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PPAA/97/1

INTERNATIONAL MONETARY FUND

Policy Development and Review Department

**Designing Disinflation Programs in Transition Economies:  
The Implications of Relative Price Adjustment**

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February 1997

**Abstract**

This paper draws implications for the design of disinflation programs of a recent study which analyzed whether inflation in transition economies resulted from insufficiently tight financial policies and wage pressures or from the protracted adjustment of relative prices. Based on the main findings, the paper discusses considerations relevant to the setting of inflation targets—in particular those guiding the choice between rapid achievement of low inflation and acceptance of prolonged moderate inflation to accommodate needed changes in relative prices. Given the dominance of money growth in explaining inflation, implications for the nominal anchor strategy to achieve disinflation are discussed.

JEL Classification Numbers: E31; P52; C53

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<sup>1</sup>The authors thank Susan Schadler, Jack Boorman, Hugh Bredenkamp, Stanley Fischer, Kalpana Kochhar, and colleagues of various departments for valuable comments; and Kadima Kalonji and Fernanda Gusmão for research assistance and document preparation.

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**DESIGNING DISINFLATION PROGRAMS IN TRANSITION ECONOMIES:  
THE IMPLICATIONS OF RELATIVE PRICE ADJUSTMENT**

Although many transition economies have succeeded in lowering inflation from very high to moderate levels of about 20-40 percent annually, there has been limited success in reducing inflation to low levels in the region of 10 percent a year. This has raised an issue whether Fund-supported programs in these countries should aim for a more ambitious reduction of inflation or target a gradual adjustment path with moderate, but declining, inflation. A particularly important question in this regard is whether the achievement of low inflation has been constrained by the adjustment of relative prices—a necessary aspect of the transition to a market economy—or whether inflation in these economies results only from the traditional factors of insufficiently tight financial policies and wage pressures.

In a recent working paper (Coorey, Mecagni, and Offerdal (1996)), we examined the empirical evidence regarding this latter question for a group of 21 transition economies in Eastern and Central Europe, the Baltics, and the other countries of the Former Soviet Union (FSU).<sup>1</sup> The analysis also provided some insight into the issue of whether continued moderate inflation has been "necessary" to accommodate relative price adjustment. The present paper summarizes the main findings of our empirical work and draws some implications for the design of Fund-supported programs in these countries with reference to two interrelated questions:

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<sup>1</sup>In this paper, Eastern and Central Europe is referred to as "Eastern Europe" and the FSU excludes the Baltics.

- In setting inflation targets, how should considerations such as possible output costs or the build up of inflation inertia guide the choice between rapid achievement of low inflation and acceptance of prolonged moderate inflation to accommodate needed changes in relative prices?

- To achieve a given path of disinflation, what considerations would guide the choice of nominal anchor strategy?

### I. THE APPROACH

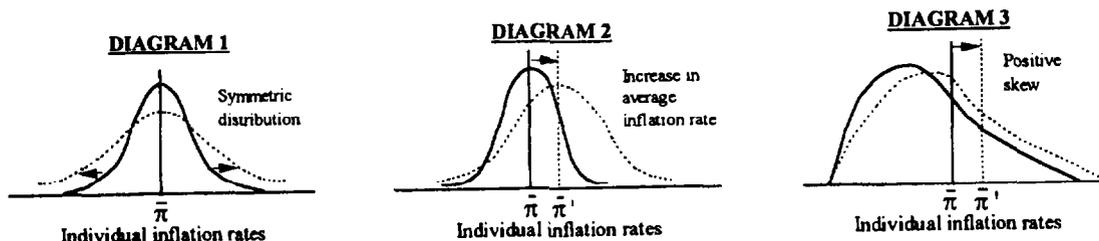
In the context of concerns over the persistence of moderate inflation, we set out to analyze the empirical evidence on the sources of inflation in transition economies. Beyond the classic sources of inflation, we focused on the possible role of relative price changes, a feature of transition economies which may make rapid disinflation more costly than in market economies. We adopted the following approach:

- First, based on a review of the existing literature on factors influencing inflation in transition economies and on the relation between relative price variability and overall inflation, a simple analytical model and a basic equation for the estimation of inflation were derived.

- Second, using a database of disaggregated CPI data specially constructed for this purpose, the statistical distributions of the inflation rates of individual goods and services comprising the CPI were analyzed for each of 21 transition economies using six indicators of relative price variability. The definition and characteristics of the various indicators of relative price variability have important implications for the interpretation of the empirical results (see box).

### Box. Issues in the Analysis of Inflation and Relative Price Variability

Changes in relative prices or relative price variability can be measured in terms of the characteristics—or shape—of the distribution of inflation rates of individual goods and services comprising a price index (such as the CPI). The shape of such a distribution is commonly described by the measures of variance and skewness. An increase in relative price variability would result in a greater dispersion of individual inflation rates and a broadening of the distribution—or an increase in variance (Diagram 1). The question whether relative price adjustment is associated with inflation can thus be analyzed in terms of whether changes in the shape of the distribution are systematically related to shifts in its mean—which correspond to changes in average inflation (Diagram 2). An increase in variance need not lead to an increase in inflation if price increases of some goods are matched by commensurate declines in others—as in a symmetric distribution. When a price distribution is positively skewed, however, large increases in the prices of a few goods are accompanied by small price increases (or even price declines) in other goods, suggesting downward inflexibility in individual prices, which is associated with an increase in inflation (Diagram 3.)



The empirical analysis of the relationship between relative price variability and inflation is complicated by the many ways of measuring relative price variability. It can be measured in terms of variance or skewness (or both). Also, a choice has to be made whether price changes should be weighted by their contribution to the CPI or be unweighted, and if the former, how the weights should enter into the definition of variability. Measured variability thus depends on the characteristics of the sample, particularly the degree of disaggregation of the price data—which influences the dispersion of the weights—and the accuracy of the weights. Hence, any observed empirical link between inflation and variability is likely to be sensitive to the choice of indicator, the characteristics of the sample as well as to the inclusion or exclusion of other variables in the estimated equation.

The variability indicators used in the estimations—the Theil variance, which is commonly used in the literature, and a corresponding skewness measure—were selected because they use the consumer expenditure weights to reflect the relative importance of a price change and assume a zero value when all individual inflation rates are equal.<sup>1</sup> Other variability indicators—such as the unweighted variance and skewness—treat all price changes equally, regardless of their relative importance in consumer expenditures, or do not assume a zero value when all individual inflation rates are equal. The sensitivity of the results to the substitution of unweighted indicators was assessed, however, because—due to subsidies and other price distortions—CPI weights in transition economies often do not accurately reflect the relative importance of certain sectors.

<sup>1</sup>The Theil variance is defined as the weighted sum of squared deviations of individual inflation rates from the weighted overall inflation rate. The unweighted variance is the unweighted sum of such deviations from the unweighted average commodity inflation rate, divided by the number of goods and services in the price index.

- Third, an equation for inflation was estimated using as regressors lagged inflation (as a measure of inertia), the rate of growth of a nominal monetary aggregate, nominal wage growth, the change in the real exchange rate,<sup>2</sup> and two selected indicators of relative price variability;<sup>3</sup> dummy variables were used to capture the effects of explicit exchange rate anchors. Due to sample limitations, only the short-run effects could be estimated and no distinction could be made between short- and long-term effects. The robustness of the results was explored in various ways, particularly with respect to the stability of the estimates across regions and over time, the sensitivity to different measures of monetary aggregates and relative price variability, and, to the extent possible, problems of simultaneity. Based on evidence of regional diversity in the estimates, separate specifications were obtained for three regional blocks: Eastern and Central Europe, the Baltics, and the FSU.

- Finally, a few specific issues relevant to the analysis of inflation, which are not well-captured by the econometric estimations, were examined in the context of five countries: the Czech Republic, Poland, Estonia, Moldova, and Russia.

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<sup>2</sup>Measured as the price of non-tradables relative to the price of tradables. The specification selected for estimation (derived from the analytical model) included money growth and the real, rather than nominal, appreciation in light of the relevance of real exchange rate behavior to the policy debate. Because of the duality between money and the nominal exchange rate, the inclusion of all three variables would have created a degree of overdetermination in the estimated equation.

<sup>3</sup>The fiscal position was not included as a separate variable because in many transition economies the government deficit vastly understates the true extent of fiscal obligations which are better reflected by credit and money growth. A fiscal expansion which is not money financed would be captured in part by the real exchange rate variable.

## II. EMPIRICAL RESULTS

The principal empirical results are summarized in Tables 1 and 2 (which report coefficient estimates and diagnostic statistics) and Table 3 (which shows the estimated contributions of the main explanatory variables to inflation).<sup>4</sup> A number of observations on the nature of inflation, its determinants, and relative price changes are suggested by the data:

(i) Inflation distributions (of the components of the CPI) in transition economies display a high degree of variance, indicating that significant relative price adjustments take place throughout the transition period even well beyond comprehensive initial liberalization. Following an initial sharp burst at the beginning of the transition, variance typically declines, but remains high relative to market economies. There is also widespread evidence that these distributions are positively skewed, consistent with downward price inflexibility and suggesting that a small number of large price increases have led the inflationary process (see box).

(ii) Money growth plays a dominant role in explaining inflation in the 21 transition economies in the sample. It is estimated to contribute, on average, about one half of quarterly inflation in the pooled sample and more than a third in each of the three regions. The monetary aggregates most closely associated with inflation are broad money (including foreign currency deposits) and domestic credit of the banking system.

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<sup>4</sup>For details on the theoretical model, the econometric methodology, and tests of alternative specifications, see Coorey, Mecagni, and Offerdal (1996).

Table 1. Final Specification: Pooled and Regional Estimates 1/ 2/

(Dependent variable: quarterly CPI inflation rate)

Variable	Pooled Sample	East and Central Europe		Baltics		FSU
	Full sample OLS-HCSE	Full sample OLS-HCSE	Post-liberalization OLS-HCSE 3/	Full sample OLS-HCSE	Post-liberalization OLS-HCSE 3/	Full sample OLS-HCSE
Constant	13.80 (2.35)**	0.36 (0.29)	1.18 (1.24)	1.56 (0.96)	4.18 (4.80)***	57.51 (3.61)***
Additive dummy for exchange rate anchors	-	-	-	-	-	-
Multiplicative dummy for exch. rate anchor effects on inflation inertia	-	-0.15 (-1.44)	0.03 (0.26)	-	-	-
Inflation rate, lagged	-	0.23 (3.30)***	0.41 (4.68)***	0.25 (3.27)***	0.09 (1.36)	-
Money growth	0.26 (2.94)***	-	-	-	-	0.20 (2.14)**
Money growth, lagged 1 quarter	0.38 (4.08)***	0.32 (2.29)**	0.21 (1.99)**	0.32 (3.82)***	0.23 (4.77)***	0.30 (2.94)***
Money growth, lagged 2 quarters	0.09 (1.78)*	-	-	-	-	-
Nominal wage growth	-	0.21 (3.21)***	0.13 (1.91)*	-	-	0.21 (2.34)**
Nominal wage growth, lagged 1 quarter	-	0.08 (2.72)***	-0.008 (-0.15)	-	-	-
Real exchange rate change (PNT/PT), lagged 1 quarter	-	-0.15 (2.08)**	-0.26 (-5.19)***	-	-	-
Variance of relative prices 4/	0.04 (6.54)***	0.02 (5.65)***	0.005 (0.57)	-	-	-
Skewness of relative prices 4/	-	-	-	0.90 (2.59)**	0.89 (2.93)***	-
Skewness of relative prices, lagged 1 quarter 4/	-	-	-	-	-	5.40 (1.96)*
Seasonal dummies	some significant	-	-	-	-	some significant
Outlier dummy	1517.3 (89.15)***	-	-	-	-	1489.27 (82.19)***
R-squared corrected	0.92	0.66	0.58	0.73	0.53	0.94
F-statistics (zero slopes)	380.4***	34.07***	20.50***	30.05***	12.04**	187.46***
Breusch-Pagan test for heteroschedasticity	101.49***	105.59***	75.50***	5.95*	9.55***	37.18***
White test for heteroschedasticity	174.68***	80.60***	53.36**	9.50	6.25	77.11***
Jarque-Bera test for normality of residuals	3780.98***	407.26***	91.84***	0.66	8.84**	52.72***
Number of observations	260	122	100	33	31	105

1/ All variables, other than variance and skewness, are measured in percentage changes. Variance and skewness are expressed in levels calculated using the inflation rates, in log change terms, of the disaggregated commodity groups comprising the CPI (see box). The sample is summarized in Appendix Table 4.

2/ For the t-statistics reported in parenthesis, three asterisks indicate statistical significance at 1 percent level; two asterisks at the 5 percent level; one asterisk at the 10 percent level; - indicates that the variable was not included because of lack of significance in the specification search. OLS-HCSE refers to correction of bias in least squares standard errors and t-statistics using a heteroschedasticity-consistent variance-covariance estimator.

3/ Excludes period of initial price liberalization (see Appendix Table 4).

4/ Measured by the Theil variance and skewness, respectively (see box).

Table 2. Relative Price Indicators: Alternative Specifications in Pooled Sample and FSU 1/ 2/  
(Dependent variable: quarterly CPI inflation rate)

Variable	Pooled Sample		FSU	
	Full sample final specification	Full sample alternative specification: including nominal wage growth 3/	Full sample final specification	Full sample alternative specification: excluding nominal wage growth 4/
Constant	13.80 (2.35)**	17.47 (2.79)***	57.51 (3.61)***	59.80 (3.24)***
Additive dummy for exchange rate anchors	-	-5.64 (-2.19)**	-	-
Money growth	0.26 (2.94)***	0.24 (3.05)***	0.20 (2.14)**	0.23 (2.03)**
Money growth, lagged 1 quarter	0.38 (4.08)***	0.32 (4.10)***	0.30 (2.94)***	0.40 (3.08)***
Money growth, lagged 2 quarters	0.09 (1.78)*	0.09 (1.68)*	-	0.12 (2.20)**
Nominal wage growth	-	0.16 (2.90)***	0.21 (2.34)**	-
Variance of relative prices 5/	0.04 (6.54)***	0.02 (1.68)*	-	0.04 (4.37)***
Variance of relative prices, lagged 1 quarter 5/	-	-	-	-0.02 (-2.66)***
Skewness of relative prices, lagged 1 quarter 5/	-	-	5.40 (1.96)*	7.57 (2.39)**
Seasonal dummies	some significant	some significant	some significant	all significant
Outlier dummy	1517.3 (89.15)***	1512.05 (96.41)***	1489.27 (82.19)***	1465.4 (60.42)***
R-squared corrected	0.92	0.93	0.94	0.93
F-statistics (zero slopes)	380.4***	358.88***	187.46***	139.77***
Breusch-Pagan test for heteroschedasticity	101.49***	114.04***	37.18***	43.57***
White test for heteroschedasticity	174.68***	206.18***	77.11***	83.62***
Jarque-Bera test for normality of residuals	3780.98***	2364.69***	52.72***	152.58***
Number of observations	260	260	105	105

1/ All variables, other than variance and skewness, are measured in percentage changes. Variance and skewness are expressed in levels calculated using the inflation rates, in log change terms, of the disaggregated commodity groups comprising the CPI (see box). The sample is summarized in Appendix Table 4.

2/ For the t-statistics reported in parenthesis, three asterisks indicate statistical significance at 1 percent level; two asterisks at the 5 percent level; one asterisk at the 10 percent level; - indicates that the variable was not included because of lack of significance in the specification search. OLS-HCSE refers to correction of bias in least squares standard errors and t-statistics using a heteroschedasticity-consistent variance-covariance estimator.

3/ If nominal wage growth term is retained at an earlier stage of the specification search (despite being statistically insignificant, as indicated by the t statistic.)

4/ If nominal wage growth term is eliminated (despite being statistically significant) and relative price variance is retained at an earlier stage of the specification search.

5/ Measured by the Theil variance and skewness, respectively (see box).

Table 3. Inflation Decomposition at Sample Mean and Final Year (1995) 1/

(In percentage points of inflation) 2/

I. At sample mean

Variable	Pooled Sample		East and Central Europe	Baltics	FSU	
	Final Specification	Alternative Specification	Final Specification	Final Specification	Final Specification	Alternative Specification
Actual Inflation	41.97	41.97	9.39	9.58	90.01	90.01
Constant and dummies variables 3/	5.57	9.81	-0.19	1.56	35.70	24.39
Lagged inflation rate	-	-	2.55	3.58	-	-
Money growth 4/	24.22	21.19	3.51	4.18	32.10	48.67
Nominal wage growth 4/	-	6.15	2.50	-	17.76	-
Real exchange rate change (PNT/PT) 4/	-	-	-0.44	-	-	-
Variance of relative prices	12.18	4.82	1.46	-	-	10.70
Skewness of relative prices 4/	-	-	-	0.27	4.45	6.24

II: In 1995

Variable	Pooled Sample		East and Central Europe	Baltics	FSU	
	Final Specification	Alternative Specification	Final Specification	Final Specification	Final Specification	Alternative Specification
Actual Inflation	11.69	11.69	3.89	6.33	20.12	20.12
Constant and dummies variables 3/	-5.37	-3.03	-2.18	2.97	-2.67	-8.60
Lagged inflation rate	-	-	1.18	1.86	-	-
Money growth 4/	12.18	10.67	2.81	2.10	12.80	21.13
Nominal wage growth 4/	-	2.11	1.37	-	5.30	-
Real exchange rate change (PNT/PT) 4/	-	-	-0.09	-	-	-
Variance of relative prices	4.88	1.93	0.80	-	-	1.01
Skewness of relative prices 4/	-	-	-	-0.60	4.69	6.58

1/ Based on full-sample equations reported in Table 1 and alternative specifications in Table 2.

2/ "-" indicates that the variable was not included because of lack of significance in the specification search.

3/ Includes regression residuals in 1995; residuals are zero at the sample mean.

4/ Combined effect of contemporaneous and lagged variables.

(iii) Nominal wage growth also appears to have a substantial impact on inflation, accounting, on average, for about a fifth to a quarter of inflation in Eastern Europe and the FSU. Wage pressures do not appear to have been a significant factor in the Baltics.

(iv) Overall, relative price variability has a statistically significant impact on inflation, although—more than in the case of the other explanatory variables—the size of the effect varies by region and over the sample period. Variability is associated with nominal wage shocks in the pooled sample (which is dominated by the FSU) and the FSU. In these cases, relative price variability is estimated to contribute anywhere from a twentieth to a third of inflation depending on whether the equation includes or excludes nominal wage growth. The estimated contribution is generally small (less than a twentieth) in Eastern Europe and the Baltics, although variance has a sizeable impact on inflation during the initial liberalization period in Eastern Europe.

(v) The indicator that captures the effect of relative price variability on inflation also varies by region and over the sample period.<sup>5</sup> In broad terms, variance seems to be significant during the initial phase of liberalization—for instance, in Eastern Europe and the FSU. However, skewness rather than variance is significant in the post-liberalization periods in Eastern Europe and the Baltics, suggesting the presence of downward price rigidity at moderate levels of inflation.

(vi) Relative price variability arises from different sources. Sharp increases in relative price variance (which are frequently concurrent with spikes in inflation) early in the transition

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<sup>5</sup>The Theil variance and skewness were used in the initial specification, although except for the FSU, the results are generally robust to the substitution of unweighted variance and skewness (see box).

tend to coincide with periods of intensive trade and price liberalization, wage and administered price increases, tax reform, and terms of trade shocks, at times accompanied by monetary accommodation. The results also offer support for the cost recovery hypothesis<sup>6</sup>—particularly in countries more advanced in the transition: increases in prices of capital-intensive services (housing, utilities, transportation) relative to other prices are evident in these cases and, when combined with downward price inflexibility, suggest that cost recovery may be an important factor influencing relative price adjustment and inflation in the later stages of transition.

(vii) The estimations do not show a significant impact of real appreciation on inflation, except for a small dampening effect (for a given money growth) observed for Eastern Europe. This may reflect the tendency for countries to resist nominal appreciation and to accommodate pressure for real appreciation through endogenous money growth via the balance of payments.

(viii) Strong real appreciation is, nevertheless, an important factor in many transition economies. Our findings suggest that although Balassa-Samuelson effects (Balassa (1964), Samuelson (1964)) could not plausibly account for large real appreciations,<sup>7</sup> the cost recovery hypothesis may offer an alternative explanation of some of the underlying pressures for real appreciation.<sup>8</sup>

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<sup>6</sup>The cost-recovery hypothesis (see Zavoico (1995)) suggests that the relative prices of capital-intensive, mainly public, services—which tend to be low in the early stages of transition reflecting the absence of debt servicing costs—would increase as real incomes rise, in order to cover the potential costs of new investment.

<sup>7</sup>For large real appreciations, Balassa-Samuelson effects would imply implausibly low—and even large negative—total factor productivity (TFP) growth in non-tradables, even allowing for generous TFP growth in tradables.

<sup>8</sup>The cost-recovery hypothesis implies not only that real appreciation may be an essential  
(continued...)

(ix) The estimated equations capture only the partial, impact effects of wage and relative price shocks, including real exchange rate movements, on inflation during a quarter. The total effect of these shocks is difficult to isolate because monetary accommodation can take place contemporaneously or in subsequent quarters and would tend to be captured by the money variable in the estimated equation. Thus, although substantial relative price variability and real appreciation are features of transition economies, a limited estimated impact of these variables on inflation may reflect rapid monetary accommodation through foreign exchange inflows in these small, open economies (particularly in the case of the Baltics).

(x) Inertia becomes a more significant influence at moderate levels of inflation and in the later stages of transition in Eastern Europe suggesting that the output costs of reducing inflation tend to increase at these levels.

(xi) The announcement effect of an explicit exchange rate anchor has only a marginal effect—which is statistically weak and becomes insignificant over time—in dampening inflation. This does not, however, imply that exchange rate anchors are ineffective in lowering inflation since two of the main channels through which such anchors would work are by disciplining financial policies, hence leading to lower money growth, and by lowering inflation expectations, hence dampening wage pressures.<sup>9</sup>

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<sup>8</sup>(...continued)

aspect of transition and rising real income, but also that the trajectory of real appreciation as real income rises would be steeper than for market economies which already face debt servicing costs on existing capital.

<sup>9</sup>The estimated equations capture only the effect on inflation of explicit exchange rate anchors for given nominal money and wage growth.

### III. IMPLICATIONS FOR INFLATION TARGETS UNDER FUND-SUPPORTED PROGRAMS

The empirical results indicate that the size of the impact of relative price variability on inflation varies across countries and time periods, so that the potential importance of such an effect has to be assessed in individual country cases. In principle, a significant relative price effect would suggest, other things equal, a worsening of any given trade off between inflation and output growth (at least at moderate inflation rates), compared with a situation without relative price adjustment. For a given relative price adjustment, rapid disinflation would be associated with a greater output loss to the extent that economic agents resist the downward adjustment of their prices. In these circumstances, inflation targets would need to take the following considerations into account:

- *The short-run positive impact of relative price adjustment on inflation may take place through an increase in velocity (when nominal money growth is controlled for and output growth can be assumed to be fixed during the quarter).<sup>10</sup> The price shock effectively pushes real money balances temporarily away from equilibrium, until such time as agents are able to readjust their money holdings. As with market economies, any longer-term effect on inflation would, in principle, depend on downward price rigidity and the extent of monetary accommodation. The case studies suggest that monetary expansion through foreign exchange inflows can be quite substantial and can accommodate shocks to inflation over the longer-term.*

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<sup>10</sup>This can be inferred from the money market identity: money growth and change in velocity = inflation + output growth. Citrin and Lahiri (1995) provide evidence for the FSU that divergences between inflation and money growth have almost always been associated with corresponding movements in velocity rather than large swings in output.

• *Relative price adjustment cannot be said to set a "floor" on inflation, provided there is a willingness to use monetary policy sufficiently aggressively. But sizeable and continuous relative price changes add to the costs to growth of tightening monetary policy sufficiently to achieve low inflation, particularly at moderate levels of inflation where inertia and downward price rigidity play a greater role.*

The evidence indicates that money growth is a dominant determinant of inflation and that relative price effects tend to be larger at higher levels of inflation and in the initial stages of liberalization. This suggests that rapid disinflation from initially high to low levels (say around 10 percent a year) would involve sharply limited monetary accommodation and potential output costs if relative price adjustment continues. Disinflation from high inflation to moderate levels (around 20-25 percent a year) may, therefore, be preferable if relative price effects are important. However, remaining at moderate inflation involves other risks: the evidence suggests that inertia and downward rigidity become significant at these levels—implying increasing output costs of disinflation in the future—and a chance that high inflation would return if the economy is subject to large relative price shocks.

• *The worsening of the tradeoff between growth and inflation when relative price changes are important suggests that for a given set of preferences between these objectives, policy makers may choose to tolerate a higher level of inflation in the presence of substantial relative price adjustment. Against this must be set the risks, and opportunity costs, of remaining at moderate inflation levels. While rapid disinflation may still be optimal if the long-term benefits are sufficiently large relative to short-term costs, the presence of relative*

*price shocks tilts the balance in the direction of a more gradual, but sustained, reduction in inflation.*

- *In view of the potential short-term conflict between relative price adjustment and disinflation, programs need to guard against the risk that countries delay structural reforms and the adjustment of public service prices in order to achieve low inflation targets. Indeed, structural reforms can aid disinflation by helping efficiency and reducing unit costs.*

- *The significant impact of nominal wage pressures on inflation in both high and moderate inflation contexts indicates the need for vigilance in programs in the area of wage growth, particularly also with regard to backward indexation which would add to inertia.<sup>11</sup>*

- *In light of the evidence in favor of the cost-recovery hypothesis, programs may need to anticipate a strong real appreciation—if real incomes are expected to rise—while recognizing that this need not imply an unacceptable loss in competitiveness. However, any attempt to bring about a more immediate adjustment in the relative prices of cost-recovery items—if successful—is likely to entail a substantial contraction in demand or—if unsuccessful—higher inflation.*

- *Since real appreciation can arise from many sources—some of which could lead to an unsustainable balance of payments—underlying pressures require close scrutiny.*

*Developments in competitiveness, export growth, real wage increases in excess of*

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<sup>11</sup>Other research suggests, however, that authorities may not be able to control nominal wage pressures effectively, so that it may be difficult, in practice, to use nominal wages as a secondary anchor (See “Wage Controls During IMF Arrangements in Central Europe” by J. Morsink in Schadler et al. (1995)).

*productivity growth (including due to indexation), and extra-budgetary expenditures are some potentially important indicators.*

#### **IV. IMPLICATIONS FOR MONETARY AND EXCHANGE RATE POLICY**

The empirical results suggest that money growth has a significant impact on inflation, whether or not relative price effects are present. Hence controlling money growth, whatever its source, is essential for disinflation. The exchange rate can, of course, provide a useful anchor in high inflation contexts, particularly if the upward pressure on inflation from relative price adjustment takes place in the short-run through shifts in velocity. Nevertheless, the evidence also suggests that money growth from capital inflows and reserve accumulation, reflecting official intervention, can be substantial at moderate inflation ranges and can accommodate the upward pressure on inflation from wage and relative price shocks.

This brings to the fore a dilemma for exchange rate policy: an exchange rate anchor may play an effective anchoring role in high inflation contexts, but it can also slow disinflation in transition economies with moderate inflation by permitting monetary accommodation of various nominal and relative price shocks.<sup>12</sup> A money-based anchor could, in principle, limit the money expansion and help disinflation in these latter circumstances, but the resulting nominal appreciation is likely to entail output costs. These considerations suggest the following implications for program design:

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<sup>12</sup>A policy of de facto exchange rate stabilization or resistance to nominal appreciation would also have a similar effect.

- *If an exchange rate anchor strategy is chosen—and there may be good reasons for not abandoning such a strategy once it is in place—or if firm commitments cannot be obtained with regard to permitting nominal appreciation, inflation targets should reflect the likelihood that moderate inflation will persist. Although inflation may eventually decline, other factors such as inertia are likely to entail output costs at this later stage.*

- *If programs envisage a gradual reduction of inflation from moderate levels, increased exchange rate flexibility—through either a switch to a money-based anchor or a widening of an exchange rate band—may be needed. If a more rapid reduction of inflation to low levels is targeted, strong and credible commitments would be needed limiting the extent of foreign exchange intervention, thus controlling money growth and allowing nominal appreciation. This is especially important if ambitious structural reforms which imply large relative price changes are envisaged. However, the design of monetary programs and the choice of anchor strategy should anticipate that significant shifts in velocity, and hence instability in the demand for real balances, may accompany large relative price adjustments, particularly in the short-run.*

- *Limits may need to be placed on sterilization operations since there may be a temptation to pursue the inflation target while resisting nominal appreciation by controlling money growth through sterilization, which would be both costly and of limited effectiveness. Sterilization would be inappropriate when the pressures for appreciation are persistent, particularly because servicing public debt at market interest rates is likely to become an undue burden on already weak fiscal positions.*

Table 4. Sample Size

(Quarters and Years)

Region	Country	Full Sample		Post-Liberalization
		Period	No. of Quarters	Period
East and Central Europe	Albania	Q2:92 - Q3:95	14	Q1:93 - Q3:95
	Bulgaria	Q3:91 - Q3:95	17	Q2:92 - Q3:95
	Czech Republic	Q3:92 - Q3:95	13	Q3:92 - Q3:95
	Hungary	Q2:91 - Q3:95	18	Q1:93 - Q3:95
	Poland	Q2:90 - Q2:95	21	Q2:91 - Q2:95
	Romania	Q3:92 - Q3:95	13	Q4:93 - Q3:95
	Slovak Republic	Q3:92 - Q3:95	13	Q3:92 - Q3:95
	Slovenia	Q3:92 - Q3:95	13	Q3:92 - Q3:95
Baltics	Estonia	Q4:92 - Q3:95	12	Q1:93 - Q3:95
	Latvia	Q4:92 - Q3:95	12	Q1:93 - Q3:95
	Lithuania	Q3:93 - Q3:95	9	Q3:93 - Q3:95
FSU	Armenia	Q2:93 - Q3:95	10	n.a.
	Azerbaijan	Q3:92 - Q3:95	13	n.a.
	Belarus	Q3:92 - Q3:95	13	n.a.
	Georgia	Q2:94 - Q3:95	6	n.a.
	Kazakstan	Q3:92 - Q3:95	13	n.a.
	Kyrgyz Republic	Q1:93 - Q3:95	11	n.a.
	Moldova	Q3:92 - Q3:95	13	n.a.
	Russia	Q2:93 - Q3:95	10	n.a.
	Ukraine	Q3:92 - Q1:95	11	n.a.
	Uzbekistan	Q2:94 - Q2:95	5	n.a.

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