IMF PAPER ON POLICY ANALYSIS
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INTERNATIONAL MONETARY FUND

European II Department

Monitoring Financial Stabilization in Moldova: The Role of Monetary Policy, Institutional Factors and Statistical Anomalies

by

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December 1994

Abstract

This paper reviews some problems encountered in the design and monitoring of Fund-supported programs in Moldova. Early in the stabilization process a discrepancy emerged between measured inflation and the targeted inflation path that was consistent with the programmed degree of monetary restraint. While several explanations for the sharp acceleration of inflation were considered, attention focused on the possibility that the figures compiled by the Moldovan authorities were biased by statistical anomalies. Inflation data adjusted to correct the published figures for the effects of these anomalies were found to correspond more closely with the degree of monetary restraint in the program.

I. Introduction

In the two years since the Baltic countries, Russia, and the other countries of the former Soviet Union (FSU) joined the International Monetary Fund (IMF), the staff has engaged the authorities of these new members in an ongoing policy dialogue. These discussions have led to Fund-assisted stabilization and reform programs in several countries. While these programs have achieved success in many respects, various problems have been encountered in their design and monitoring owing in part to weaknesses in the statistical bases of these countries. These weaknesses have made it difficult to gauge the initial conditions under which stabilization measures were introduced, and have introduced additional uncertainties in the evaluation of Fund-supported programs.

In Moldova, serious problems of this kind were encountered in 1993 following the introduction of programs supported by the Systemic Transformation Facility (STF) and stand-by arrangement (SBA). In particular, a large discrepancy emerged between measured inflation and the targeted inflation path that was consistent with the programmed degree of monetary restraint, resulting in an unexpectedly sharp rise in velocity. Because it was difficult to reconcile the increase in velocity with other indicators available at the time, particularly the nominal appreciation of the leu, questions regarding program design and the applicability of the underlying theoretical paradigm were raised. On the one hand, some argued that the acceleration of inflation following the implementation of monetary policy under the program indicated that the program was too lax, and that additional tightening was necessary. On the other hand, others argued that the "unique" characteristics of former centrally-planned economies vitiates

the relationship between money and inflation, making them poor candidates for traditional IMF stabilization programs.

This paper reviews the experience of the Fund staff in resolving this anomaly. At the time, several explanations for the acceleration of inflation were considered, including a number of institutional features associated with the introduction of the new national currency, the leu. While these factors could account for some of the higher-than-programmed inflation, attention also focused on the possibility that the inflation figures compiled by the Moldovan statistical authorities were biased by statistical anomalies. Inflation data adjusted to correct the published figures for the effects of these anomalies were found to correspond more closely with the degree of monetary restraint in the program.

II. Macroeconomic Instability and Financial Stabilization

Following the collapse of the Soviet Union, Moldova, as a member of the dysfunctional ruble zone, had little direct control over domestic financial conditions, and thus the rate of inflation, which were determined by the financial policies of the anchor country. By early 1993, the Moldovan authorities confronted an extremely difficult situation: output was declining steadily and expectations of high inflation were deeply entrenched, as inflation exceeded 2,000 percent by year-end 1992. The authorities recognized that the situation was untenable and initiated

discussions with the Fund staff on a program of financial stabilization and structural reforms that would arrest the output decline and establish conditions conducive to growth. Although important progress was made in this regard, a consistent program of financial stabilization could not be formulated in the context of continuing instability in the ruble area.[2]

The demonetization of pre-1993 Russian rubles and the adoption of the Moldovan coupon as a de facto national currency in July 1993 permitted the authorities to exercise greater control over monetary policy and domestic credit conditions. On this basis, a stabilization program supported by the use of Fund resources under the STF was approved in September 1993. The program was subsequently strengthened under an SBA that was approved on December 17, 1993.[3] The revised program aimed to achieve low, single-digit monthly inflation by end-1993, and price stability (monthly inflation of 1 percent) by end-1994 through & sharp deceleration in the monetary aggregates. Under the STF, the monthly growth of base money was envisioned to decline from 23 percent in the second quarter of 1993 to 7 percent by the fourth quarter. A similar profile for the net domestic assets (NDA) of the central bank was also programmed.[4]

Despite the observance of the programmed targets on NDA and broad money, Inflation accelerated significantly. Inflation as measured by the Moldovan authorities increased from about 20 percent in June to almost 60 percent by December 1993 (Table 1). Real money balances declined by 58 percent in the fourth quarter. Although the program envisioned a significant increase in velocity (broad money was targeted to increase by 20 percent over the fourth quarter of 1993, compared with projected inflation of 40 percent over the same period), the sharp acceleration of inflation in the context of financial restraint resulted in a larger-than-expected increase in measured velocity (Chart 1). This development was perplexing, especially as the leu appreciated against the U.S. dollar in nominal terms (Chart 2), and as real interest rates, albeit still negative, moved toward positive levels.

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[2] Monthly inflation averaged about 20 percent through the first half of 1993, in line with developments elsewhere in the ruble area.

[3] The SBA incorporated the monetary program targets specified in the STF with some modifications.

[4] Base money is defined as currency, required reserves and excess reserves. Net domestic assets are defined as the difference between base money minus net international reserves, including the net position of the National Bank of Moldova correspondent accounts with the central banks of all other FSU countries.

Chart 1

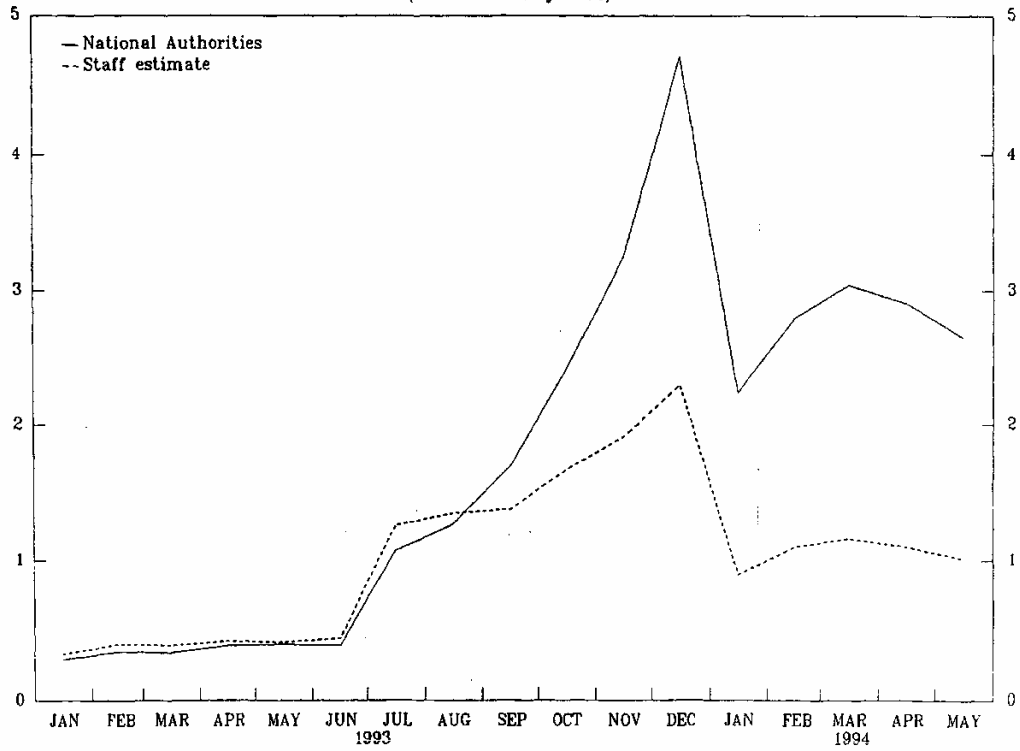## Moldova: Monthly Velocity
(Jan. 1993 - May 1994)

- National Authorities
-- Staff estimate

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY
1993 1994

Chart 2
Moldova: Exchange Rate Developments
Jan. 1993 - May 1994

MDL/US$

Nominal Exchange Rate
(Right scale) _____

Real Exchange Rate (1993=1)
(Left scale)

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY
1993 1994
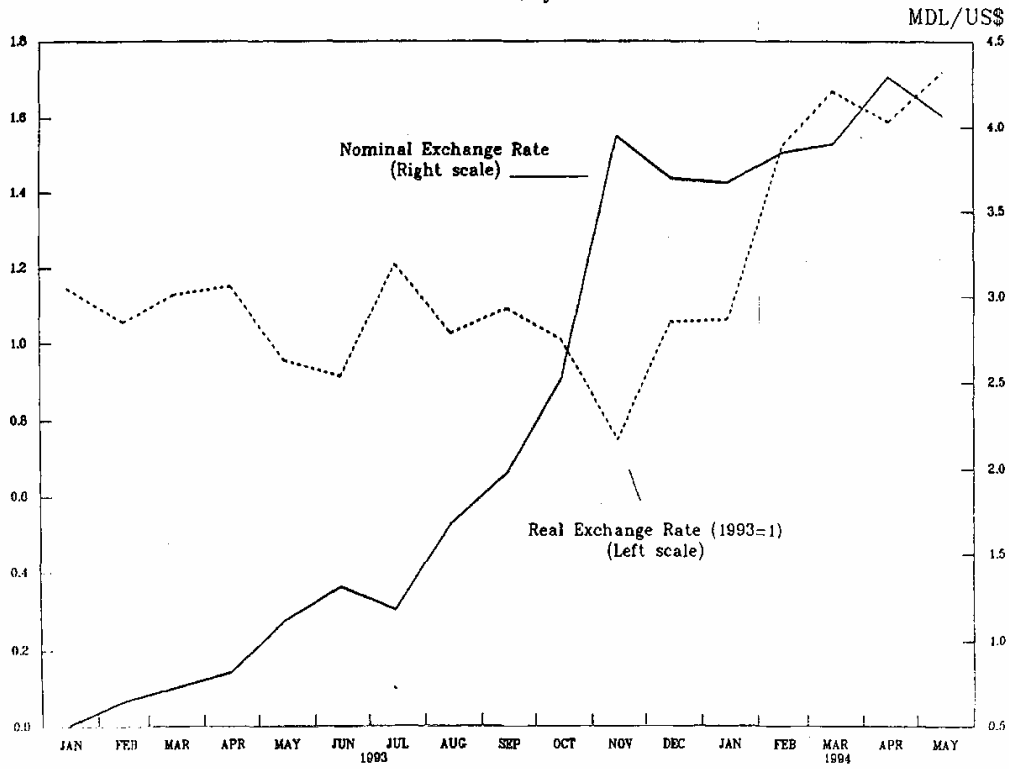
III. Institutional Factors

In an effort to understand the factors behind the acceleration of Inflation, attention focused first on Institutional factors. Although a major price liberalization planned for September 1993 was factored into the program, the reduction of subsidies on key foodstuffs was larger than programmed, resulting in a commensurate increase in price pressures. This was followed, in October and early November, by concerns that the Introduction of the new currency, the leu, scheduled for end-November would include confiscatory elements. Individuals sought to insulate themselves from such measures by converting cash balances into goods and foreign exchange.[5] The ensuing panic buying of goods and the depreciation of the Moldovan coupon partly explains the increase in velocity observed in this period.

Furthermore, it is likely that the conversion rate of 1 leu to 1000 coupons and a subsequent shortage of small denomination coins resulted in a one-time-upward rounding of prices. It may also be possible that the introduction of the leu provided monopolistic price-setting enterprises with the opportunity to raise politically-sensitive prices. The gradual pass through of higher import prices resulting from the depreciation of the Moldovan coupon in August, meanwhile, resulted in a series of staggered increases in key administered products, such as energy.

These factors, however, could not explain a sustained increase in inflation without their subsequent validation by a monetary accommodation; for a given monetary growth path, all firms raising prices would result in excess supply.[6] This would become apparent, however, only following the unwanted accumulation of inventories. As this process would take some time, inflation and measured velocity would both rise in the interim. It is possible, therefore, that these factors contributed to a temporary higher-than-programmed inflation. This would have introduced a lag in the relationship between the monetary aggregates, income and inflation.[7]

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[5] These fears were well founded: In the three years prior to the introduction of the leu, the population experienced two monetary reforms, price liberalization, and periodic episodes of cash shortages. As each of these events reduced the real value of cash balances, rational consumers would respond to the announcement of the introduction of the leu by converting cash balances into more durable stores of value.

[6] The accumulation of wage, payment, and banking arrears might also accommodate, temporarily, these price increases if all agents responded symmetrically. Arrears (i.e., private liquidity) did emerge as financial conditions tightened. This is consistent with the increase in velocity, as some transactions were conducted on nonmonetary terms. This outcome is unsustainable over long periods, however, as agents will eventually refuse to passively extend additional credits, breaking the needed symmetry of the arrears equilibrium. Haley (1993) discusses these effects in more detail.

[7] Formal modelling of the demand for money is precluded by the severe degrees of freedom constraint imposed by data availability and the effects of (ongoing) structural changes.

IV. Statistical Anomalies

Because of the increasing use of the U.S. dollar in the economy, the staff considered currency substitution as a possible explanation for the jump in velocity. Inflation remained high in January 1994, however, in contrast to the stability of the leu against the U.S. dollar, suggesting that another explanation for the discrepancy between the rate of inflation and the underlying stance of monetary policy was required. The dilemma was whether to accept the inflation figures, which might have required a revision of the program by tightening financial conditions still further, or investigate the reliability of the data. Based on problems encountered elsewhere in the FSU regarding anomalies in official data, the published inflation figures were examined in detail.

The weakness of the statistical bases of new Fund members in the FSU reflects the role played by the statistical offices in the former republics and the use of the information collected. Most statistical agencies were assigned the task of collecting data for transmittal to Moscow and had little or no direct responsibility for its compilation or analysis.[8] The dissolution of the Soviet Union resulted in the assumption of many new functions by these agencies, generally without a commensurate increase in financial resources and technical expertise. The statistical problems encountered also reflect the fact that data were used largely to monitor the performance of individual economic units against the targets established by the planning authorities. Data for a given period was therefore typically reported relative to previous periods (month, quarter, year). This method of reporting can introduce statistical anomalies if the so-called Sauerbeck, or weighted average of price relatives, index is used by the statistical authorities.[9]

These anomalies arise because fixed-based year weights are applied to comparator "relatives" (e.g., price this month relative to the price in the previous month). This has the effect of magnifying the effect of one-time price increases, since overall inflation in the CPI is computed by taking a weighted average of these comparator relatives. A good whose price increased significantly in a previous period will continue to exert an additional upward impulse to the overall inflation rate, even if in the current period its price increases at the rate of other goods. Moreover, using the "chain" of monthly figures derived in this manner to estimate annual inflation can result in a significant overstatement of inflation.[10] This is the case in Moldova in 1993: the published monthly inflation rates yield an annual rate of inflation of roughly 3200 percent, compared to annual rate of inflation of somewhat less than 2000 percent given by the December-over-December estimate.

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[8] The institutional weaknesses of most republican statistical agencies are discussed by Noren (1993).

[9] The Sauerbeck problem was noted in the case of the Russian Federation by Koen (1994). An authoritative statement of the problem is given by Lequiller and Zieschang (1994).

[10] A simple two-good (A and B) and three-period (0, 1, 2) example illustrates the upward bias. Suppose that both goods account for half of the index at time 0; that the price of A doubles in the first period, while that of B remains unchanged, and vice versa in the second period. A Laspeyres index will indicate a 100 percent increase in the price level between time 0 and time 2, while the chained Sauerbeck index will yield a 125 percent increase ($\{0.5x(l/l)+0.5x(2/l)x\{0.5x(2/l)+0.5x(2/2))-2.25$). Lequiller and Zieschang (1994) provide a full discussion of the Sauerbeck index and the problem of "base drift".

Following discussions with the State Department of Statistics (SDS), it was confirmed that the published consumer price index, inflation estimates were subject to the Sauerbeck problem. To correct for the problem, the staff calculated a monthly inflation series using a monthly index of current prices relative to average prices in 1991 collected by the SDS as a guide (Table 1) .[11]

Table 1. Inflation: Various Estimates

	Sauerbeck [1,2]	Current Relative to 1991 Prices [1]	Adjusted [3]
1993			
January	37.1	55.7	. . .
February	28.0	27.0	. . .
March	25.0	26.0	. . .
April	19.9	14.7	. . .
May	17.7	10.6	. . .
June	19.2	33.6	. . .
July	34.3	37.9	. . .
August	34.5	23.2	21.0
September	64.0	39.3	25.8
October	38.1	43.5	18.2
November	38.1	22.7	16.7
December	59.2	59.3	31.9
1994			
January	44.5	18.9	. . .
February	26.0	21.6	. . .
March	13.4	10.0	. . .
April	. . .	5.0	. . .
May	. . .	2.7	. . .
June	. . .	2.7	. . .
July	. . .	2.2	. . .
August	. . .	-0.1	. . .
September	. . .	2.5	. . .

[1] Effective January 1994, the State Department of Statistics excludes effects of Transnistrian inflation from their estimates of inflation.

[2] Beginning in April 1994, the authorities discontinued the publication of inflation estimates based on the Sauerbeck index.

[3] Inflation excluding the Sauerbeck problem and the effects of Transnistrian inflation.

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[11] The validity of this index was verified by a Fund Statistics Department price mission in April 1994 which calculated a separate Laspeyres consumer price index using a subset of the raw price data underlying the 1991 price index. The monthly changes in this modified CPI closely tracked the changes in the larger index.

This measure is immune to the Sauerbeck problem of "base drift," as it uses the same fixed-year base index. Because it does not suffer from the chaining problem to which the published month-over-month figure is subject, it may provide a less biased estimate of monthly inflation in 1993.[12]

The inflation data were also adjusted to exclude the effects of inflation in the Transnistria region, which operated a separate monetary regime, since price data from there were included in the official inflation statistics.[13] This did not pose a significant problem until the Russian currency conversion and the subsequent withdrawal of rubles from circulation in Moldova (and other FSU republics) in July 1993. Following the Russian monetary conversion, however, the Transnistria was the only region in which pre-1993 Gosbank notes still circulated as a medium of exchange. This led to a deluge of these notes. Although the Transnistrian authorities attempted to maintain price controls in response to the influx of ruble notes, these controls were unenforceable and inflation accelerated dramatically. Because the SDS converted Transnistrian prices using a grossly-overvalued official exchange rate established by the Transnistrian authorities in compiling their CPI, a further upward bias was introduced to the Moldovan inflation figures. The staff purged the effects of Transnistrian inflation using proxies for the economic importance of the region to the whole of economy and the unofficial exchange rate between the Moldovan leu and the Transnistrian currency.[14]

The revised index - adjusted for the Sauerbeck problem and Transnistrian inflation - was then used to evaluate monetary developments. The adjusted inflation path conformed more closely with financial and real developments. Several features of the path of velocity are noteworthy (Chart 3).[15]

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[12] This index is itself subject to a potential bias as base-year prices are those in 1991, while the consumption weights reflect 1992 expenditure patterns. The size of this bias is probably quite modest relative to that introduced by the Sauerbeck problem. In the absence of alternative indices, it was decided that the use of the 1991 index prepared by the SDS was preferable to continued reliance on the highly distorted Sauerbeck index.

[13] Transnistria refers to the area of land which lies mainly on the left: bank of the Nistru river. Following the dissolution of the Soviet Union, the local authorities declared independence, which has not been recognized by the international community.

[14] The resulting adjustment is subject to considerable uncertainty for two reasons: first, only partial information on the parallel exchange rates was available to the staff; and, second, the unofficial exchange rates used are probably biased by a premium to compensate for the risk of engaging in illegal activities.

[15] Starting in January 1994, the Moldovan authorities excluded price data from the Transnistria region. The use of the Sauerbeck index, meanwhile, was discontinued from April 1994 onwards.

Chart 3

Monthly Velocity
(Jan. 1993 - May 1994)
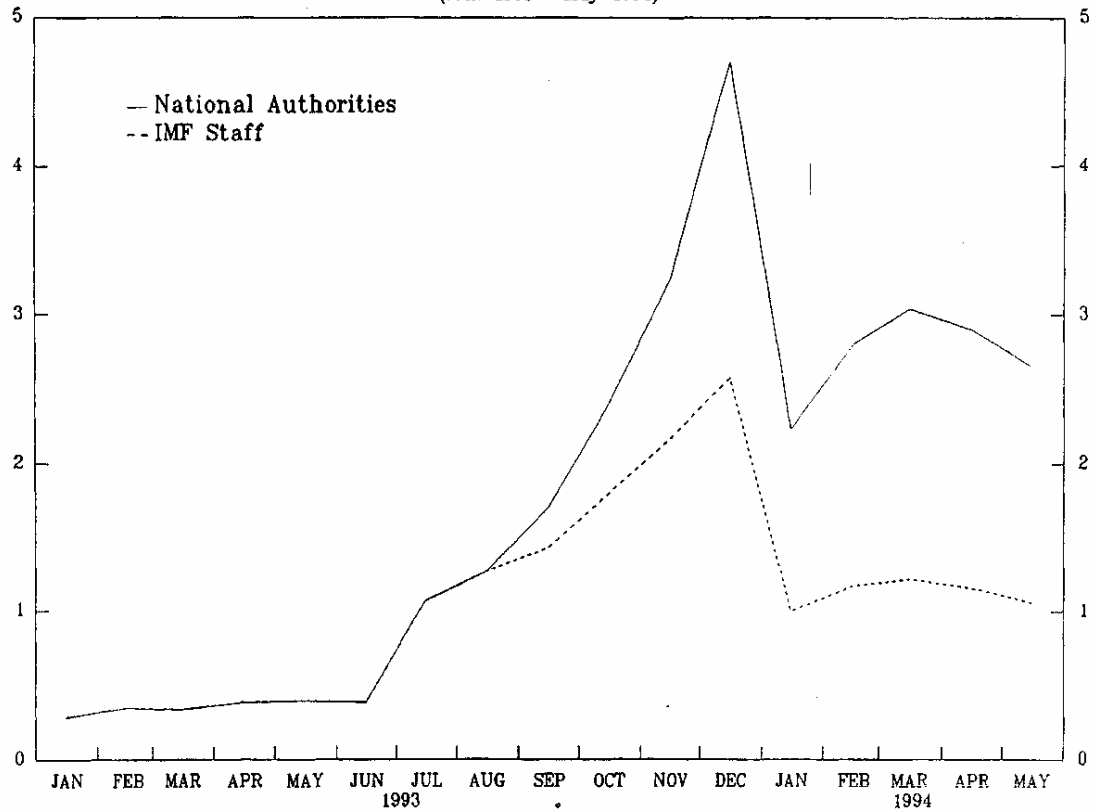
First, the two measures of velocity coincide through the first half of 1993, but diverge very markedly afterwards. This reflects the bias introduced by the Sauerbeck problem, which builds over time, and the inclusion of Transnistrian inflation, which accelerated through the fall of 1993. Second, the velocity profile derived from the adjusted inflation series exhibits a substantially smaller increase in the fourth quarter of 1993 than that calculated on the basis of the published SDS figure. This increase can be attributed to institutional factors discussed earlier such as concerns that the introduction of the leu would result in the confiscation of money balances and, perhaps, to administrative price-setting behavior accommodated by the accumulation of arrears. The third point to note with respect to Chart 3 is the decline (and leveling off) of velocity in early 1994. A plausible explanation for this development is that, as the commitment to financial discipline gained credibility, the demand for leu increased.[16]

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[16] Expectations of inflation and the behavior of individual firm managers may be unresponsive to financial discipline In the initial stages of a program, in anticipation of a subsequent policy reversal. This could lead to higher-than-programmed inflation, accommodated by the accumulation of interenterprise arrears. Once the program gain s credibility, however, and expectations and behavior changes, a rapid decline in inflation might be expected. This scenario closely describes the situation in Moldova in the fourth quarter of 1993 through the second quarter of 1994,

V. Conclusions: The Vindication of Theory

This paper reviews the experience of the Fund staff in explaining an apparent anomaly between programmed targets and (seemingly) objective facts that emerged very early in the Fund-supported program with Moldova. At the time, the acceleration of inflation was cited by some as evidence that the program was too lax, and that additional tightening was necessary. Another criticism, that the "unique" characteristics of former centrally planned economies made them poor candidates for traditional Fund stabilization programs, was raised by some in Moldova.

The authorities faced a difficult policy dilemma. A further tightening of policy, as warranted by the acceleration of inflation, would have risked the political sustainability of the program. At the same time, the outcome in the fourth quarter appeared to make the inflation objectives of the program unattainable. In the absence of a theoretical basis which might have accounted for the sharp increase in velocity in the fourth quarter of 1993, the possibility that the data on which the criticism of the program was based might be inaccurate was explored and broadly confirmed.

Several conclusions follow from the Moldovan experience. First, the correspondence between price developments and the degree of monetary restraint was shown to be far closer than was thought to be the case on the basis of the published inflation figures. This weakened the case that had been made against the theoretical paradigm on which the Fund-supported program was based. Although inflation was initially unresponsive to the introduction of monetary restraint for the reasons cited above, once the monetary program gained credibility, inflation declined very quickly and velocity moved back closer toward its previous level. Second, in addition to the uncertainties regarding the appropriateness of performance targets normally associated with monetary programming, economists working in the region are confronted with a problem of data uncertainty - that the data published by state statistical agencies may not accurately reflect the underlying economic situation. This points to the need for the staff to be especially careful in assessing developments to ensure that a program is not revised based on inaccurate data. Although problems of data reliability arise in all countries, in the FSU they are sufficiently severe as to present a threat to policy implementation. Lastly, the involvement of the Fund was helpful in that it protected the authorities from a possible criticism that the downward revision of the inflation figures was politically motivated.

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