate and the final target may deteriorate during a crisis. Figures 30-32 show that the relationship between reserve money and inflation, as well as broad money and inflation, shifted in most countries reviewed. Sundararajan and Baliño (1991) show that there is an increase in total domestic credit in real terms both before and after a banking crisis, despite declines in real output and foreign exchange reserves. As previously mentioned, monitoring other indicators of inflationary pressures—such as the exchange rate for countries under a flexible exchange rate, central bank sales and purchases of reserves for countries under a fixed exchange rate, or asset prices—might have helped avert inflationary pressures.

As for the IMF-supported programs' intermediate monetary targets, all countries had a credit target, except Paraguay for which there was no program in place. In all cases, credit targets correctly included OIN, since they would have been affected by improper accounting of nonperforming loans and bank losses. Also, in all cases NDA was calculated at the level of the central bank, rather than at the level of the banking system. The countries under a CBA changed their target from the cumulative change of the NIR of the central bank to the cumulative change in the free international reserves (FIR) of the CBA, defined as the difference between gross international reserves and the monetary base. This implied a change from a target that was not totally controlled by the monetary authorities under a CBA to a controllable target. Only one of the countries reviewed, the Philippines, moved to a money target during the crisis but the move was not so much related to the crisis itself but to the changes in the exchange rate regime that occurred during that time (Table 10).

Several of the countries reviewed introduced automatic adjustors and waivers to allow for more flexibility in the expansion of NDA due to liquidity injection into distressed banks. In the case of Argentina, about a year after having changed the external target from NIR to FIR, an automatic adjustor was introduced on the FIR and NDA targets, to allow for a more active role of the central bank as lender-of-last-resort. This constituted an upward (downward) adjustment for NDA (FIR) by up to US\$300 million. In the program with Lithuania, a waiver was introduced in 1995 to account for the reduction in reserve requirements to help distressed banks.

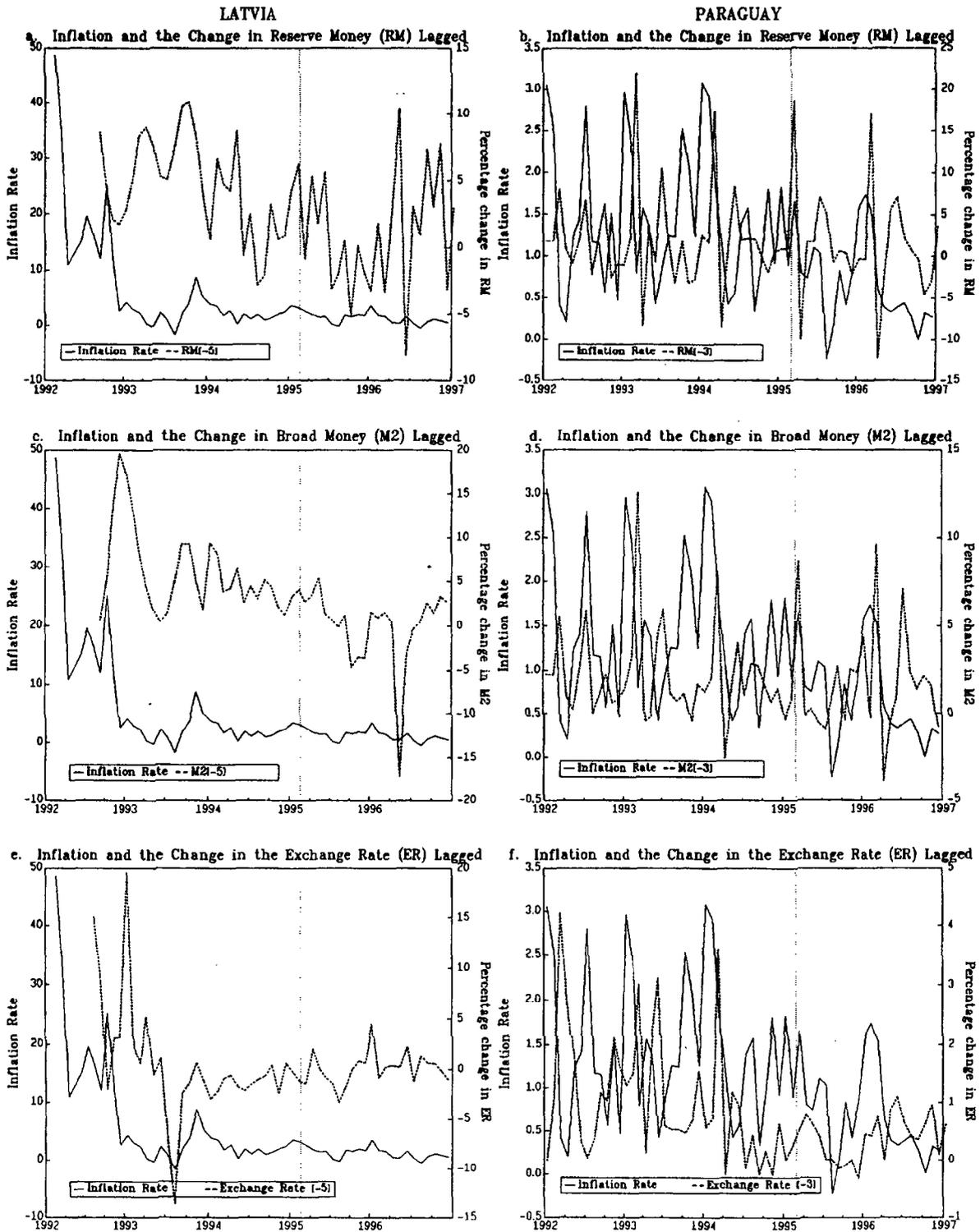
FIGURE 30: Countries Under a Fixed Exchange Rate  
Relationship Between Money and Inflation 1/



Source: International Financial Statistics.

1/ The number of lags for each country was chosen so as to reflect the closest relationship with inflation.

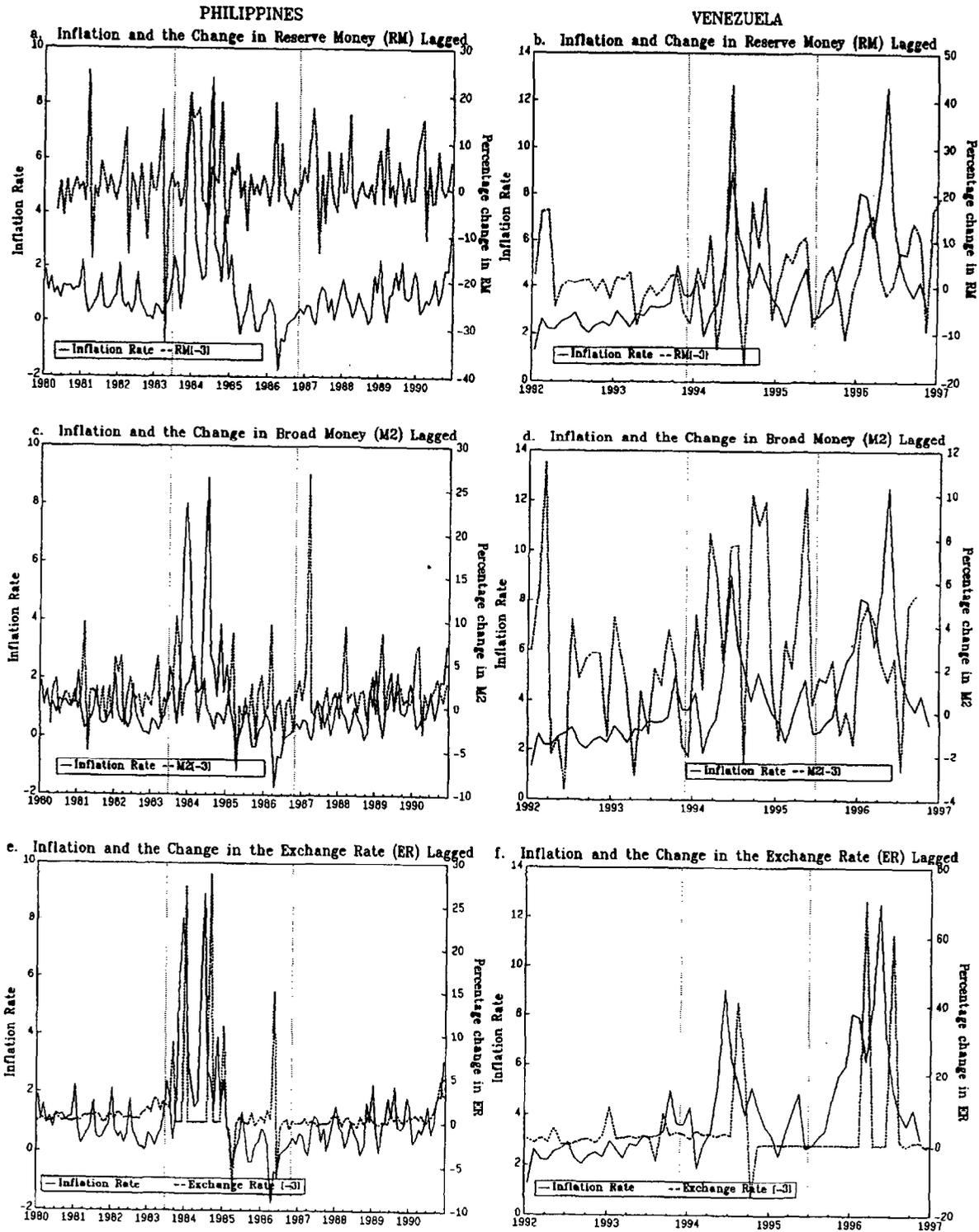
FIGURE 31: Countries Under a Flexible or Managed Exchange Rate Relationship Between Money, Inflation, and the Exchange Rate 1/



Source: International Financial Statistics.

1/ The number of lags for each country was chosen so as to reflect the closest relationship with inflation.

FIGURE 32: Countries Under a Flexible or Managed Exchange Rate Relationship Between Money, Inflation, and the Exchange Rate 1/



Source: International Financial Statistics.

1/ The number of lags for each country was chosen so as to reflect the closest relationship with inflation.

The inclusion of automatic adjustors and waivers may have reduced the chances of setting an inappropriate intermediate target in IMF-supported programs because of the changes in the monetary and economic conditions brought about by the crisis. And yet, the experience of the countries analyzed shows that the changes in monetary and economic conditions might be too large to be able to avert them through the introduction of automatic adjustors and waivers. The introduction of more frequent targets and, thus, reviews of IMF-supported programs would help take more into account the changes in monetary and credit aggregates, as well as other economic conditions, that occur during banking crises.

Table 10: Changes in Monetary Targets in IMF-Supported Programs During Periods of Banking Crisis

Countries	CB Intermediate Target	Program Monetary Targets	Changes in Program Targets
ARG	None <sup>30</sup>	NDA of CB; NIR of CB	FIR instead of NIR
EST	None	NDA of CB; NIR of CB	FIR instead of NIR
LAT	None	NDA of CB; NIR of CB	
LITH	Currency in circulation	NDA of CB; NIR of CB	Base Money introduced as indicative target. FIR instead of NIR
PAR	Currency in circulation	No program in place	
PHIL	Base money	NDA of CB; NIR of CB	Base Money instead of NDA
VEN	Base money and NIR	NDA of CB; NIR of CB	

Source: Fund documents.

#### D. Impact on Inflation

The impact of a banking crisis on inflation will depend in part on the monetary stance that can be maintained during a crisis and on the authorities' decision as to whether inflation remains the primary objective of monetary policy. This latter consideration may be less obvious in countries with low levels of foreign currency deposits and loans, where inflation can be used to shrink banks' balance sheets in real terms. This was the case in Venezuela where sharp

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<sup>30</sup>In Argentina, Estonia and Lithuania, the countries that were under a CBA from the ones analyzed, the monetary authorities responded passively to changes in foreign exchange flows.

surges in reserve money were allowed, due to the massive injections of liquidity into distressed banks, resulting in a surge in inflation (Figure 35.b). In the other two Latin American countries reviewed, there was a large share of foreign currency deposits which, together with their foreign-currency denominated debt, would have made it too costly to use inflation to shrink banks' balance sheets. In both countries, especially in Argentina, inflation remained subdued, thanks to the fiscal and monetary restraint that accompanied the operations of liquidity injection to distressed banks. (Figures 33.a and 34.b).

In any event, to the extent that inflation remains an objective, the problems mentioned earlier regarding the measurement and interpretation of monetary aggregates, it would be particularly helpful in a banking crisis to closely monitor additional indicators of inflationary pressures, such as asset prices, including real estate prices, the exchange rate, or foreign exchange sales for countries under a fixed exchange regime. More frequent reviews of monetary programs may also be warranted, as previously mentioned.

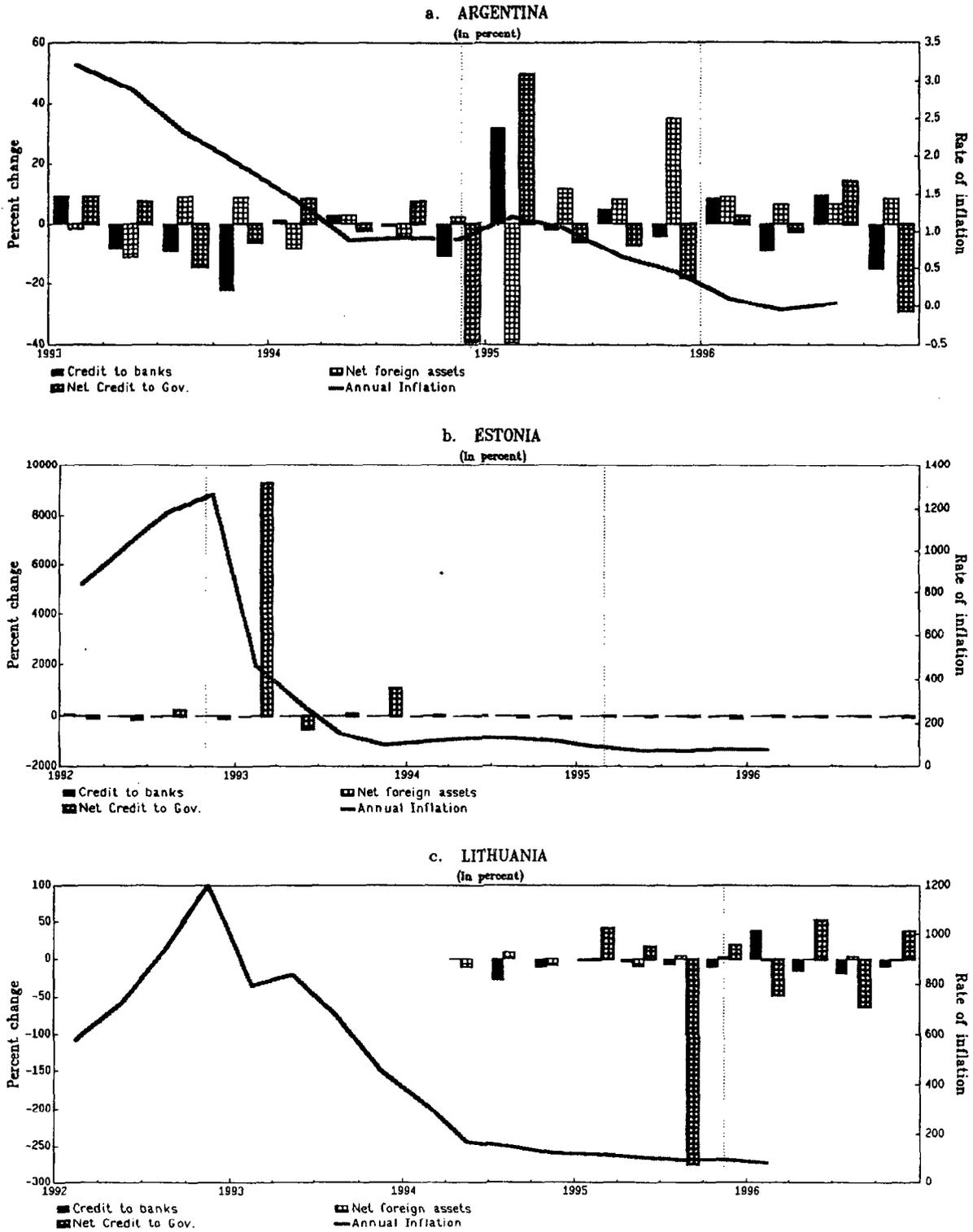
## V. CONCLUSIONS

The monetary impact of a banking crisis will depend on the origin and the scope of the crisis. Crises caused by both macroeconomic and bank-specific circumstances tend to have larger monetary consequences than crises originated purely by macroeconomic shocks or bank-specific causes. Also, the larger the scope of the crisis, in terms of number of banks and share of assets affected, the more substantial its monetary impact tends to be. However, the cost of the crisis to the government is less closely related to the monetary consequences of a crisis and more to the bank restructuring strategy that is chosen by the authorities.

The exchange rate regime and the degree of dollarization will also influence the monetary impact of a banking crisis, and the authorities' decision on the importance of the inflation objective during a crisis. In countries under fixed exchange regime, a sharp fall in monetary aggregates and an increase in interest rates will occur, unless the authorities decide to opt for a devaluation and thus a large inflation. In countries under a flexible exchange regime, the exchange rate generally depreciates and inflation accelerates. In the case of a dollarized economy, a devaluation may be more costly than a sharp fall in the monetary aggregates and an increase in interest rates. The devaluation will affect borrowers in dollars negatively and, thereby, their loan portfolio of banks if borrowers do not have sufficient income in dollars to continue servicing their loans normally. The probability of a surge in inflation, through a devaluation, will therefore decrease, the higher the level of dollarization of the country. Among the dollarized countries reviewed, only the Philippines opted for floating the previously fixed exchange rate but it was in the midst of a balance-of-payments crisis.

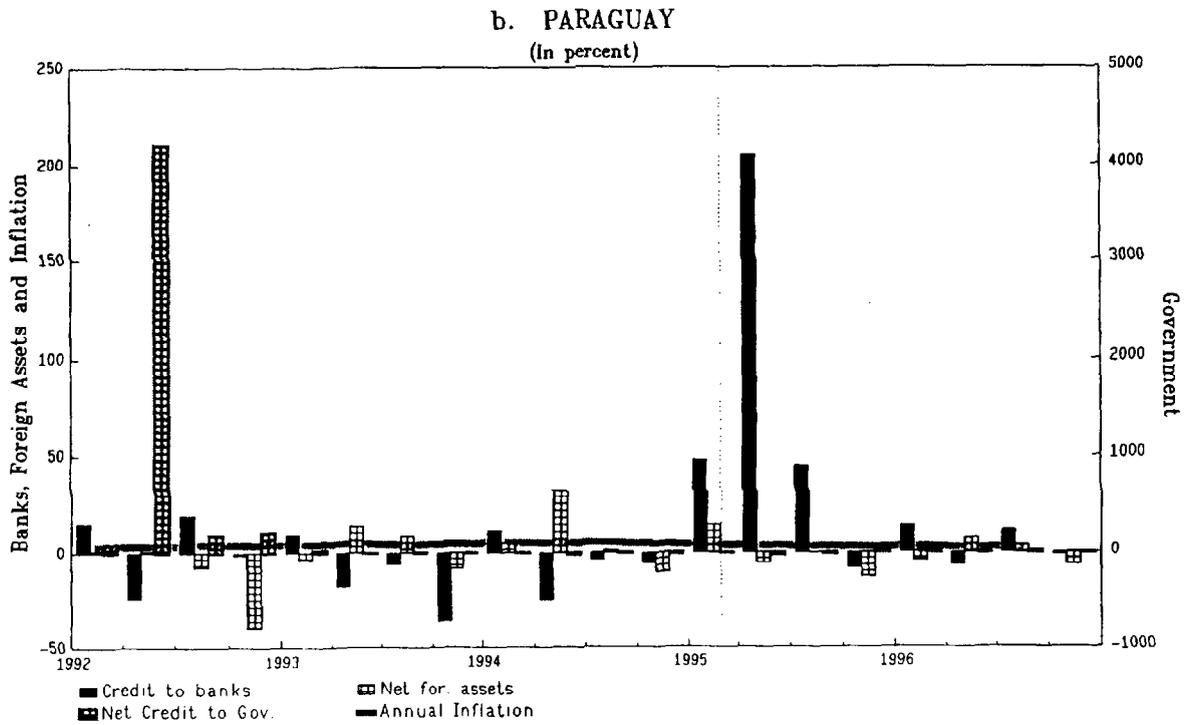
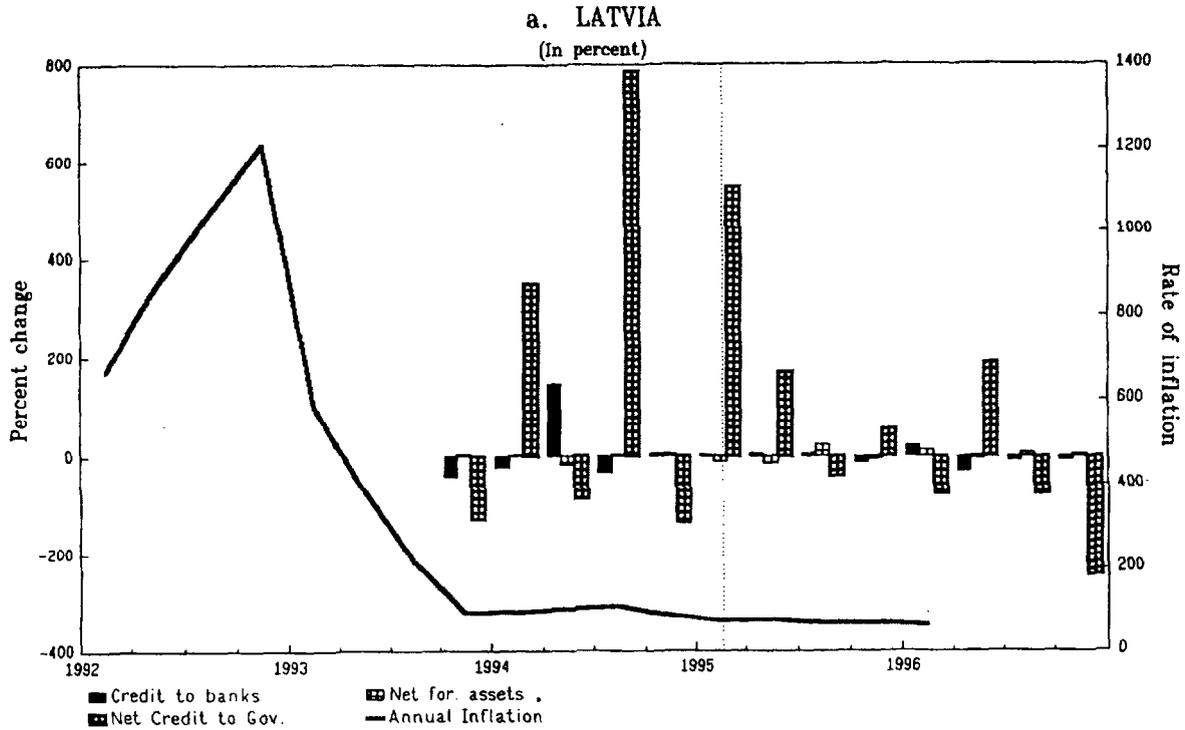
The monetary impact of a banking crisis will crucially depend on the structure of the banking system and its institutional characteristics, prior to the crisis period. The larger the share of deposits in foreign banks, and in government-owned banks perceived to have an implicit government guarantee, the more stable the deposit base will be. This is because foreign and

FIGURE 33: Countries Under a Fixed Exchange Rate  
Contributions to Reserve Money



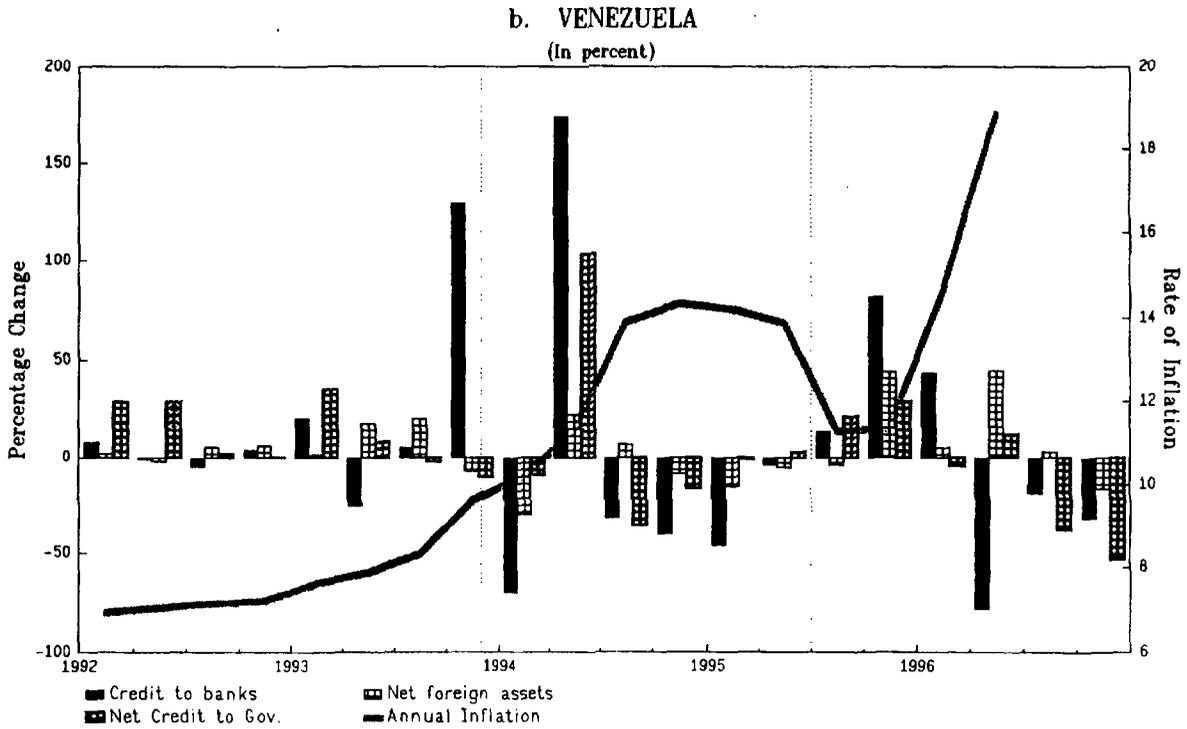
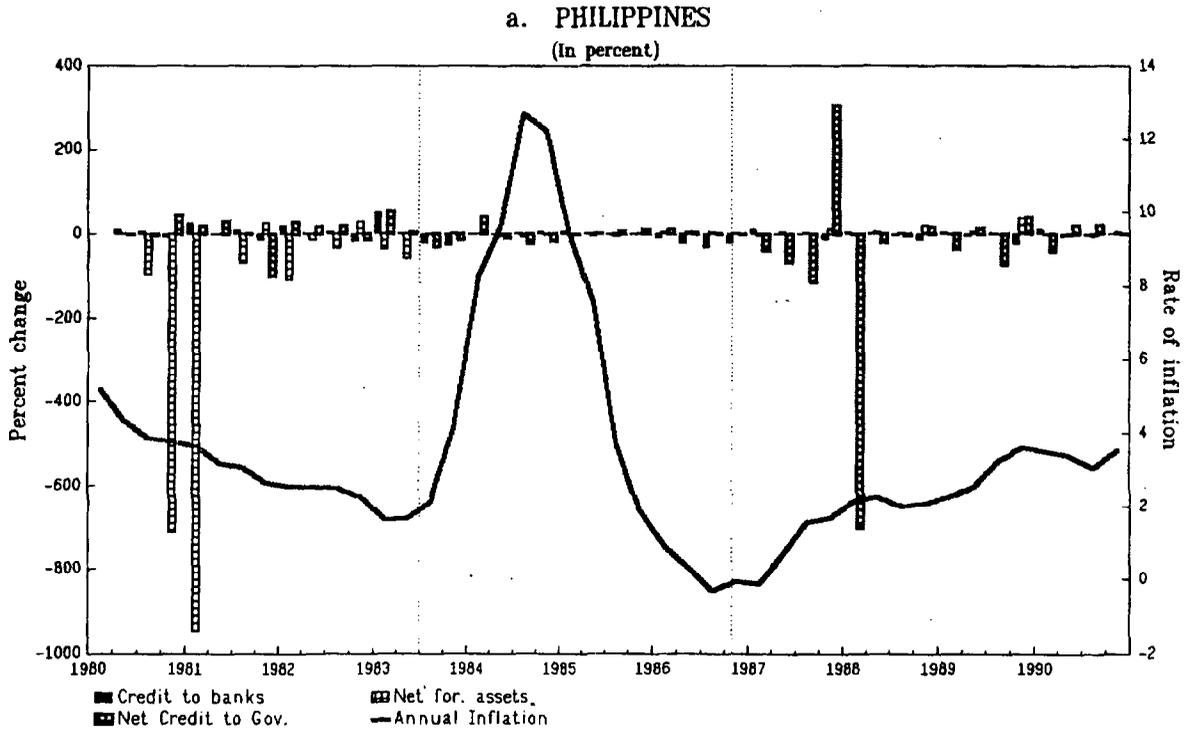
Source: International Financial Statistics.

FIGURE 34: Countries Under a Managed Exchange Rate  
Contributions to Reserve Money



Source: International Financial Statistics.

FIGURE 35: Countries Moving From Flexible to Fixed Exchange Rates  
Contributions to Reserve Money



Source: International Financial Statistics.

government-owned banks tend to be viewed by the public as safe havens, encouraging flight to quality, rather than flight out of the system. The underdevelopment of a country's financial market appears to increase the monetary impact of a crisis because financial intermediation is practically only carried out by the banking system. Finally, the existence of a well-funded DIS tends to limit the reduction in the deposit base during a crisis, but will not be able to restore confidence in a situation of systemic crisis.

Monetary and credit aggregates become more unstable during a crisis, especially if they have continued to grow until the crisis erupts. This is especially the case in the countries reviewed that underwent financial (and capital account) liberalization without strengthening bank supervision. When the bank problems begin, credit and deposit growth slows down, and sometimes becomes negative, especially in countries with a small share of foreign and government-owned banks perceived as safe, and with an underfunded DIS, as was the case of Venezuela. Sharp movements in the different components of monetary aggregates will often occur. In Argentina and Latvia, foreign currency deposits increased in absolute terms during the crisis, picking up part of the fall in saving deposits, and thus helping to stabilize money demand. In Latvia and Venezuela, demand deposits also played the role of automatic stabilizers in some instances, absorbing part of the fall in time deposits. Quite surprisingly, time deposits increased in the Philippines.

Income velocity tends to fall before a banking crisis and to increase thereafter, although in Estonia, Latvia and Paraguay, velocity started to rise before the crisis erupted. Notwithstanding changes in velocity, the econometric tests carried out for the countries reviewed are consistent with the hypothesis of long-run stability of money demand even during the crisis period. In the short-run, though, the demand for money is unstable and in some cases, particularly in Lithuania, sharp structural breaks occurred during the crisis.

The money multiplier tends to increase prior to a crisis because of the fall in the reserve-to-deposit ratio stemming from a reduction in reserve requirements, as in Argentina, or from the reduction in excess reserves of distressed banks, as in Venezuela. Only in Estonia and Lithuania did the multiplier fall before the crisis. This was related to the sharp increase in the currency-to-deposit ratio prior to the crisis and the accumulation of excess reserves because of the tightening of prudential regulations on lending. During the crisis period, sharp movements in the money multiplier occurred in most of the countries reviewed. In the Baltics and the Philippines these movements were due to both changes in reserves and in the demand for currency. In the Latin American countries reviewed the demand for currency was more stable than in the Baltics and the Philippines, and also more stable than their own demand for broader aggregates.

Both the credit and the interest rate channel of the transmission mechanism tend to be distorted during a banking crisis. The credit channel will be less effective as the demand for credit becomes relatively more inelastic because of the moral hazard problems stemming from the large amounts of bad loans in the banks' balance sheet. This was especially the case in the Baltics and Venezuela. The interest rate channel will be hampered because of the inability of

distressed banks to adjust their lending in response to monetary policy actions and by the reduced sensitivity to, and predictability of, responses to interest rates by banks' customers. The transmission mechanism will tend to change in the aftermath of the crisis as well, because of changes in the structure of the banking system, in terms of the number of banks and the concentration of assets and liabilities in different groups of banks.

Signal variables of monetary policy, such as interbank interest rates and excess reserves, will be more difficult to interpret during a banking crisis. Conditions in the interbank market, especially in countries with a segmented banking system, may reflect the distressed situation of certain banks rather than the overall stance of monetary policy. The level of excess reserves will also lose its explanatory power because it will be influenced by the degree of segmentation of the banking system. Traditional signal variables will, therefore, become less useful during a crisis, unless disaggregated data, at least by groups of banks (sound and unsound) is analyzed.

Banking crises will generally have a negative impact on the payments system, which will further complicate monetary policy. This was especially the case for Paraguay, where there was a loss in confidence in banks' commercial paper, widely used as a medium of exchange, and for Estonia where the difficulties encountered by three major banks led to system-wide payments delays.

Monetary management will be further complicated by banking crises because of changes in the nature of monetary and credit aggregates. Monetary aggregates may vary sharply depending on the accounting principles that are followed when a bank is intervened or closed. Credit aggregates also become unreliable because of the misclassification of nonperforming loans and accrued interest.

The changes in monetary and credit aggregates, income velocity, the transmission mechanism and the signal variables generally used by central banks call for additional support indicators, such as the exchange rate in countries under a flexible exchange regime, the amounts sold and purchased of foreign currency by the central bank in countries under a fixed exchange regime, and asset price developments, including real estate prices.

The central bank's responsibility for maintaining financial and payments system stability, through the use of its LLR facilities, may impinge on its primary objective of price stability. In Venezuela and Paraguay, massive assistance was given to the banking system, directly or indirectly, through the central bank's LLR facilities. A surge of reserve money and inflation occurred in Venezuela, while the accompanying restriction in fiscal policy helped maintain price stability in Paraguay. In most countries, the massive assistance to banks was given through other forms of liquidity injection, other than the normal LLR facilities of the central bank. Such instruments were generally noncollateralized, which eventually increased the central bank's losses even more than the use of the LLR existing facilities.

As for general liquidity management, the fast, and sometimes drastic, changes in monetary conditions under a crisis call for a reduction in the implementation lag of monetary policy by shifting to instruments that can be adjusted rapidly such as repos, as compared to reserve requirements. Furthermore, high reserve requirements may deteriorate the situation of sound banks, aggravating the crisis.

Both intermediate monetary targets, and eventually the inflation target, will be more difficult to achieve during a banking crisis not only because of the reasons previously mentioned but also because the relation between changes in monetary aggregates and inflation tends to weaken. Furthermore, monetary programming in IMF-supported programs will be affected by banking crises. Bank losses may produce erratic movements in net domestic credit and other items net as well as in net foreign assets. Difficulties will also appear when programming credit to the private sector because of distortions in the accounting of loans and accrued interests. Some of the programs that were in place in the countries' reviewed (Argentina's and Lithuania's) tried to account for the difficulties in the design of monetary targets. However, this may not be enough when sharp movements in monetary and credit aggregates occur, as in most of the countries analyzed. More frequent reviews of monetary programs may be needed in countries facing a systemic banking crisis to facilitate monetary policy implementation and, therefore, increase the probability of achieving the inflation target.

**Econometric Results on Money Demand Stability**

ARG	Long-run stability of money demand (January 1983- December 1996, monthly data in logs)																				
real M1, real Y, and inflation	<p>by Johansen procedure, one cointegrating vector:</p> <table border="1" data-bbox="422 585 1412 723"> <thead> <tr> <th>Vectors (H<sub>0</sub>=rank p)</th> <th><math>-T\sum \lg(1-\mu)</math></th> <th>using T-nm</th> <th>95%</th> <th>Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td>p=0</td> <td>29.57 **</td> <td>21.98*</td> <td>21.0</td> <td>0.1767</td> </tr> <tr> <td>p≤ 1</td> <td>8.66</td> <td>6.44</td> <td>14.1</td> <td>0.0554</td> </tr> <tr> <td>p≤ 2</td> <td>2.92</td> <td>2.17</td> <td>3.8</td> <td>0.0190</td> </tr> </tbody> </table> <p>Chow tests: demand for narrow money went through a clear structural break during the 1989-90 banking crisis. A smaller break occurred during 1995 (Figures 11.a and b). Forecasts of demand for narrow money conducted from Jan 1995 onwards; forecast residuals show less variability than the residuals from 1983 to beginning of 1991 (Figure 11.e).</p>	Vectors (H <sub>0</sub> =rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test	p=0	29.57 **	21.98*	21.0	0.1767	p≤ 1	8.66	6.44	14.1	0.0554	p≤ 2	2.92	2.17	3.8	0.0190
Vectors (H <sub>0</sub> =rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test																	
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real M2, real Y, and inflation	<p>by Johansen procedure, one cointegrating vector:</p> <table border="1" data-bbox="422 1074 1412 1212"> <thead> <tr> <th>Vectors (H<sub>0</sub>=rank p)</th> <th><math>-T\sum \lg(1-\mu)</math></th> <th>using T-nm</th> <th>95%</th> <th>Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td>p=0</td> <td>44.29 **</td> <td>32.93**</td> <td>29.7</td> <td>0.1663</td> </tr> <tr> <td>p≤ 1</td> <td>16.64*</td> <td>12.37</td> <td>15.4</td> <td>0.0686</td> </tr> <tr> <td>p≤ 2</td> <td>5.83*</td> <td>4.33</td> <td>3.8</td> <td>0.0376</td> </tr> </tbody> </table> <p>Chow tests: demand for broad money went through a clear structural break during the 1989-90 banking crisis. In 1995, the demand for broad money was at the boundaries of parameter constancy (Figures 11.c and d). Forecasts of demand for broad money conducted from Jan 1995 onwards; forecast residuals show less variability than the residuals from 1983 to beginning of 1991 (Figures 11.f).</p>	Vectors (H <sub>0</sub> =rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test	p=0	44.29 **	32.93**	29.7	0.1663	p≤ 1	16.64*	12.37	15.4	0.0686	p≤ 2	5.83*	4.33	3.8	0.0376
Vectors (H <sub>0</sub> =rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test																	
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p≤ 1	16.64*	12.37	15.4	0.0686																	
p≤ 2	5.83*	4.33	3.8	0.0376																	

EST	Long-run stability of money demand (March 1992 to March 1996, monthly data in logs)																				
real M1, real Y and deposit rate	<p>by Johansen procedure, one cointegrating vector: 1/</p> <table border="1" data-bbox="423 415 1409 541"> <thead> <tr> <th>Vectors (Ho=rank p)</th> <th><math>-T\sum \lg(1-\mu)</math></th> <th>using T-nm</th> <th>95%</th> <th>Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td>p=0</td> <td>39.46 **</td> <td>25.53</td> <td>29.7</td> <td>0.5859</td> </tr> <tr> <td>p≤1</td> <td>9.48</td> <td>6.13</td> <td>15.4</td> <td>0.2112</td> </tr> <tr> <td>p≤2</td> <td>1.41</td> <td>3.80</td> <td>0.9</td> <td>0.0407</td> </tr> </tbody> </table> <p>Chow tests: demand for narrow money went through a large structural break in 1996. Also, in 1995, the demand for narrow money surpassed the limit of parameter constancy (Figures 12.a and b).                      Forecasts of demand for narrow money were not conducted because of lack of observations.</p>	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test	p=0	39.46 **	25.53	29.7	0.5859	p≤1	9.48	6.13	15.4	0.2112	p≤2	1.41	3.80	0.9	0.0407
Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test																	
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real M2, real Y and deposit rate	<p>by Johansen procedure, one cointegrating vector: 1/</p> <table border="1" data-bbox="423 877 1409 1003"> <thead> <tr> <th>Vectors (Ho=rank p)</th> <th><math>-T\sum \lg(1-\mu)</math></th> <th>using T-nm</th> <th>95%</th> <th>Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td>p=0</td> <td>44.30 **</td> <td>28.67</td> <td>29.7</td> <td>0.6089</td> </tr> <tr> <td>p≤1</td> <td>12.38</td> <td>8.01</td> <td>15.4</td> <td>0.2579</td> </tr> <tr> <td>p≤2</td> <td>2.23</td> <td>1.44</td> <td>3.8</td> <td>0.0635</td> </tr> </tbody> </table> <p>Chow tests: demand for broad money went through a structural break in 1996. Also, in 1994 and 1995, the demand for broad money was beyond the limit of parameter constancy, when looking at the one step-up Chow test (Figures 12.c and d).                      Forecasts of demand for broad money were not conducted because of lack of observations.</p>	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test	p=0	44.30 **	28.67	29.7	0.6089	p≤1	12.38	8.01	15.4	0.2579	p≤2	2.23	1.44	3.8	0.0635
Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test																	
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1/ These results should be considered with caution because of the short sample period for which data was available.

LAT	Long-run stability of money demand (January 1993 to March 1996, monthly data in logs)				
real M1, real Y, and inflation	by Johansen procedure, one cointegrating vector: 1/				
	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test
	p=0	50.52 **	37.53**	29.7	0.6467
	p≤1	14.10	10.47	15.4	0.2351
	p≤2	4.71*	3.51	3.8	0.1261
	Chow tests: The one step-up Chow test shows that the demand for narrow money went slightly beyond the limit of parameter constancy during the banking crisis in late 1995 (Figures 13.a and b). Forecasts of demand for narrow money were not conducted because of lack of observations.				
real M2, real Y, and change in exchange rate	by Johansen procedure, one cointegrating vector: 1/				
	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test
	p=0	44.69 **	33.20*	29.7	0.5171
	p≤1	19.21*	14.27	15.4	0.4122
	p≤2	0.61	0.45	3.8	0.1715
	Chow tests: The one step-up Chow test shows that the demand for broad money went well beyond the limit of parameter constancy in 1994 and slightly beyond the limit in 1995 (Charts 13.c and d). Forecasts of demand for broad money were not conducted because of lack of observations.				

1/ These results should be considered with caution because of the short sample period for which data was available.

LITH	Long-run stability of money demand ( March 1993 to March 1996, monthly data in logs)				
real M1, real Y, and change in the deposit rate	by Johansen procedure, weak evidence of a cointegrating vector: 1/				
	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test
	p= 0	32.81*	22.63	29.7	0.5017
	p≤ 1	12.61*	8.69	15.4	0.3237
	p≤ 2	1.26	0.87	3.8	0.0425
<p>Chow tests: The demand for narrow money went through a very large structural break when the banking crisis erupted in late 1995-beginning 1996 (Figures 14. a and b).                      Forecasts of demand for narrow money were not conducted because of lack of observations.</p>					
real M2, real Y, and change in the deposit rate	by Johansen procedure, one cointegrating vector: 1/				
	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test
	p= 0	40.23 **	27.75	29.7	0.6258
	p≤ 1	11.72	8.08	15.4	0.3314
	p≤ 2	0.04	0.03	3.8	0.0015
<p>Chow tests: The demand for broad money went through an extremely a large structural break, the largest from all countries reviewed, when the banking crisis erupted in late 1995-beginning 1996 (Figures 14.c and d).                      Forecasts of demand for broad money were not conducted because of lack of observations.</p>					

1/ These results should be considered with caution because of the short sample period for which data was available.

PAR	Long-run stability of money demand (January 1991 to June 1996, monthly data in logs)																				
real M1, real Y, and inflation	<p>by Johansen procedure, one cointegrating vector: 1/</p> <table border="1"> <thead> <tr> <th data-bbox="428 421 651 449">Vectors (<math>H_0 = \text{rank } p</math>)</th> <th data-bbox="743 421 883 449"><math>-T \sum \lg(1 - \mu)</math></th> <th data-bbox="932 421 1052 449">using T-nm</th> <th data-bbox="1089 421 1138 449">95%</th> <th data-bbox="1235 421 1406 449">Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td data-bbox="483 455 537 483"><math>p = 0</math></td> <td data-bbox="781 455 883 483">38.51 **</td> <td data-bbox="964 455 1052 483">34.84*</td> <td data-bbox="1089 455 1138 483">29.7</td> <td data-bbox="1295 455 1377 483">0.3504</td> </tr> <tr> <td data-bbox="483 485 537 512"><math>p \leq 1</math></td> <td data-bbox="781 485 846 512">11.33</td> <td data-bbox="964 485 1052 512">10.25</td> <td data-bbox="1089 485 1138 512">15.4</td> <td data-bbox="1295 485 1377 512">0.1630</td> </tr> <tr> <td data-bbox="483 514 537 542"><math>p \leq 2</math></td> <td data-bbox="781 514 846 542">0.11</td> <td data-bbox="964 514 1052 542">0.10</td> <td data-bbox="1089 514 1138 542">3.8</td> <td data-bbox="1295 514 1377 542">0.0018</td> </tr> </tbody> </table> <p>Chow tests: demand for narrow money went through a large structural break in late 1995, during the banking crisis (Figures 15.a and b).</p> <p>Forecasts of demand for narrow money conducted from mid-1995 onwards; forecast residuals show more variability than previous residuals (Figure 15.e).</p>	Vectors ( $H_0 = \text{rank } p$ )	$-T \sum \lg(1 - \mu)$	using T-nm	95%	Eigenvalue Test	$p = 0$	38.51 **	34.84*	29.7	0.3504	$p \leq 1$	11.33	10.25	15.4	0.1630	$p \leq 2$	0.11	0.10	3.8	0.0018
Vectors ( $H_0 = \text{rank } p$ )	$-T \sum \lg(1 - \mu)$	using T-nm	95%	Eigenvalue Test																	
$p = 0$	38.51 **	34.84*	29.7	0.3504																	
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real M2, real Y, and inflation	<p>by Johansen procedure, one cointegrating vector:</p> <table border="1"> <thead> <tr> <th data-bbox="428 949 651 976">Vectors (<math>H_0 = \text{rank } p</math>)</th> <th data-bbox="743 949 883 976"><math>-T \sum \lg(1 - \mu)</math></th> <th data-bbox="932 949 1052 976">using T-nm</th> <th data-bbox="1089 949 1138 976">95%</th> <th data-bbox="1235 949 1406 976">Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td data-bbox="483 983 537 1010"><math>p = 0</math></td> <td data-bbox="781 983 883 1010">40.15 **</td> <td data-bbox="964 983 1052 1010">36.20**</td> <td data-bbox="1089 983 1138 1010">29.7</td> <td data-bbox="1295 983 1377 1010">0.3496</td> </tr> <tr> <td data-bbox="483 1012 537 1040"><math>p \leq 1</math></td> <td data-bbox="781 1012 846 1040">13.91</td> <td data-bbox="964 1012 1052 1040">12.54</td> <td data-bbox="1089 1012 1138 1040">15.4</td> <td data-bbox="1295 1012 1377 1040">0.1886</td> </tr> <tr> <td data-bbox="483 1042 537 1070"><math>p \leq 2</math></td> <td data-bbox="781 1042 846 1070">1.16</td> <td data-bbox="964 1042 1052 1070">1.04</td> <td data-bbox="1089 1042 1138 1070">3.8</td> <td data-bbox="1295 1042 1377 1070">0.0188</td> </tr> </tbody> </table> <p>Chow tests: the one step-up Chow test shows that the demand for broad money was above the normal levels of parameter constancy in three instances between 1994 and 1996 (Figures 15.c and d).</p> <p>Forecasts of demand for broad money conducted from mid-1995 onwards; forecast residuals show more variability than previous residuals (Figures 15.f).</p>	Vectors ( $H_0 = \text{rank } p$ )	$-T \sum \lg(1 - \mu)$	using T-nm	95%	Eigenvalue Test	$p = 0$	40.15 **	36.20**	29.7	0.3496	$p \leq 1$	13.91	12.54	15.4	0.1886	$p \leq 2$	1.16	1.04	3.8	0.0188
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1/ These results should be considered with caution as well because of the significance measurement inaccuracies of monetary aggregates. Such inaccuracies are due in large part to the pool of unregistered deposits in the Paraguayan banking system, particularly prior, to the 1995 crisis.

PHIL	Long-run stability of money demand (Q1 1980-Q4 1995 quarterly data in logs)																				
real M1, real Y, and inflation	<p>by Johansen procedure, one cointegrating vector:</p> <table border="1" data-bbox="431 417 1406 549"> <thead> <tr> <th>Vectors (Ho=rank p)</th> <th><math>-T\sum \lg(1-\mu)</math></th> <th>using T-nm</th> <th>95%</th> <th>Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td>p=0</td> <td>88.48 **</td> <td>69.17*</td> <td>29.7</td> <td>0.7436</td> </tr> <tr> <td>p≤1</td> <td>13.61</td> <td>10.64</td> <td>15.4</td> <td>0.2115</td> </tr> <tr> <td>p≤2</td> <td>0.53</td> <td>0.42</td> <td>3.8</td> <td>0.0096</td> </tr> </tbody> </table> <p>Chow tests: demand for narrow money were conducted. As one would expect, the Chow tests do not show any structural break after the crisis period, on the contrary, the standard deviation decreases over time. This is because the banking crisis occurred at the beginning of the sample (Figures 16.a and b). For the same reason, no forecast residuals were conducted.</p>	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test	p=0	88.48 **	69.17*	29.7	0.7436	p≤1	13.61	10.64	15.4	0.2115	p≤2	0.53	0.42	3.8	0.0096
Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test																	
p=0	88.48 **	69.17*	29.7	0.7436																	
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real M2, real Y, and inflation	<p>by Johansen procedure, one cointegrating vector:</p> <table border="1" data-bbox="431 917 1406 1049"> <thead> <tr> <th>Vectors (Ho=rank p)</th> <th><math>-T\sum \lg(1-\mu)</math></th> <th>using T-nm</th> <th>95%</th> <th>Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td>p=0</td> <td>51.84 **</td> <td>40.53*</td> <td>29.7</td> <td>0.5555</td> </tr> <tr> <td>p≤1</td> <td>7.25</td> <td>5.66</td> <td>15.4</td> <td>0.1164</td> </tr> <tr> <td>p≤2</td> <td>0.44</td> <td>0.34</td> <td>3.8</td> <td>0.0080</td> </tr> </tbody> </table> <p>Chow tests: demand for broad money were conducted. As for narrow money the Chow tests do not show any structural break after the crisis period, on the contrary, the standard deviation decreases over time, but by less than that of narrow money (Figures 16.c and d). No forecast residuals were conducted for broad money either.</p>	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test	p=0	51.84 **	40.53*	29.7	0.5555	p≤1	7.25	5.66	15.4	0.1164	p≤2	0.44	0.34	3.8	0.0080
Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test																	
p=0	51.84 **	40.53*	29.7	0.5555																	
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VEN	Long-run stability of money demand (January 1983- December 1996, quarterly data in logs)																									
real M1, real Y, exchange rate, and acceleration in prices	<p>by Johansen procedure, one cointegrating vector:1/</p> <table border="1"> <thead> <tr> <th>Vectors (Ho=rank p)</th> <th><math>-T\sum \lg(1-\mu)</math></th> <th>using T-nm</th> <th>95%</th> <th>Eigenvalue Test</th> </tr> </thead> <tbody> <tr> <td>p=0</td> <td>58.00**</td> <td>24.86</td> <td>47.2</td> <td>0.5277</td> </tr> <tr> <td>p≤ 1</td> <td>26.49</td> <td>11.35</td> <td>29.7</td> <td>0.3015</td> </tr> <tr> <td>p≤ 2</td> <td>11.42</td> <td>4.89</td> <td>15.4</td> <td>0.1546</td> </tr> <tr> <td>p≤ 3</td> <td>4.36 *</td> <td>1.87</td> <td>3.8</td> <td>0.0986</td> </tr> </tbody> </table> <p>Chow tests: demand for narrow money went through a large structural break in 1989, and a smaller one in 1990, at the time the macroeconomic adjustment program was put in place.(Figures 17.a and b).</p> <p>Forecasts: demand for narrow money conducted from Jan 1995 onwards; forecast residuals show more or less the same variability as residuals from 1983 to beginning of 1991, but there seems to be some remaining autocorrelation, (Figure 17.e).</p>	Vectors (Ho=rank p)	$-T\sum \lg(1-\mu)$	using T-nm	95%	Eigenvalue Test	p=0	58.00**	24.86	47.2	0.5277	p≤ 1	26.49	11.35	29.7	0.3015	p≤ 2	11.42	4.89	15.4	0.1546	p≤ 3	4.36 *	1.87	3.8	0.0986
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Data source: IFS and country authorities.

1/ Such autocorrelation could not be avoided because of simple size problems.

Notes: A star indicates that the series is stationary at a 5 percent confidence interval; two stars indicate that the series is stationary at a 1 percent confidence interval.

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