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**The Definition of Reserve Money: Does It Matter for Financial Programs?**

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**Abstract**

Does the definition of reserve money matter for the design of Fund-supported financial programs? Specifically, should reserve money be defined to include or exclude banks' excess reserves? Excluding such reserves could permit a build-up of liquidity, while including them may introduce a volatile element not easily controlled by policies. The analysis suggests that (1) the definition of reserve money can have practical consequences for the achievement of program's targets; and (2) unless there are institutional factors that can give rise to large and erratic movements in excess reserves, they should be included in reserve money.

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# THE DEFINITION OF RESERVE MONEY:
## DOES IT MATTER FOR FINANCIAL PROGRAMS?

## I. INTRODUCTION

The financial restraint central to Fund-supported financial programs relies heavily on ceilings on net domestic assets (NDA) and floors on net international reserves (NIR) geared toward achieving targets for monetary aggregates—typically base (or reserve) money and broad money. Developments in some recent programs have brought to the fore questions about the definitions of NDA and base money used in programs. Of specific concern is whether these aggregates should be defined to include or exclude banks' excess reserves.[1] Excluding such reserves could permit an undesirable build-up of potential liquidity, even when program ceilings are being met, while including them may introduce a volatile element not easily controlled in the short term by policies.

A key issue for the conduct of monetary policy, and thus for the design of programs, is the choice of operating and intermediate monetary targets that are most likely to provide reliable signals of whether policies are having the desired impact on the ultimate objectives of the program—inflation, foreign exchange reserves and economic activity. Traditionally, various measures of the money stock—M1, M2 and the like—have been the principal choices for intermediate target variables.[2] The operating target variable, in many Fund-supported programs, is a reserve money aggregate, while performance criteria (ceilings and floors that a country must adhere to in order to make purchases under the program) are generally set on the NIR and NDA of the monetary authority—the latter being defined as the difference between the reserve money aggregate and NIR. This note addresses the basic question of whether the breadth of coverage of the reserve

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[1] The term "excess" reserves is used to refer to those reserves held by banks in excess of legally required reserves and does not necessarily imply "disequilibrium" or "undesired" reserve holdings. For the purposes of this note, excess reserves can be seen as being synonymous with free reserves.

[2] In practise, the link between the intermediate target and the program's ultimate targets is an empirical issue that should be examined before the choice of target is made. It is not, however, dealt with explicitly in this paper which takes as given that most programs' intermediate monetary policy target is broad money.

aggregate and the corresponding credit aggregate matters to the achievement of the program's intermediate targets and, if so, what considerations should guide the choice of the definition used.[3]

The paper is organized as follows: Section 2 describes the definitions of NDA on which program targets are established in current Fund-supported programs; Section 3 discusses the criteria that should, in general, guide the choice of definition; Section 4 outlines some of the implications for program monitoring of the definition of NDA; Section 5 uses the recent experience of Jamaica and Russia to illustrate how the choice of definition could be made and discusses the potential implications for program monitoring of using different NDA definitions; and Section 6 contains some conclusions.

## II.  CURRENT PRACTICE IN FUND PROGRAMS

A variety of definitions of reserve money is used in Fund-supported programs—ranging from a broad measure which includes currency in circulation and all reserve deposits of commercial banks to narrower ones, which exclude excess reserves or include only currency in circulation (Table 1).  Of the 60 programs in place as of end-1995, programs in 10 countries used narrow definitions of reserve money—that is, ones that excluded either total or free reserves of commercial banks.  With respect to the variables on which performance criteria are established, in addition to floors on NIR which virtually all programs had, 2 had ceilings on reserve money and 58 had ceilings on NDA.[4]  Of the latter group, 23 (or 40 percent) had ceilings on the NDA of the banking system, and 35 (or 60 percent) had ceilings on the NDA of the monetary authority.

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[3] This paper does not address issues related to choosing appropriate fiscal, monetary, exchange rate and wage policies which are clearly important for the achievement of the program's final targets, nor does it address issues related to choosing between NDA (of the banking system or of the monetary authority), money or exchange rate targets. The latter are discussed in more detail in Guitian (1973), Aghevli, Khan and Montiel (1991), Guitian (1994), and Alexander, Baliño and Enoch (1995).

[4] Also, in 9 programs, indicative ceilings were placed on reserve money.

## Table 1.   Definition of Reserve Money in Current Fund-Supported Programs

(Stand-by arrangements, EFFs, and ESAFs in place as of end-December 1995)

| | Reserve Money definition | | | Performance criteria | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | Currency in Circulation and Total Reserves | Currency in Circulation and Required Reserves | Currency in Circulation | Ceilings on | | Floor on Net International Reserves | Ceiling on Reserve Money |
| | | | | Net Domestic Assets of the Banking System | Net Domestic Assets of the Monetary Authority | | |
| Albania | x | | | x | | x 1/ | |
| Algeria | x | | | | x | x | |
| Argentina | x | | | | x | | |
| Armenia | x | | | | x | x | |
| Azerbaijan | x | | | | x | x | x 2/ |
| Belarus | x | | | x | x 2/ | x | x |
| Benin | x | | | | x | | |
| Bolivia | | | x | | x | x | |
| Burkina Faso | x | | | | x | | |
| Cambodia | x | | | x | | x | |
| Cameroon | x | | | | x | | |
| Chad | x | | | x | | | |
| Cote d'Ivoire | *x* | | | | *x* | | |
| Croatia | x | | | x | | x | |
| Ecuador | | | x | | x | x | |
| Egypt | x | | | | x | x | |
| El Salvador | | | x | | x | x | |
| Equatorial Guinea | x | | | x | | | |
| Estonia | x | | | | | x | |
| Georgia | x | | | | x | x | x 2/ |
| Ghana | x | | | | x | x | |
| Guinea | x | | | x | | x | |
| Guinea-Bissau | x | | | x | | x | |
| Guyana | | | x | | x | x | |
| Haiti | | | x | | x | x | |
| Honduras | x | | | | x | x | |
| Jamaica | | | x | | x | x | |
| Jordan | x | | | x | | | |
| Kazakstan | x | | | | x | x | |
| Kyrgyz Republic | x | | | | x | x | |
| Lao PDR | x | | | | x | x | |
| Latvia | x | | | x 2/ | x | x | x 2/ |
| Lesotho | x | | | x | | x | |
| Lithuania | x | | | | x | x | |
| Macedonia, FYR | x 3/ | | | x | | x | x 2/ |
| Malawi | x | | | x | | x | |
| Mali | x | | | x | | x | |
| Mauritania | x | | | x | | x | |
| Mexico | | | x | | x | x | |
| Moldova | x | | | | x | x | x 2/ |
| Mongolia | x | | | x | | x | |
| Mozambique | x | | | x | | x 4/ | |
| Nicaragua | | | x | | x | x | |
| Pakistan | x | | | | x | x | x 2/ |
| Papua New Guinea | *x* | | | *x* | | *x* | |
| Peru | | | x | | x | x | |
| Philippines | x | | | | | x | x |
| Poland | x | | | x | | x | |
| Romania | x | | | x | | x | x 2/ |
| Russian Federation | | x | | | x | x | |
| Senegal | x | | | x | | | |
| Sierra Leone | x | | | | x | x | |
| Slovak Republic | x | | | x | | x | |
| Togo | x | | | x | | | |
| Turkey | x | | | | x | x | |
| Uganda | x | | | | x | x 1/ | |
| Ukraine | x | | | | x | x | x 2/ |
| Uzbekistan | x | | | | x | x | x 2/ |
| Vietnam | x | | | x | | x | |
| Zambia | x | | | | x | x | |

1/ Gross reserves.
2/ Indicative limit.
3/ Includes currency and excess reserves, but excludes required reserves.
4/ Net foreign assets of the banking system.

## III. CRITERIA FOR SELECTING THE OPERATING TARGET DEFINITION

Several considerations bear on the choice of the reserve money aggregate which is to be used as the operating target of monetary policy.

### A. Predictability

An important consideration is the predictability and stability of the behavior of the chosen operating target. In textbook discussions of reserve money and monetary policy, excess reserves are typically viewed as an indicator of the ease or tightness of monetary policy. In general, to the extent that there is a well-defined and stable demand by banks' for excess reserves that depends, inter alia, on the opportunity cost of holding these reserves, the central bank is better able to interpret movements in these reserves and can exercise influence over them, for example, through short-term security transactions and changes in interest rates.

However, there may be circumstances in which movements in excess reserves are too volatile to be usefully included in a target or control variable. Moreover, movements in excess reserves may not necessarily reflect actual or potential movements in liquidity. In particular, there may be institutional factors, such as deficiencies in the payments and clearing systems and in interbank markets, that could introduce an erratic element in movements in the level of the payment float that, in turn, may result in movements in excess reserves.[5]

Both the size and the variability of float can influence the demand for reserves. A highly volatile float complicates commercial banks' liquidity management, while a large float (relative to total deposits) could involve major settlement risks for these banks. Both factors would tend to induce banks to increase their holdings of excess reserves, and in such circumstances, excess reserve holdings may not represent potential future liquidity. In addition, monetary management by the central bank is complicated by the difficulty associated with interpreting movements in excess reserves when the float is large and volatile. Thus, in the presence of a volatile interbank payment

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[5]These factors appear to be of particular relevance in transition economies. These issues have been examined in detail in FSU countries in Sensenbrenner and Sundararajan (1994a and 1994b) and in other transition economies in Baliño, Dhawan and Sundararajan (1994).

float arising from institutional deficiencies, a broad definition of reserve money—which includes excess reserves—could pose problems for liquidity management.

In general, whether excess reserves should be included in, or excluded from, the measure of reserve money is an empirical issue. The more stable and predictable the behavior of reserves, the stronger would be the case for their inclusion in the reserve money aggregate. A practical way to conduct such an analysis is discussed in Section 5 below.

## B. Leading Indicators

Another important consideration in the choice of operating target variable is the extent to which it acts as a leading indicator of the intermediate and the final targets of monetary policy. The use of measures of reserve money that include only currency or currency plus required reserves has typically been justified on the grounds that currency tends to bear the closest relationship with inflation.[6] As pointed out earlier, the relationship between the operating and intermediate targets, on the one hand, and the program's ultimate objectives, on the other, is an empirical issue that should be examined on a case by case basis.

A related but separate issue is how closely the operating and intermediate targets are linked. Clearly, because currency is included in broad money, there is likely to be a close contemporaneous relationship between the two variables. However, the leading indicator nature of the operating target is potentially more important. To the extent that a build-up of banks' excess reserves is used to increase lending, it affects short-term interest rates and is a potential source of monetary expansion. In these circumstances, use of a broader definition of reserve money—which includes excess reserves—would be preferable. Such a measure would permit a more accurate interpretation of monetary developments and liquidity conditions, and provide early and more transparent signals of potential strains on program objectives and targets. However, as will be discussed further in Section 4 below, if movements in excess reserves are largely the counterpart of movements in the

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[6]As can be seen from Table 1, there is a preponderance of Latin American countries in the group using narrower measures of reserve money. This approach is typically justified on the grounds that currency is the monetary aggregate most closely related to inflation.

payment float, the "leading indicator" relationship between reserve money and broad money is likely to be weaker.

An analysis of leading indicators can be performed using Granger causality tests between broad money (the intermediate target) and the alternative measures of the operating target, while controlling for some of the other influences on broad money, such as economic activity and inflation.[7] If the bulk of the variation in excess reserves does in fact reflect changes in the stance of monetary policy, then it could be expected that the broader measures of the reserve aggregate (and the corresponding NDA definition) would better predict movements in monetary conditions. An illustration of such an analysis is presented in Section 5 below.

## IV. IMPLICATIONS FOR PROGRAM DESIGN

The choice of whether or not to include excess reserves in reserve money has a counterpart in the measure of NDA used for program monitoring. This section explores the operational implications of different measures of NDA for liquidity management, depending on the source of movements in excess reserves. Two measures of NDA are considered—one based on a reserve aggregate that includes excess reserves and a second that excludes them.[8] With the narrower measure of reserve money, excess reserves would be counted as negative components of NDA. The

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[7] The variables among which Granger causality is to be examined are typically expressed in the form of a vector autoregression (VAR) in which a vector of endogenous variables, say, $x$, $y$, and $z$ are regressed on their own and each others' lagged values. Contemporaneous and lagged "exogenous" variables can also be included in the system. If lagged values of $y$ are significant in the equation for $x$, then $y$ is said to "predict" or "Granger cause" $x$. The incremental predictive power of each variable for the others is tested using an F-test of the joint significance of the coefficients on the lagged values of that variable in the equation for the other variables. It is well-known that the implementation of these tests can be problematic and, for that reason, the results should be interpreted with caution—not necessarily in the sense of economic explanatory power, but primarily in the sense that $y$ is causally prior to variable $x$. However, for the purposes of this paper, it is sufficient to establish such causal precedence between the operating and intermediate targets.

[8] To simplify the discussion, required reserves are assumed to be zero.

two definitions of NDA on which performance criteria of financial programs can be established are the following:

$$NDA_b = DC + OIN = C + ER - NIR$$

$$NDA_n = DC + OIN - ER = C - NIR = NDA_b - ER$$

where C is currency in circulation; ER is excess reserves; NIR is net international reserves of the central bank; DC is domestic credit; OIN is other items, net; and the subscripts 'b' and 'n' stand for broad and narrow.

From the balance sheet identities above, it can be seen that movements in excess reserves have their counterpart in NIR, DC, C or OIN. In each case, the movements in excess reserves may raise different concerns for liquidity management under the alternative measures of NDA (summarized in Table 2). Assume there are no excess reserves at the program's start.

### A. Unanticipated Foreign Exchange Inflows

For a given exchange rate, these inflows may initially be reflected in the accounts of the Central Bank as an increase in NIR and an increase in monetary liabilities in the form of banks' reserve deposits. Abstracting from the issues relating to the appropriate policy response to these inflows (that is, sterilized or unsterilized intervention, exchange rate appreciation, etc.), what implications would the use of the two definitions of reserve money have for accomplishing the program's targets?

Assuming that the monetary, international reserves and credit aggregates are initially at their program ceilings/floors, the capital inflow would lead to an overperformance on the NIR floor, no change in $NDA_b$ and a fall in $NDA_n$; that is, overperformance on the NDA target as measured by $NDA_n$.[9] The broad measure of reserve money would, however, exceed the programmed path.[10]

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[9]These general conclusions would hold even if the variables were below (above) their program ceilings (floors).

[10]The amount of overperformance on the NIR (and the excess of base money over its ceiling) would be moderated by the extent to which the nominal exchange rate is allowed to appreciate.

**Table 2. The Coverage of Reserve Money And Program Design**

| Sources of increases in excess reserves | Impact on: 1/ | | | | | Possible consistency with inflation targets of performance criteria on: | |
|---|---|---|---|---|---|---|---|
| | NIR | $RM_b$ | $RM_n$ | $NDA_b$ | $NDA_n$ | $NDA_b$ | $NDA_n$ |
| Foreign exchange inflows | ↑ | ↑ | ↔ | ↑ | ↓ | Yes | No |
| Increase in domestic credit | ? | ↑ | ↔ | ↑ | ↔ | Yes | No |
| Decline in currency demand | ? | ↔ | ↓ | ↔ | ↓ | Maybe | No |
| Increase in other items, net; due to movements in the payment float | ↔ | ↑ | ↔ | ↑ | ↔ | No | Yes |

1/ ↑ = increase, ↓ = decrease, ↔ = no change, ? = ambiguous

While all performance criteria would be met using either definition of NDA, the overshooting of the path for broad reserve money would provide warnings of a potential build-up of liquidity.

Moreover, in the case of $NDA_n$, the measurement of excess reserves as a negative component of NDA creates scope for the simultaneous accumulation of excess reserves and greater-than-programmed expansion of domestic credit by the central bank. In these circumstances, program ceilings could be met in the short-term, even while liquidity has been built up (and/or the initial margin of international reserves above the program floor is being run down). Any subsequent reversal of the accumulation of these excess reserves would lead to a loosening of monetary conditions vis-à-vis the program path and could strain compliance with program ceilings.

### B.  Domestic Credit Expansion

The accumulation of excess reserves could result from an expansion of domestic credit, for example, due to a surge in government payments, financed by credit from the central bank. In this case, there would be no direct effect on $NDA_n$ or in the narrow measure of reserve money. However, $NDA_b$ would rise, signaling the potential for an expansion of liquidity. As in the previous example, a future decumulation of these reserves would lead to a loosening of liquidity conditions relative to the program path and could threaten the attainment of the program's targets.

### C.  Shifts in the Demand for Cash

A change in the public's preference for holding cash relative to deposits could also affect excess reserves. A decline in the demand for currency in circulation, for example, would be matched by an increase in banks' reserves. In this case, neither definition of NDA would provide a clear signal of the potential easing of monetary conditions that takes place through the increase in the money multiplier. In particular, there would be no change in $NDA_b$ or in the broad measure of reserve money, even though there is now an increase in the potential for liquidity expansion. However, the link between the operating target and the intermediate target is potentially further weakened in the case of $NDA_n$ which would fall below the program path, thus creating the leeway for additional liquidity expansion as in the two examples discussed above. The blurring of the signals between the operating target and the intermediate target would also occur in the case of an

increase in the demand for cash. While there would be no change in $NDA_b$, $NDA_n$ would increase, signaling an expansion even though liquidity conditions were actually becoming tighter.

### D. Movements in Other Items, Net

A final case is when the increase or decrease of excess reserves reflects erratic changes in the payment float due to weaknesses in payments systems, which would have its counterpart in movements in other items, net.[11] By definition, such movements in the payment float would be reversed and therefore do not represent shifts in liquidity. In the case of an increase in excess reserves, for example, there would be no measured change in $NDA_n$ or the narrow measure of reserve money, while $NDA_b$ would increase. In the latter case, the authorities could be forced to adopt an unduly restrictive policy stance to offset the temporary increase in excess reserves (or in other items, net), that could result in volatile movements in interest rates and credit conditions.

To sum up, in three of the four cases, a strong case can be made for including excess reserves in the definition of reserve money (and in the corresponding NDA target). In the fourth case, the main problem for monetary management of including excess reserves would be the short-term volatility of such reserves and the possibility that such movements are unrelated to current or future monetary conditions. However, the alternative of excluding excess reserves from the measure of reserve money altogether risks generating inappropriate policy responses when movements in excess reserves arise from sources other than the payment float.

One way to resolve the trade-off between these two concerns—the volatility of excess reserves with its attendant consequences for monetary management versus the potential for an undesired build-up of liquidity—is to include a lagged moving average, rather than current values, of excess reserves in the operating target variable, on the grounds that such a measure would serve to filter the signal from the noise of movements in excess reserves.

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[11] The term "float" refers to the amount that has been debited (credited) from a payor's (payee's) account before the corresponding credit (debit) entry has been posted in a payee's (payor's) account. The difference in the timing of crediting and debiting accounts arises from delays in the transmission of information, processing of payments, inefficient clearing procedures and settlement methods, etc.

The discussion so far has been based on the assumption that there are no excess reserves at the start of the program period. However, the conclusions in the case when there is a <u>positive stock of excess reserves</u> at the outset of the program are consistent with the ones above—i.e., that $NDA_b$ is preferred if the demand for reserves is stable. Specifically, when there is a pre-existing stock of excess reserves, there maybe a concern that these reserves can unexpectedly be drawn down during the program period resulting in an increase in the money multiplier and a loosening of monetary conditions relative to those envisaged under the program. A performance criterion on $NDA_n$ would ensure that reductions in the stock of excess reserves were offset by a reduction in domestic credit. By contrast, in these circumstances of an unstable demand for reserves, a performance criterion on $NDA_b$ would not provide such a safeguard.

However, if the broader measures of reserve money and NDA were to be chosen on the basis of criteria discussed in Section 3, the financial program would need to anticipate the elimination of these reserve holdings. The risk of a drop in excess reserves creating excessive liquidity could be overcome by applying an asymmetric adjuster to the performance criterion on $NDA_b$. The adjuster would specify that if excess reserves fell below the level at the start of the program, the $NDA_b$ ceiling would be adjusted downward by an equivalent amount. Increases in the stock of excess reserves would not, however, entail an increase in the $NDA_b$ ceiling, thus ensuring that the program is protected from the build-up in liquidity associated with an increase in excess reserves.

The different operational implications of whether or not excess reserves are included in the reserve aggregate implies that the choice between such aggregates should be given careful consideration. Depending on the source and causes of fluctuations in excess reserves, the choice of whether or not to place ceilings on $NDA_b$ or $NDA_n$ affects the monetary policy response. In practice, the choice between alternative operating targets to guide monetary policy is largely an empirical issue. This is illustrated below using the examples of two countries—Jamaica and Russia.

# V.  COUNTRY EXAMPLES

The two country examples are used, first, to illustrate how the choice of NDA coverage could be made; and, second, to examine the implications for program targets of using the two alternative measures of NDA.  Jamaica was chosen to represent the group of Western Hemisphere countries where most programs are based on $NDA_n$, and Russia, because it permits a discussion of the problems involved in designing a program in transition economies where a large and variable payment float may exist.

The behavior of banks' demand for, and the central bank's supply of excess reserves has been extensively studied, generally in the context of models of the money supply process in industrial countries: for example, Frost (1971), Kaufman and Lombra (1980), Coleman, Gilles and Labadie (1993), Brunner (1994) and Bernanke and Mihov (1995).  In most such models, a reduced-form equation is specified, with excess reserves being a function of short-term interest rates, the discount rate, the level or the variance of total deposits, reserve requirement ratios, measures of open market operations, and sometimes, dummy variables to capture the effect of important changes in banking regulations and operating procedures of monetary policy.

Due to the short length of time-series available and the fact that major structural shifts took place (especially in Russia) during the period under consideration, such an approach was not pursued here.  Instead, movements in excess reserves were "decomposed" into their balance sheet components.  If excess reserve movements appear to reflect primarily changes in NIR, cash or domestic credit, it could be argued that they should be included in the coverage of the operating target (see Section 4).  If, however, movements in excess reserves appear to be largely driven by changes in "other items, net" which includes the payment float, the case for exclusion would be strengthened.

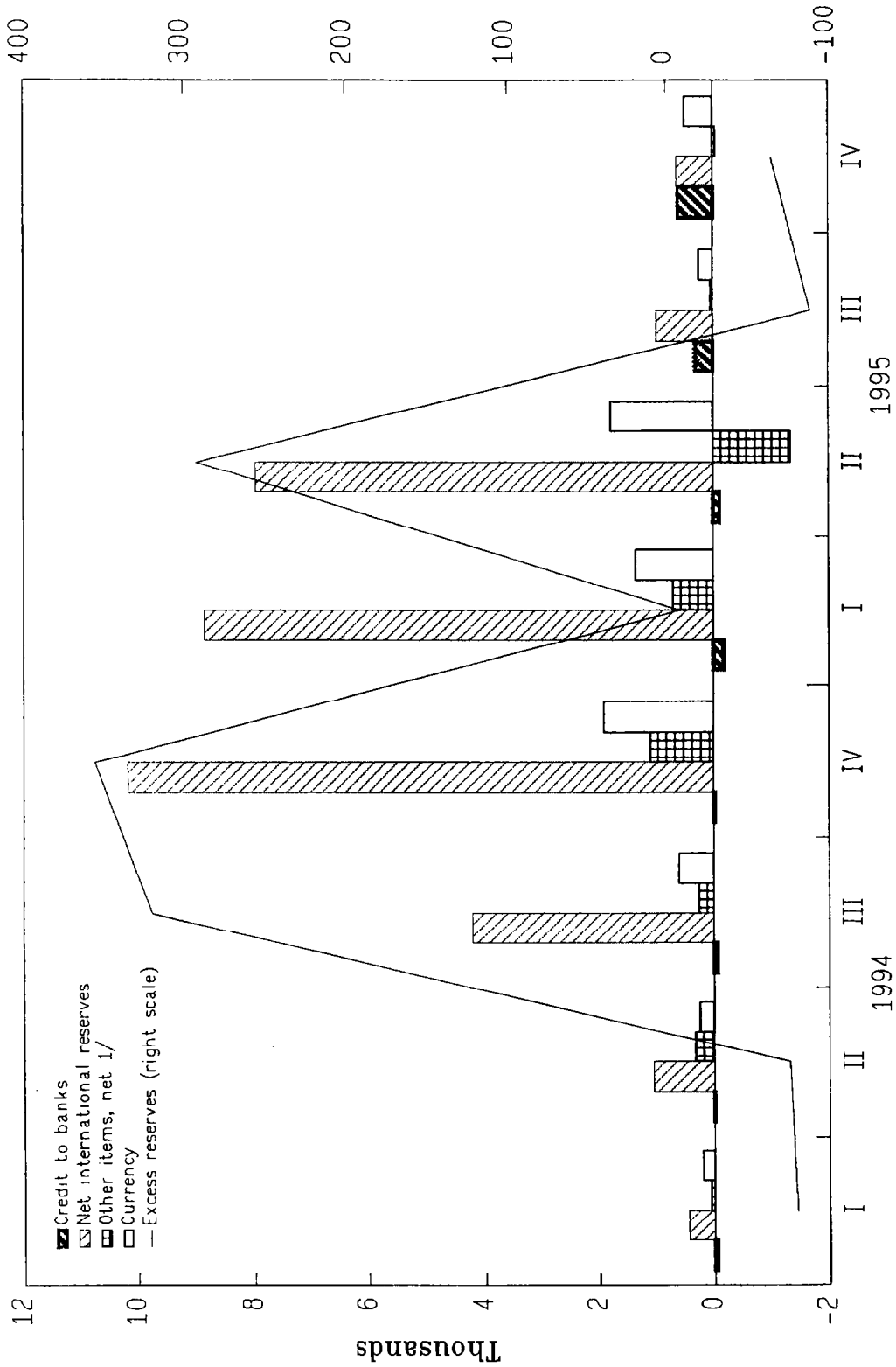## A.  Jamaica

### Source of movements in excess reserves

An examination of the contributions to the growth in excess reserves of credit to banks, NIR and OIN (Chart 1) in Jamaica shows that the largest contribution consistently came from NIR, while

CHART 1

JAMAICA

# Factors Contributing to Changes in Excess Reserves
### (Changes over 12 months; in percent of initial stock of excess reserves)



Legend:
- Credit to banks
- Net international reserves
- Other items, net 1/
- Currency
- Excess reserves (right scale)

1/ Other items net are calculated as reserve money less NIR less credit to banks less net claims on the public sector.

credit to banks and OIN were small in comparison. Also, there is no evidence of a negative relationship between movements in currency and excess reserves, as would be expected if changes in excess reserves had reflected changes in preferences between currency and bank deposits.

An examination of the behavior of excess reserves and the payment float (Chart 2), reveals that excess reserves averaged about 2 percent of broad reserve money during this period. Net payment float (which averaged about 0.4 percent of reserve money) was somewhat larger and considerably more variable than net payment float, say, in the United States, where it varied between 0.7 and -0.2 percent of reserve money over the same period. However, the data shown in the chart do not suggest that there is a particularly close positive association between movements (changes over 12 months) in excess reserves and changes in the float.

**Which reserve aggregate is a better leading indicator of broad monetary aggregates?**

To the extent that excess reserve movements reflect changes in the payment float and are unrelated to fundamental movements in liquidity, it could be expected that narrow reserve money (or the corresponding definition of NDA) would have a (more stable and) closer causal relationship with broad monetary aggregates, such as M2. Tests of Granger causality between broad money on the one hand, and currency or broad reserve money on the other, however, suggest that there is strong evidence that reserve money growth "Granger causes" broad money growth in Jamaica, but that the same is not true for currency.[12]
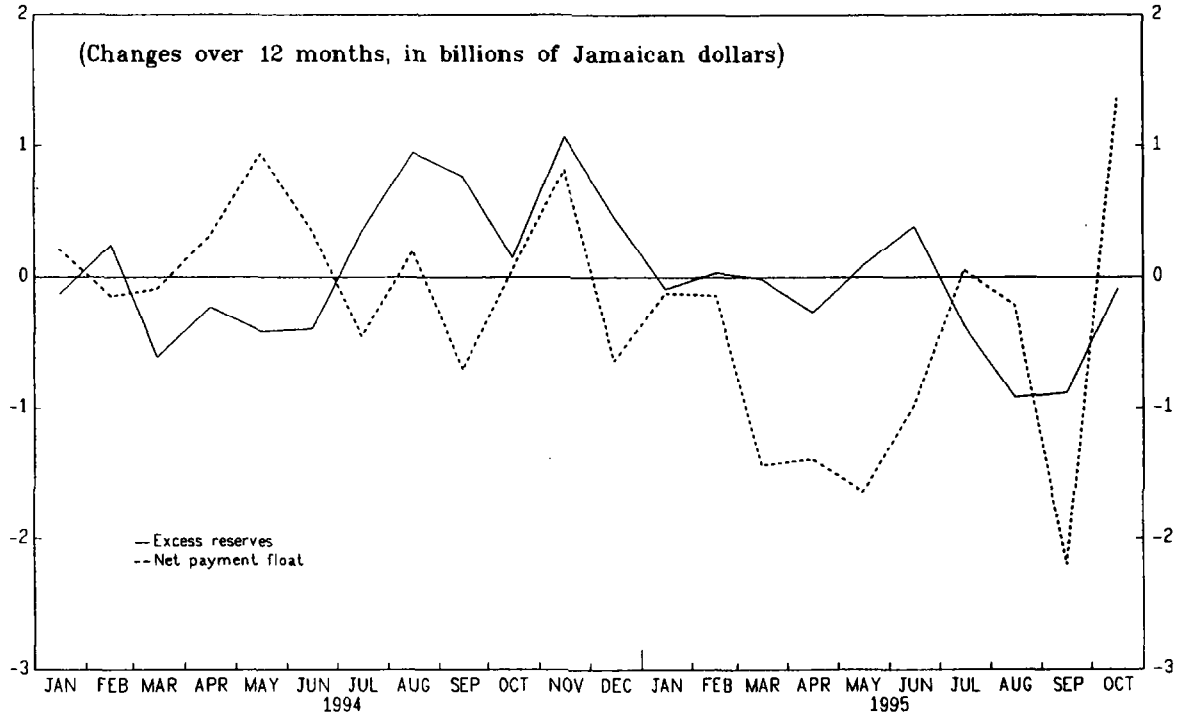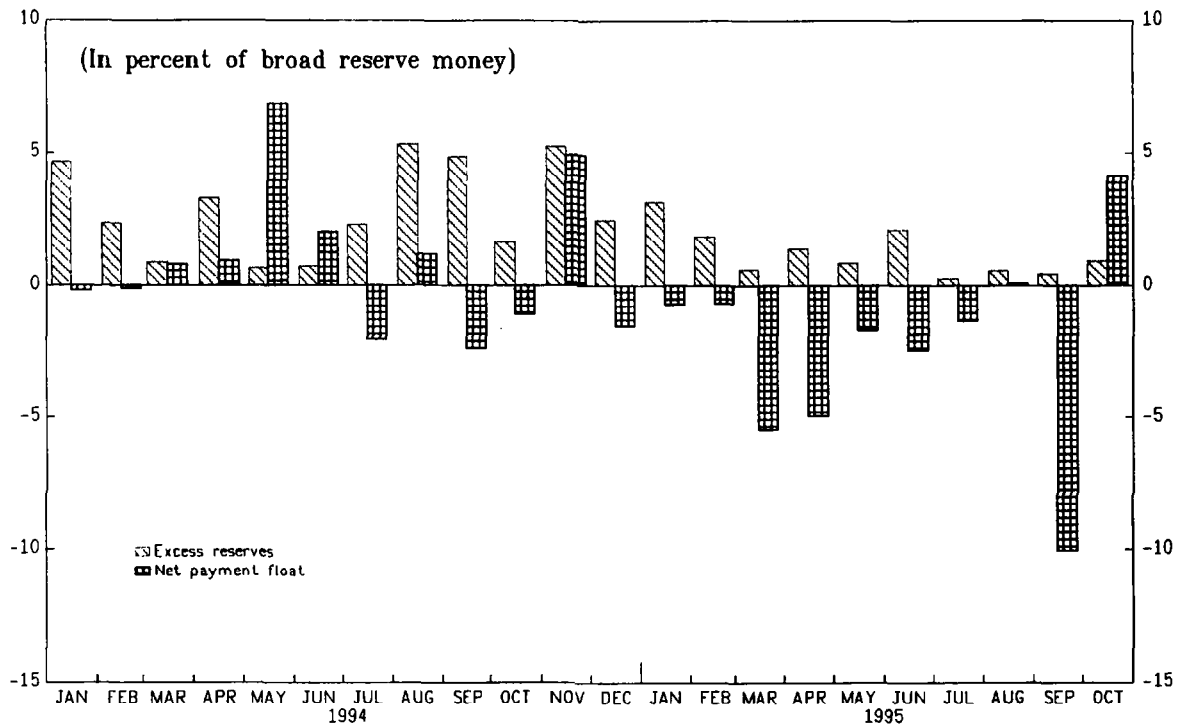
The available evidence therefore suggests that movements in excess reserves appear to be closely linked to those in NIR. The institutional features of the payments and clearing system in Jamaica do not offer strong reasons to believe that payment system inefficiencies are likely to be an

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[12]Granger causality is examined using a vector autoregression of two lags of seasonally adjusted monthly data for broad money (M2), reserve money and currency, after controlling for lagged inflation over the period 1993 to 1995. The data were expressed in logs and first differences prior to estimation. The probability of accepting the null hypothesis that growth in reserve money does not Granger cause broad money growth is about 0.06, while that of accepting the hypothesis that growth in currency does not Granger cause broad money growth is 0.5. The results reported here are robust to variations in the sample period and the choice of the lag length, although the latter is constrained by the length of the available time series. Details of these tests can be provided upon request.

CHART 2

JAMAICA

# Excess Reserves and Net Payment Float, 1994-95

(In percent of broad reserve money)

Excess reserves
Net payment float

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT
1994                                               1995

(Changes over 12 months, in billions of Jamaican dollars)

—Excess reserves
--Net payment float

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT
1994                                               1995

important issue. Furthermore, there is strong evidence that the broader reserve aggregate is a better leading indicator of monetary developments than currency alone. Taken together, the analysis above would suggest that there is no reason to exclude excess reserves from the operating target of monetary policy.

**Developments under the program**

In the most recent extended arrangement with Jamaica (December 1992 to February 1996), program ceilings were established on NDA defined as the difference between currency and NIR. This choice of a narrow measure of NDA blurred the link between the operating and intermediate target of monetary policy so that intended and actual outcomes of monetary policy actions were often in conflict. For example, at some test dates during 1995, the monetary authorities were able to avoid unpalatable reductions in credit while meeting the ceilings on $NDA_n$ by purchasing foreign exchange and increasing NIR. This tactic relied on the assumption that, at least in the short-term, currency would not increase by an equivalent amount and banks' would accumulate reserves, thereby relieving pressure on the $NDA_n$ ceilings.
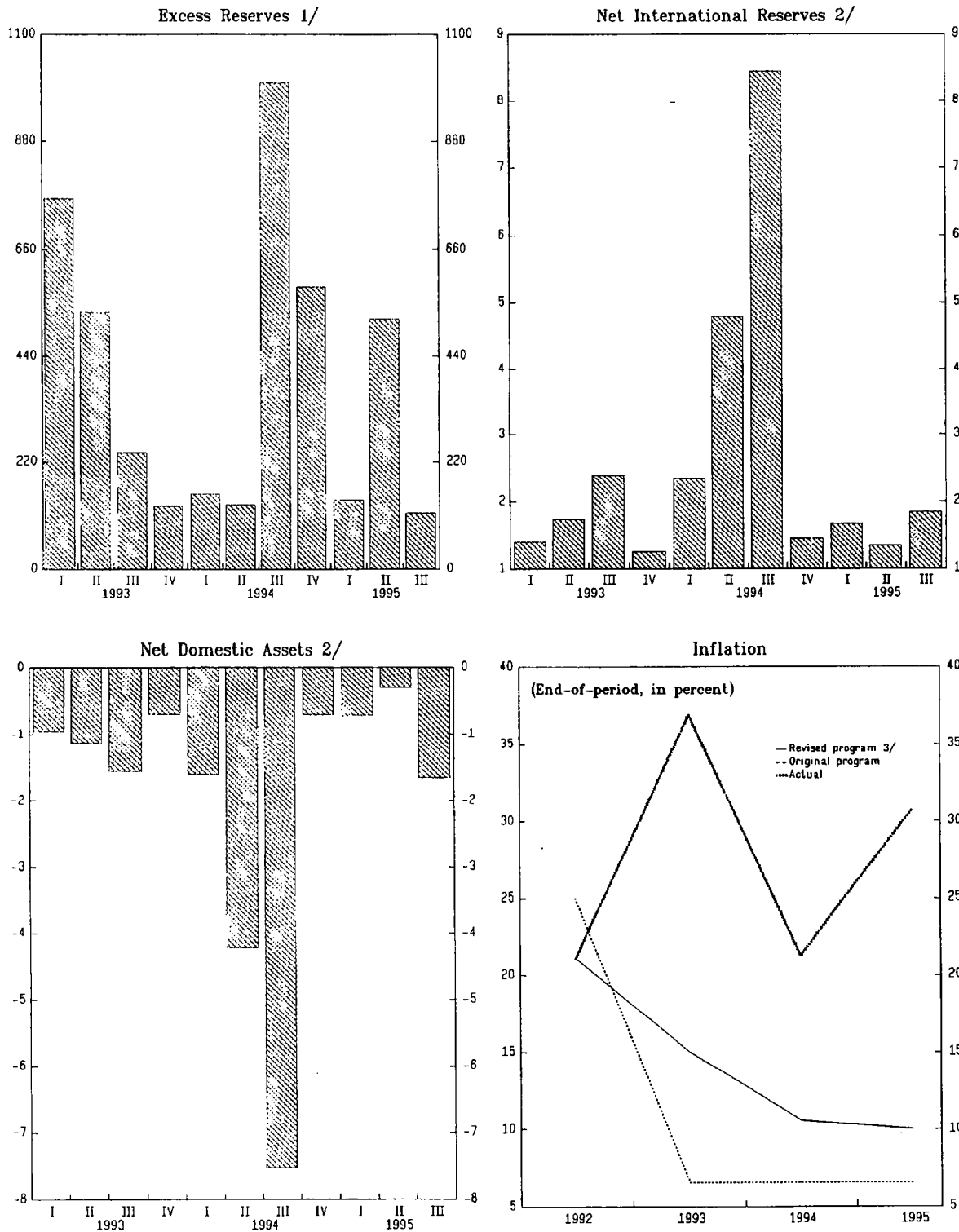
The gap between actual and program levels of NIR, and $NDA_n$ is shown in Chart 3 together with targeted and actual inflation rates. A striking finding is that inflation targets were consistently overshot at the same time that all of the performance criteria on $NDA_n$ were met. In contrast, a performance criterion on $NDA_b$ would have focused attention on the build-up of liquidity associated with the accumulation of excess reserves, requiring either a reversal of the foreign exchange purchases or offsetting action on domestic credit. In this way, a performance criterion on $NDA_b$ may have permitted the authorities to head off the risk of higher inflation than envisaged under the program and prevent the persistent overshooting of actual inflation over program targets.[13] Indeed,

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[13]While the inflation outcome vis-a-vis the program cannot be attributed entirely to the choice of reserve money or NDA measure, it is nevertheless noteworthy that inflation targets were consistently missed when NDA targets were met. Since about 1990, inflation in Jamaica would appear to be largely attributable to wage growth in excess of productivity gains resulting in losses in competitiveness and downward pressure on the currency. The concomitant inflationary pressures have tended to be accommodated by monetary growth. Clearly, the only way to establish, in a more definitive manner, the conclusion that performance criteria on $NDA_b$ would have delivered a better outcome would be to construct a counterfactual program with targets on $NDA_b$—an extremely difficult task.

CHART 3

JAMAICA

# Developments in Monetary Aggregates and Inflation
## (In billions of Jamaican dollars, unless otherwise specified)

Excess Reserves 1/

Net International Reserves 2/

Net Domestic Assets 2/

Inflation

(End-of-period, in percent)

—Revised program 3/
-- Original program
---Actual

1/   In millions of Jamaican dollars.
2/   Actual less program levels.
3/   Based on revisions during the first, third and fourth reviews.

the Jamaican authorities subsequently recognized the problems associated with targeting currency and have recently moved to using a broad measure of reserve money as the operating target for monetary policy.

## B. Russia

### Sources of movements in excess reserves

A decomposition of the source of growth in excess reserves for Russia suggests that much of the movement in excess reserves during 1994 can be associated with changes in domestic credit, while during 1995, both changes in domestic credit and in NIR appear to have contributed (Chart 4). Contributions from movements in OIN were smaller in comparison, and progressively declined over this period. If movements in excess reserves are largely a reflection of changes in the demand for currency, excess reserves and currency could be expected to move in opposite directions. However, no such clear pattern is evident during the period under consideration.

Turning next to the association between excess reserves and the payment float, excess reserves and net payment float as a share of the broad measure of reserve money and changes over 12-months in excess reserves and net payment float are shown in Chart 5. Excess reserves were relatively large, averaging about 19 percent of broad reserve money in 1994-95, although a declining trend is evident in the second half of 1995. Payment float relative to reserve money was both larger and considerably more variable than in, for example, the United States (where it varied between 0.7 percent and -0.2 percent of reserve money over the same period).[14] An examination of the
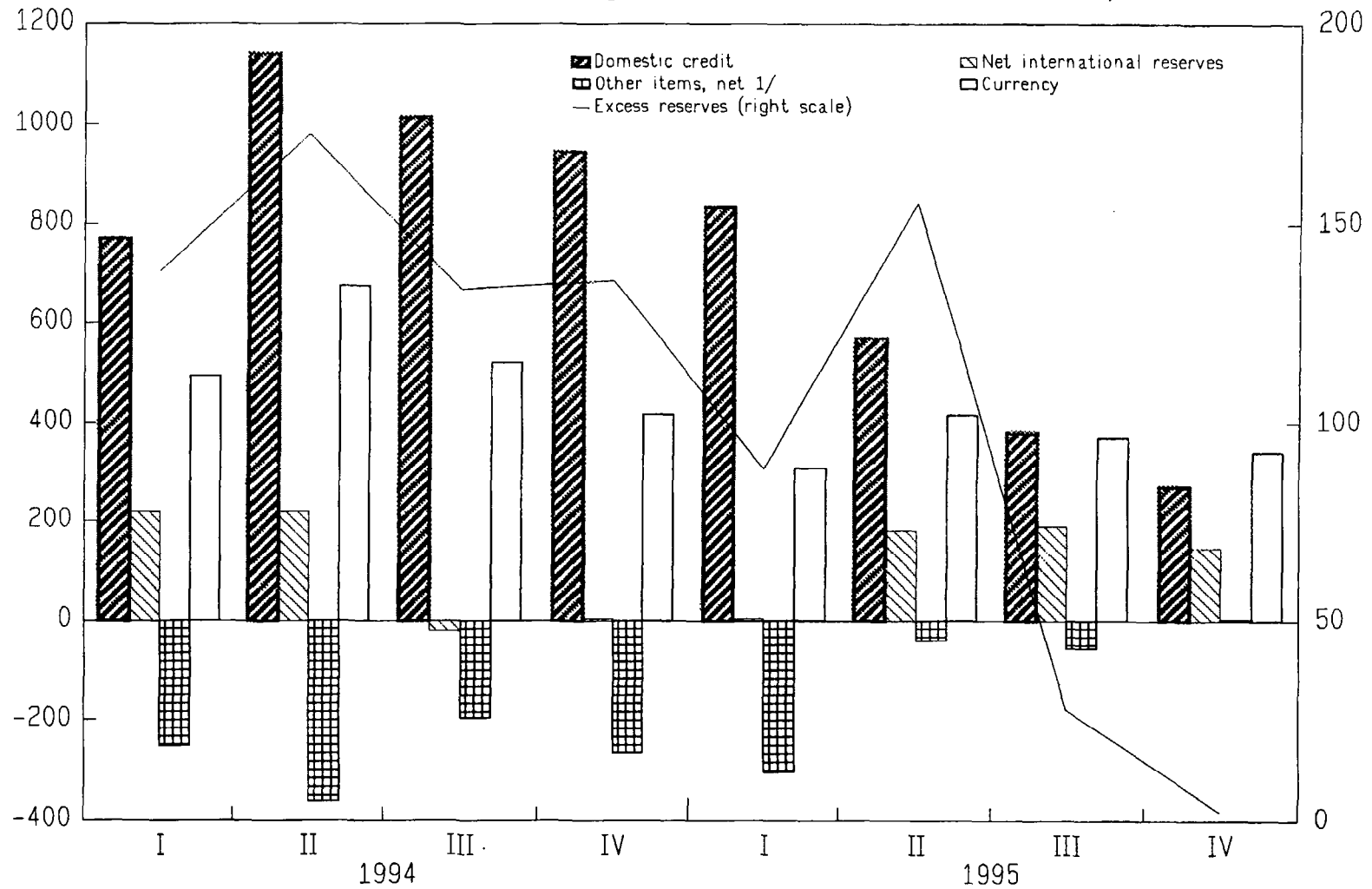
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[14]Sensenbrenner and Sundararajan (1994a and 1994b) estimate an equation for the behavior of the net payment float in Russia during the period May 1992 to May 1994. The estimated coefficients suggest that an increase in credit to the government results in an increase in the payment float, while an increase in inflation and payment system reforms in late 1992 and early 1993 (represented by dummy variables) reduces it. However, the estimated equation explained less than 50 percent of the variation in the payment float, suggesting that movements in float during this period were dominated by erratic elements and therefore were difficult to predict. An important finding from an examination of the residuals from this equation over different sub-sample periods was that other banking reforms (not captured by the dummies) also served to reduce the variability of payment float over time, suggesting that the "unpredictable" element of the float was becoming progressively smaller.
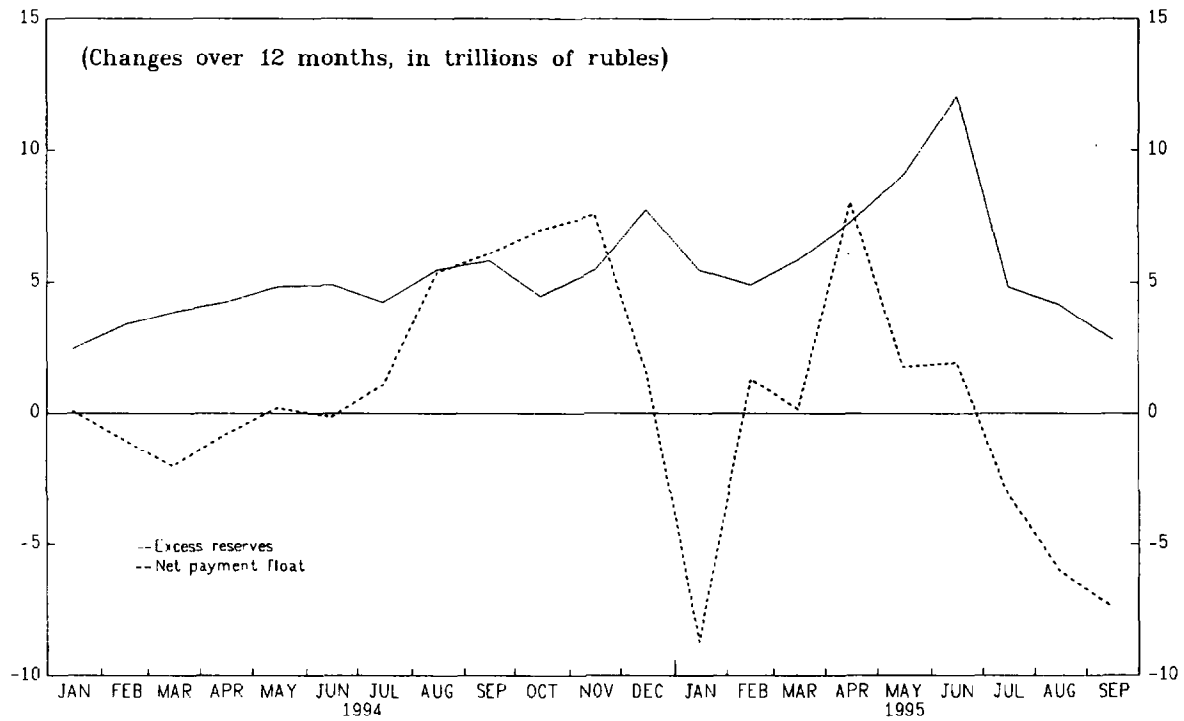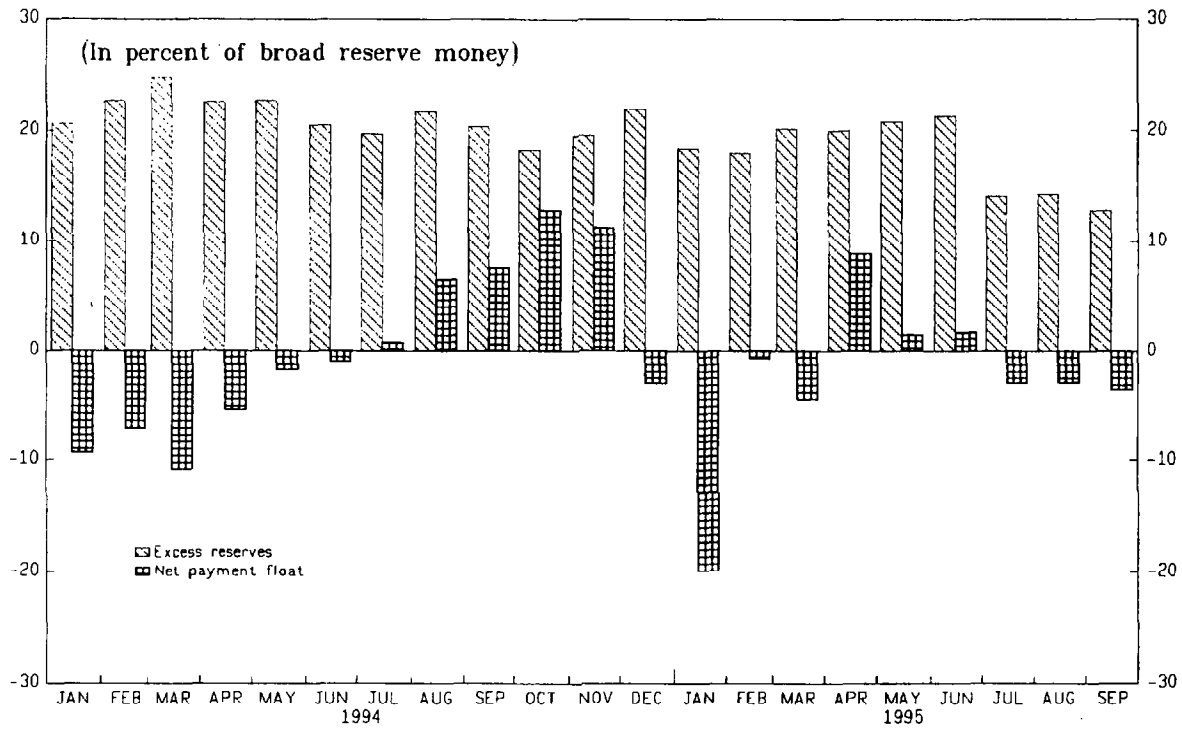
CHART 4

RUSSIA
# Factors Contributing to Changes in Excess Reserves
## (Changes over 12 months; in percent of initial stock of excess reserves)



Legend:
- ▨ Domestic credit
- ⊞ Other items, net 1/
- — Excess reserves (right scale)
- ◩ Net international reserves
- ☐ Currency

1994    1995

1/ Other items net are calculated as reserve money less NIR less credit to banks less net claims on the public sector.

CHART 5

RUSSIA

# Excess Reserves and Net Payment Float, 1994-95

(In percent of broad reserve money)

☐ Excess reserves
▥ Net payment float

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

1994                                                      1995

(Changes over 12 months, in trillions of rubles)

-- Excess reserves
-- Net payment float

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

1994                                                      1995

association between movements in excess reserves and in the payment float (measured by changes over the preceding twelve-month period) reveals that changes in excess reserves do not appear to have been particularly closely related to those in the net payment float.
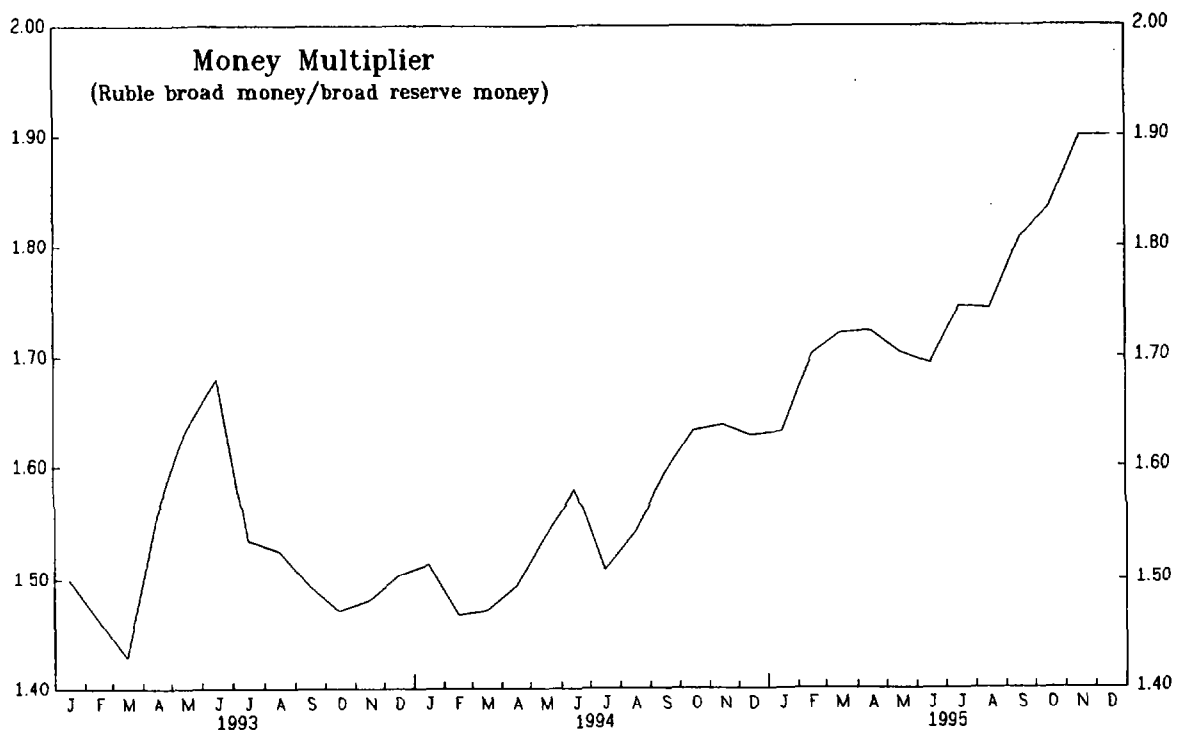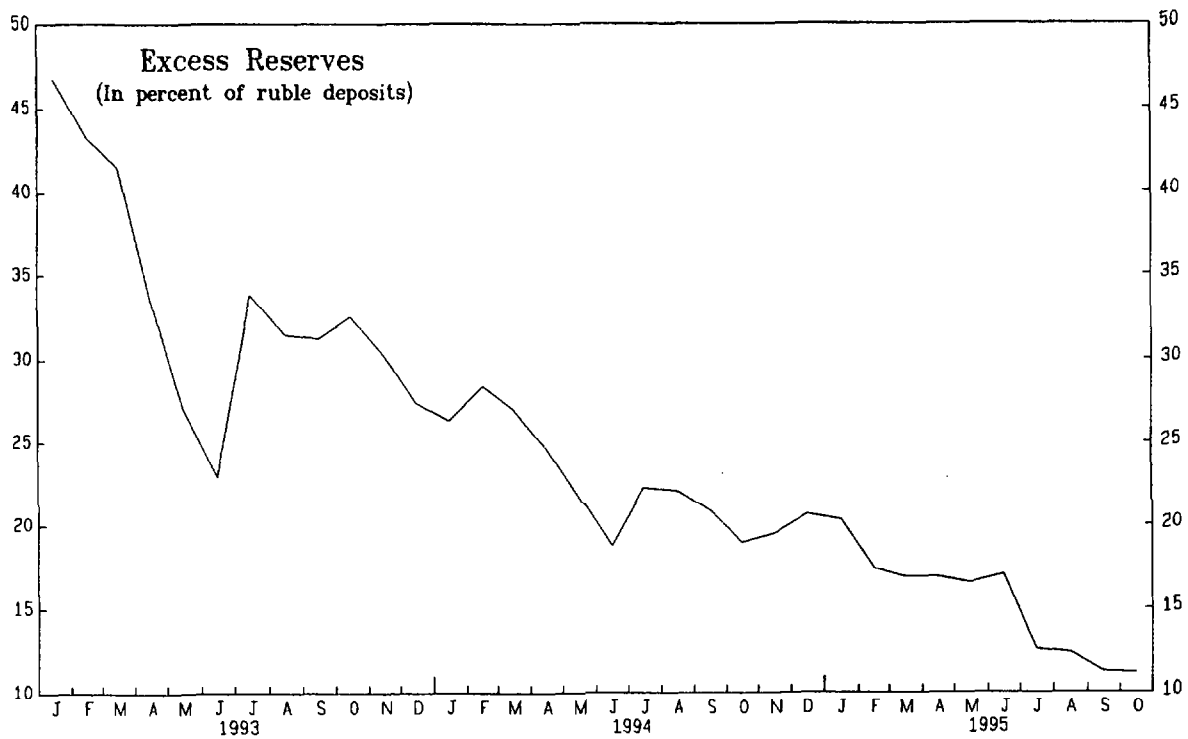
**Which NDA measure is a better indicator of movements in broad money?**

Granger causality tests are used to examine the "causal" relationship between the narrow or broad measures of reserve money, on the one hand, and broad money, on the other, after controlling for real GDP growth and inflation.[15] These tests suggest that the narrow measure of reserve money is a better leading indicator of ruble broad money than the broad measure.[16] This result is somewhat puzzling in view of the fact that changes in the net payment float (or more generally, in "other items, net") appear to have contributed relatively little to changes in excess reserves over the period under consideration, which would imply that the broad measure of reserve money should be a better leading indicator of broad money. These apparently contradictory findings may be reconciled by taking into account the fact that there existed a positive, but declining, stock of excess reserves during most of the sample period (Chart 6). When excess reserves are being drawn down, the interpretation of the results of the Granger causality tests is not straightforward. In particular, when excess reserves are being drawn down, the broad measure of reserve money would decline, even though, *ceteris paribus*, the money multiplier and broad money would be

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[15]Granger causality is examined using a vector autoregression of one lag of seasonally adjusted monthly broad money and narrow and broad measures of reserve money (from 1993 to 1995), after controlling for lagged inflation and lagged GDP growth. The variables were expressed in logs and first differences.

[16]The probability of accepting the null hypothesis that changes in narrow reserve money do not "cause" changes in ruble broad money is 0.02 while that of the null hypothesis that changes in broad reserve money does not "cause" ruble broad money is higher (equal to about 0.23). However, an important caveat is in order. The results reported here are extremely sensitive to the choice of time period and lag length, which is not surprising given the extent of structural changes that were taking place in Russia during the sample period. The results should therefore be interpreted with caution.

RUSSIA

# Excess Reserves and the Money Multiplier 1/



**Excess Reserves**
(In percent of ruble deposits)

**Money Multiplier**
(Ruble broad money/broad reserve money)

1/ Based on seasonally adjusted data.

increasing.[17] Thus, the observed predictive power of broad reserve money for broad money would be lower. However, this finding should not, by itself, imply choosing the narrow measure of reserve money. As the ratio of excess reserves to banks' deposit liabilities approaches more normal levels, reserve holdings may become an increasingly important predictor of actual or potential movements in liquidity. Under these circumstances, it would be advisable to keep the choice of target variables under constant review.

**Developments under the 1995 stand-by arrangement**

In Russia's first Fund-supported program (STF), a measure of reserve money which included excess reserves was used. However, in view of the large, and rapidly declining stock of excess reserves at the time, it was decided that there was a bigger risk to the program from the drawdown of excess reserves than from incipient build-up of such balances. Therefore, a narrow measure of reserve money (currency plus required reserves) was used in subsequent programs. In particular, reserve money was defined to include currency and required reserves in the program supported by a stand-by arrangement in 1995, and correspondingly, performance criteria were established on $NDA_n$.

Excess reserves averaged about Rub 10 trillion in the second half of 1994, but rose to about Rub 18 trillion by mid-year. The major source of the build-up of excess reserves in May/June 1995 was a surge in capital inflows. The significant overperformance on the NIR targets prompted a review of the program's financial targets, and the surge in capital inflows was assessed to be associated with a larger-than-anticipated increase in money demand. Accordingly, from August 1995, program floors for NIR were raised to reflect the higher-than-anticipated capital inflows, with little or no change to the programmed path of $NDA_n$. The subsequent drawdown of these excess reserves since July 1995 resulted in upward pressure on the NDA ceilings especially in

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[17]Indeed, the negative sign on the coefficient of broad reserve money in the equation for broad money suggests that declines in broad reserve money are accompanied by increase in broad money—a possibility only if the money multiplier is increasing. Details are available upon request.

November/December 1995. In the event, the ceilings on $NDA_n$ were met, but by very narrow margins.

Although actual inflation was consistently higher than program targets during this episode, establishing the extent to which this reflected the choice of reserves money definition is difficult in the absence of a fully specified counterfactual. The use of the narrow definition posed risks in one respect, however, in that it created margins under the $NDA_n$ for credit expansion (Chart 7) which, had they been exploited, could have compounded the externally-sourced expansion in reserve money with faster domestic credit growth.[18]
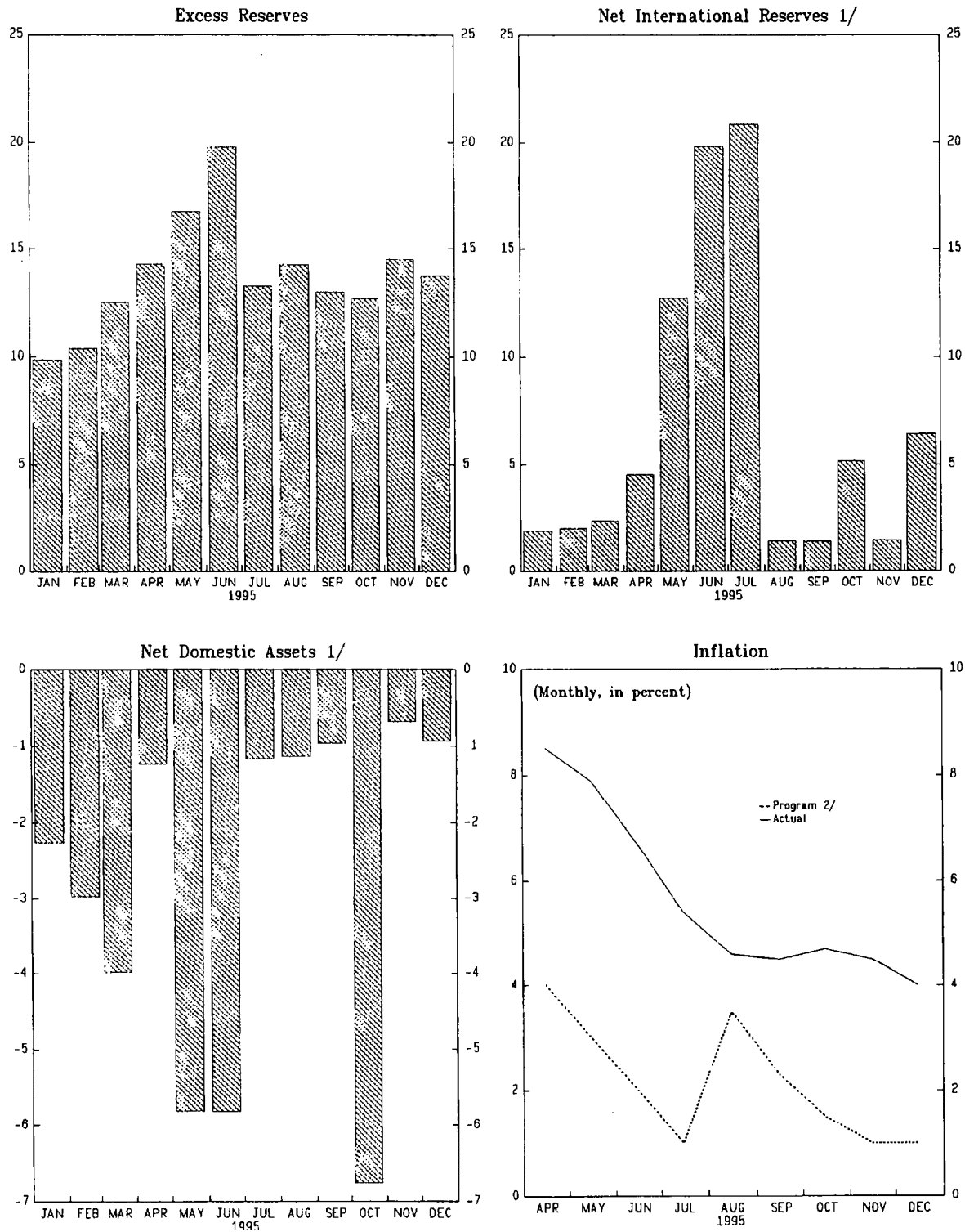
## VI. Conclusions

The foregoing discussion suggests that the choice of reserve money coverage deserves careful consideration in the design of programs, and that it can have practical consequences for the achievement of the program's quantitative targets. It also suggests that this choice is generally an empirical issue that should be examined on a case-by-case basis. The experience of Jamaica and Russia suggests, among other things, that with the growing integration of these economies with the rest of the world, and the attendant increase in capital flows, the importance of excess reserves as a leading indicator of liquidity developments is likely to rise.

Two factors would argue in favor of including excess reserves as well as required reserves in the coverage of the reserve aggregate (and against deducting them from the corresponding definition of NDA upon which program targets are established): first, that movements in excess reserves are broadly predictable; and second, that they serve as leading indicators of future liquidity movements. When these conditions exist, broader definitions of reserve money would be more transparent indicators of the stance of monetary policy and would thus be more useful measures by which to monitor program developments. With narrower definitions, compliance with quantitative

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[18]Some measures were built into the program to guard against the possibility that a rise in excess reserve balances would result in higher-than-programmed credit expansion in the form of targets on credit to the government and an agreed indicative path of gross credit to banks.

CHART 7

RUSSIA
# Developments in Monetary Aggregates and Inflation
## (In trillions of rubles, unless otherwise specified)

### Excess Reserves



### Net International Reserves 1/



### Net Domestic Assets 1/



### Inflation

(Monthly, in percent)

-- Program 2/
— Actual



1/ Actual less program levels.
2/ For April–July, program targets as established at the first quarterly review, from August onwards, program targets established at the second quarterly review.

performance criteria in the short-run may be inconsistent with the achievement of the program's economic objectives, primarily because targets based on narrower definitions of reserve money will not, in general, provide early warning signals of shifts in liquidity associated with excess reserves. Thus there is a risk that corrective action is initiated "too late", that is, after there has been a significant build-up of potential pressures on inflation, net international reserves, and/or the exchange rate.

However, in some circumstances, there may be factors that can give rise to large and erratic movements in excess reserves, which would complicate the use of a broad measure of reserve money as an operating target and as the basis for setting performance criteria. For example, institutional factors in the interbank market that are a source of volatility in excess reserves could unduly complicate monitoring of the program and compliance with program ceilings. In such cases, it may be reasonable to use a measure of reserve money that excludes excess reserves. However, careful and explicit attention should still be given to movements in excess reserves in order to identify the potential for monetary expansion. Consideration could be given to including a lagged moving average of excess reserves in the target aggregate, as an alternative to excluding them altogether. Once payments system reforms are sufficiently advanced so that excess reserves are no longer subject to idiosyncratic movements, the coverage of the operating target should be reconsidered with a view to adopting a more comprehensive measure of reserve money.

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