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What Explains Persistent Inflation Differentials Across Transition Economies?

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Abstract:

Panel estimates based on 19 transition economies suggests that some central banks may aim at comparatively high inflation rates mainly to make up for, and to perhaps exploit, lagging internal and external liberalization in their economies. Out-of-sample forecasts, based on expected developments in the underlying structure of these economies, and assuming no changes in institutions, suggest that incentives may be diminishing, but not to the point where inflation levels below 5 percent could credibly be announced as targets. Greater economic liberalization would help reduce incentives for higher inflation, and enhancements to central bank independence could help shield these central banks from pressures.

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I. INTRODUCTION

1. **Over 2000-2005 a substantial gap opened in the inflation performance of different groups of transition economies** (Figure 1). Inflation in Central and Eastern Europe (the CEEC, comprising the new member states of the European Union and Croatia as a candidate country) has declined to below 10 percent and remained there. The eastern CIS countries (CIS-East) have also reached inflation rates below 10 percent. However, Belarus, Moldova, Russia, and Ukraine (the CIS-West) have all converged on a higher inflation rate—around 10 percent.

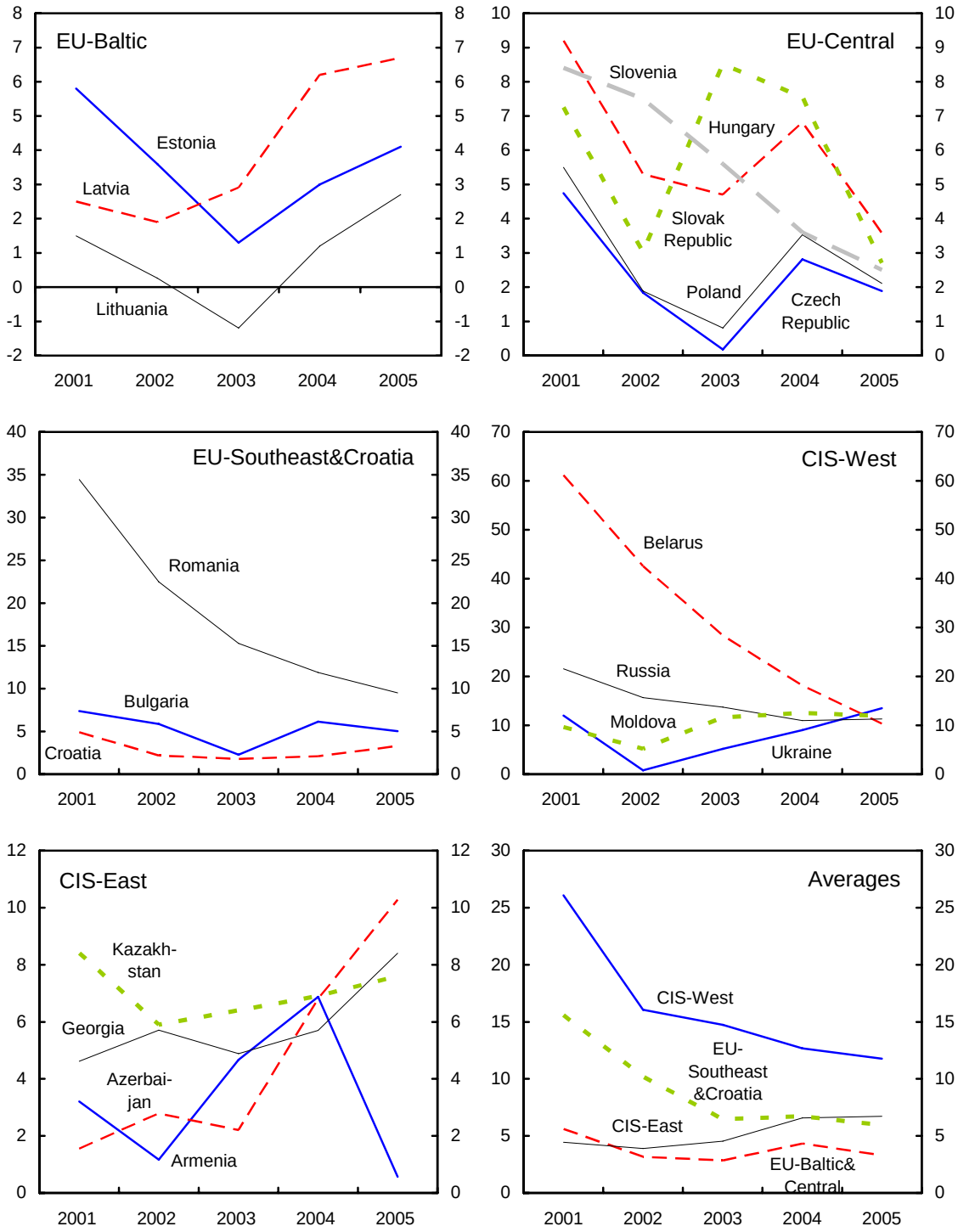
2. **Studies of inflation for individual countries in the CIS-West have emphasized the role of monetary policy and the exchange rate framework** (Appendix 1). For Belarus and Ukraine the link has been made between monetary aggregates and inflation (Pelipas, 2006; Lissovolik, 2003; Leheyda, 2005), whereas for Russia inflation has been seen as determined by exchange rate policy (due to unsterilized foreign exchange intervention) (Granville and Mallick, 2006; Ohnsorge and Oomes, 2004). These individual country studies have not examined what has motivated the central banks to choose their monetary regimes.

3. **Cross-country studies have modeled inflation outcomes as the result of central banks' choice problems** (Appendix 2). Cottarelli, Griffiths, and Moghadam (1998) examine the influence of various incentives on inflation outcomes in transition economies, but in a much earlier time period (1992–95). Mafi-Kreft and Kreft (2006) confirm the well-known role of hard pegs like currency board arrangements in reducing inflation, and find that central bank independence and the prospect of early accession to the EU reduced inflation in the CEEC in contrast to the CIS. Aisen and Veiga (2006) focus on the relation between inflation and political instability in a comprehensive sample of developing and advanced countries.

4. **In this paper we apply the cross-country choice/incentive approach to help illuminate possible explanations for the divergent CIS-West and CEEC inflation paths**. Continuing high inflation in Russia, Ukraine, Belarus and Moldova suggests that incentive problems may not have been resolved. Our set of explanatory variables covers the key costs and benefits of inflation for transition economies, and key institutional features in them. Our panel also covers eastern CIS countries, which provide a useful control given their lower inflation rates and lagging institutional development relative to the CEEC.

5. **The rest of the paper is organized as follows**. The second section examines CPI measurement issues, and rejects the notion that the inflation differential could simply be a statistical artifact. The third and fourth sections discuss the approach to modeling the inflation choice of a central bank, the specific variables to be used in our model, and the panel estimation technique. The fifth section discusses the estimation results and the sixth section uses them to examine the source of higher inflation rates in Russia, Ukraine, Belarus and Moldova, and whether high inflation could persist. The final section discusses policy implications for these countries.

Figure 1: Inflation in CEEC and CIS, 2001–2005



Source: EBRD.

II. Could the Inflation Differential Simply Be a Statistical Artifact?

6. **Measuring the true rate of CPI inflation is not straightforward for any country.** The basket of goods used can turn out to be incorrect, due to substitution by consumers away from (suddenly) more expensive goods, or due to the appearance of new goods. Alternatively, the measured price change can be misleading because of unaccounted quality changes, or because of shifts in purchasing patterns to less expensive outlets.[1] It is also possible that statistical techniques used could be sub-par (for instance, and as an extreme, political interference could exist in published data).

7. **Direct studies of mismeasurement bias in transition countries are few, and do not seem to indicate any unusual transition mismeasurement effect**. Filer and Hanousek (2003) find that Czech inflation may be overestimated by more than 4 percent due to neglected new goods and the quality bias, but no studies are available on Russia, Ukraine, Belarus or Moldova. Accounting for the level of inflation, the Czech estimate is broadly in line with relative magnitudes measured for advanced economies (Table 1). We thus look more directly at the possibility of a larger bias in Russia, Ukraine, Belarus and Moldova.

Table 1: Estimates of Inflation Bias in Advanced Economies and the Czech Republic
(percentage points per year)

		Product substitution bias	New product and quality bias	Outlet substitution bias	Total bias	Average inflation 1/
USA	Boskin et al. (1996)	0.4	0.6	0.1	0.8-1.6	2.8
Canada	Crawford (1998)	0.1	0.5	0.1	0.7	5.1
UK	Cunningham (1996)	0.0-0.1	0.2-0.5	0.1-0.3	0.4-0.8	2.9
Germany	Hoffmann (1999)	0.1	0.3	<0.1	0.5	1.1
Japan	Shiratsuka (1999)	0.1	0.7	0.1	0.9	0.6
Switzerland	Brachinger et al. (1999)	0.4	0.1-0.2	0	0.5-0.6	1
Typical index	Diewert (1997)	0.2	>0.4	0.3	>0.8	N.A.
Czech Republic 1996-97	Filer and Hanousek (2000)	0.8-1.2	1.0	0.7	2.5-2.9	8.7
Czech Republic 1990-99	Filer and Hanousek (2003)	>0.8	3.9	0.1	>4.8	13.2

Source: Filer and Hanousek (2003).
1/ Average of three years starting 5 years prior to the publication date of the paper to allow for publication lags except for Filer and Hanousek (2000), which used actual figures for 1996 and 1997, and Filer and Hanousek (2003), which used compound rates from 1999 to 2001.

8. **Differences in CPI-basket related biases do not appear to play a significant role in the inflation differential.** The CPI baskets do differ considerably between the CEEC and CIS-West, with the latter showing a much higher share of food (Table 2). And a common feature of the household surveys used to generate the CPI basket is that expenditures on food are overrepresented (IMF 2005a; Revenko 2006). However, even if inflation were to be

[1] See Boskin and others (1996, 1998); and Gordon (2000, 2006).

measured with weights closer to the standardized weights used in EU new member states, CIS-West inflation rates would remain high relative to the CEEC (Table 3).

Table 2: Weights of Sectors in CPI, 2001–2005

	Food		Nonfood Goods		Services	
	2001	2005	2001	2005	2001	2005
Czech Republic	0.29	0.30	0.41	0.39	0.31	0.32
Estonia	0.33	0.30	0.39	0.41	0.28	0.29
Hungary	0.29	0.28	0.41	0.43	0.30	0.29
Latvia	0.36	0.33	0.38	0.39	0.25	0.28
Lithuania	0.44	0.36	0.39	0.40	0.17	0.24
Poland	0.36	0.28	0.40	0.44	0.23	0.28
Slovak Republic	0.30	0.25	0.44	0.42	0.26	0.33
Slovenia	0.26	0.24	0.44	0.43	0.30	0.33
EU-Baltic&Central	**0.33**	**0.29**	**0.41**	**0.41**	**0.26**	**0.29**
Bulgaria	0.47	0.42	0.36	0.37	0.17	0.21
Romania	0.46	0.45	0.40	0.40	0.14	0.15
EU-Southeast 1/	**0.47**	**0.43**	**0.38**	**0.38**	**0.15**	**0.18**
Belarus	0.64	0.54	0.19	0.25	0.17	0.21
Moldova	0.57	0.46	0.26	0.30	0.17	0.24
Russia	0.55	0.46	0.31	0.33	0.14	0.21
Ukraine	0.64	0.64	0.14	0.17	0.22	0.20
CIS-West	**0.60**	**0.52**	**0.22**	**0.26**	**0.17**	**0.22**

Source: Eurostat, SSCU, authors' estimates.
1/ No disaggregated data available for Croatia.

Table 3: Inflation Based on Different Weights, Russia, Ukraine, Belarus, Moldova 2001–2005

	Belarus		Moldova		Russia		Ukraine	
	Actual	Benchmark	Actual	Benchmark	Actual	Benchmark	Actual	Benchmark
2001	63.7	78.9	10.0	8.1	21.7	24.2	12.3	9.1
2002	42.9	49.6	5.3	5.9	16.0	19.7	0.8	1.3
2003	28.5	34.1	11.8	11.3	13.7	16.0	5.2	3.9
2004	18.3	16.9	12.6	12.4	10.9	11.6	9.0	6.9
2005	10.4	9.0	12.7	11.8	12.5	13.2	13.5	10.2

Source: SSCU, authors' estimates.
Notes: Benchmark inflation is based on 30 percent food, 40 percent nonfood goods, and 30 percent services.

9. **Similarly, different price mismeasurement biases do not seem to be a relevant issue**. For example, the Global Retail Development Index developed by A.T. Kearney (2006) indicates low market saturation in Russia, Ukraine, Belarus and Moldova, and no evident change relative to central and eastern European countries over the past few years. While outlet bias could become more of an issue in the future—international retailers have started to move into these countries with modern hypermarkets and discount stores—it is unlikely that it contributed significantly to a higher relative bias in their past inflation.

10. **Finally, IMF assessments of data quality do not point to any significant differences in CPI data techniques or quality**. Eurostat supervised the implementation of western European standards in the CEEC. IMF Reports on the observance of standards and codes (data modules) indicate only minor shortcomings relative to international standards in compiling the CPI in Russia, Ukraine, Belarus and Moldova.[2]

III. MODELING THE INFLATION DIFFERENTIAL

11. **To better understand the inflation differential, we construct an empirical model of inflation outcomes in transition countries.** We estimate a cross-country panel following the approach of Cottarelli, Griffiths, and Moghadam (1998), Mafi-Kreft and Kreft (2006) and Aisen and Veiga (2006). To the extent that this cross-country model reproduces the inflation differential, we can assess the factors that may be pushing central banks in Russia, Ukraine, Belarus and Moldova to choose higher inflation rates, and even ask whether any change could be expected in these factors, and thus the differential, going forward.

12. **The empirical model takes its cue from the standard central bank choice problem laid out in the time consistency literature** (see, for example, Barro and Gordon, 1983). Thus the central bank may be understood as having targets for inflation and unemployment, which may not be consistent. These in turn reflect underlying structural features of the economy, and possibly trade-offs against other less formal central bank aims (e.g. financial stability).[3] The central bank is also understood to have a short-run incentive to use surprise inflation to raise output, and a more pronounced incentive would be associated with higher inflation expectations in equilibrium as agents internalize the central bank's choice problem.[4] Finally, the central bank is understood to have certain weights on output and inflation stabilization in its welfare function. The political and institutional environment in which monetary policy operates helps determine these. In this approach, the actual

[2] See http://www.imf.org/external/np/rosc/rosc.asp for details on CPI statistical techniques used in Russia, Ukraine, Belarus, and Moldova. Moldova does not follow international standards for proper techniques in imputation of missing and new observations. To the extent missing observations are associated with scarcity of an item in question, this may understate the CPI, which would imply the inflation differential is understated.

[3] See Rodríguez Palenzuela, Camba-Méndez, and Garcia (2003) for a full discussion of factors affecting the choice of optimal inflation rate. See Cukierman (1992) for a discussion of the various motives that may impinge on a central banks' inflation choice. Besides employment, these can include fiscal revenues, external competitiveness and financial stability.

[4] The short-run trade-off will depend, among other things, on the variance of nominal relative to real shocks (but not directly on the level of inflation). Thus a sustained attempt by a transition country central bank to exploit the output-inflation trade-off would essentially eliminate it. For this reason, we confine our sample to the post-hyperinflation period. More generally, when the game between the central bank and agents is in an equilibrium, there is no further incentive for the central bank to shock the economy with unanticipated inflation, and thus to change the relative variances. What matters then are other structural influences on the trade-off, which help determine the level of inflation at which the incentive disappears. We model these.

inflation outcome also reflects a variety of unanticipated shocks to aggregate demand and supply. That is, in the short run a central bank may not be able to offset inflation impulses.

13. **The model's focus on the factors underlying the inflation choice is not to imply that intermediate targets do not matter**. The assumption we make is that the choice of intermediate target is penultimate, and reflects a central bank's preferences over inflation and output, as well as the political and economic environment and expectations that it faces. Thus when a central bank chooses a pegged exchange rate, it effectively chooses to import an inflation process, and our model attempts to shed light on this latter choice.[5]

14. **Turning to the inflation choice, to capture influences that may bear on transition central banks' unemployment and inflation targets, we use a number of variables:**

- **Factors bearing on the output or unemployment target.** A key feature of the transition has been the need to shift labor from overstaffed state enterprises and collective farms to more productive uses (see, e.g., Schiff et al., 2006).[6] Central banks may have resisted unemployment due to massive sectoral labor shifts by ensuring significant credit growth to the economy via a loose monetary policy. Directed credit from the banking system was in fact a consideration in Belarus and Ukraine at least during the first half of the sample period (see IMF 2005b,c). We use the EBRD's index of enterprise restructuring, and the share of agriculture in GDP to capture this potential influence on inflation.[7]

- **Factors bearing on the optimal inflation target.** As transition proceeds, and productivity and wages in the traded goods sector rise, so too would wages in the nontradables sector, putting pressure on the overall price level. We capture this (the Balassa-Samuelson effect) via labor productivity growth in the manufacturing sector,

[5] Technical factors may constrain a central bank's choice of monetary regime. However, those central banks which lack the capacity to manage a flexible exchange rate regime are not doomed to import an inflation process; they can always manage inflation via an adjustable peg.

[6] In transition economies, structural changes—obsolescence of capital and disorganization on one side of the transition recession and massive productivity gains on the other—are likely to have been much more important than cyclical issues over the last 10 years. For these reasons it is difficult to estimate the output gap or other capacity measures for these economies, and indeed data in these areas is very incomplete. Our variables for structural unemployment pressures are thus reasonable controls for capacity pressures.

[7] Other authors like Cukierman, Edwards, and Tabellini (1992) argue that the agricultural sector is difficult to tax and therefore consider it to be a fiscal motive. This interpretation makes some sense for developing economies with low revenue ratios and large informal agricultural sectors. For the transition economies which we consider, where the agricultural sector is much more organized (e.g., collective farms) and where tax ratios are generally in the 30–40 percent of GDP range, it is not a very compelling interpretation.

interacted with the exchange rate regime.[8] A central bank may be also concerned about distortions to after tax real factor returns created via the interaction of inflation with the tax code. We construct a dummy variable for the presence of a flat income tax—which should be less distortionary—to capture this possible influence.

- **Other influences on targets: fiscal sustainability**. If the government is constrained by a large debt stock—with interest payments crowding out other budget expenditures and rollover considerations creating a flow financing problem—fiscal dominance may hold. A central bank may prefer to maintain loose credit conditions, accentuating fiscal impulses to aggregate demand, rather than risk that monetary tightening produced default, and all the economic turmoil that could bring. We take the stock of government debt as a ratio to GDP as an indication of fiscal sustainability, and use a one-period lag to address potential endogeneity problems.[9]

- **Other influences on targets: external sustainability**. A central bank may attempt to reduce a persistent current account deficit by devaluing the currency. This, via pass-through of higher import prices, will raise the inflation rate in the near term.[10] The pay-off is a reduced risk of external crisis in the medium term (which would involve overshooting depreciation, very high inflation, and large output losses). We use the current account balance as a share of GDP, lagged one period, to capture this effect.

- **Other influences on targets: financial markets.** A greater degree of financial market development could reduce the need for a central bank to keep monetary conditions loose in support of high credit growth. We take the EBRD's bank reform index and securities market development index as possible measures.[11] At the same time, central banks may independently seek to smooth interest rates or exchange rates

[8] Existing empirical evidence suggests that if anything this should work against an inflation differential. Égert, Halpern, and MacDonald (2006) suggest that among the CEEC the highest Balassa-Samuelson effect may be found in Hungary and Poland (up to 2 percent) and the lowest in the Czech Republic and Latvia (close to zero). Égert (2005) finds the effect to be 0.7 percent for Russia and for 0.5 percent for Ukraine.

[9] Many of the transition economies have had large contingent liabilities at one point or another. The so-called lost savings in the CIS from the early 1990s hyperinflation are an example. These liabilities would provide an additional incentive towards inflation, since these have typically not been indexed. Data limitations preclude their use.

[10] If all prices are raised in proportion to the exchange rate depreciation, there would be no real depreciation, and no incentive to use this channel. This could occur in a fully dollarized economy, but none of the transition economies fits this mold for the time period in question.

[11] Financial dollarization is one reflection of financial market development that could impact inflation outcomes, for instance by creating an incentive for a central bank to minimize exchange rate movements (this would prevent impacts on agents' balance sheets, but would also transmit external disturbances to the economy). However, dollarization can also reflect expectations of inflation (see Levy Yeyati, 2006), and due to this endogeneity issue, is not modeled here.

to keep intermediation smooth. We use the standard deviation of interest and exchange rates to capture this potential influence.

15. **To capture the incentive a transition country central bank may have to inflate in the short run, we use several variables identified as important in the literature:**

- **Openness.** The real benefits of surprise inflation decline with openness, since competitiveness and net exports suffer (Romer, 1993). We measure openness by the EBRD's trade and foreign exchange system liberalization index.

- **Competition.** Rogoff (2003) notes that competition tends to make prices and wages more flexible, reducing the real effects of unanticipated monetary policy. There is thus less incentive for central banks to inflate. We use the EBRD's competition policy index to capture this potential influence.

- **Price liberalization**. When prices and wages are rigid, the real effects of unanticipated monetary policy become larger (though effects may also show up as shortages of goods). We focus on price rigidities here since we do not have good labor market data for many transition economies (wage indexation, contract duration, and centralization of wage bargaining). There are good economic reasons why price rigidities may exist even in market economies (e.g., menu costs), but these are likely dominated by pure price liberalization considerations in our set of formerly planned transition economies. We use the EBRD's price liberalization index as a measure.

16. **We aim to capture the weight a central bank places on inflation in its objective function by controlling for key features of the political and institutional environment:**

- **Political instability**. Frequent elections and unstable governments may reduce a central bank's horizon, and enhance its focus on output and employment outcomes. In equilibrium, this would lead to higher inflation expectations and inflation. A preliminary look at World Bank data suggests that while this could explain inflation, it will not likely explain the gap: Table 4 shows a clear gap between the CEEC and the CIS countries, but in a direction that favors higher inflation in the CEEC.

Table 4: Government Stability in Transition Countries, Averages 1999–2003

	EU-Baltic&Central	EU-Southeast &Croatia	CIS-West
Years chief executive in office 1/	4.20	2.80	5.40
Changes in effective executive 2/	0.30	0.27	0.15
Herfindahl index for the government 1/	0.56	0.73	0.56
Government fractionalization 1/	0.45	0.27	0.44
Party fractionalization index 2/	0.76	0.75	0.70

1/ Database of Political Institutions, World Bank.
2/ Cross National Time Series Data Archive.

- **Central bank independence** (CBI). A greater degree of CBI may lead a central bank to target a very low level of inflation, and to put more weight on inflation outcomes (ignoring potential short-run trade-offs with output). To control for endogeneity concerns—that low inflation leads central banks towards a stronger institutional framework—we take the initially prevailing degree of CBI. Data are drawn from Cukierman, Miller and Neyapti (2002), and measure only the legal degree of independence, which may differ from independence in practice.[12]

- **EU accession**, and the requirements this imposes on economic policies, may directly encourage low inflation (for instance, the conditions for adoption of the euro) and indirectly help import monetary policy credibility. We capture this influence via a dummy variable that takes a value of 1 once accession talks begin.

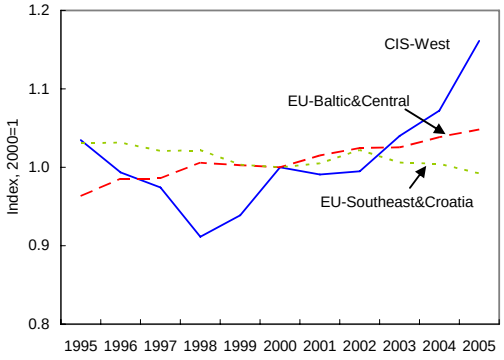
17. **Finally, we link inflation choices to outcomes by controlling for the following key (in the transition context) unanticipated shocks to aggregate demand and supply**:[13]

[12] Up-to-date data on central bank independence is in any event unavailable. IMF staff reports on Article IV consultations (Bassett 2003; IMF 2005b; 2005c; 2006) as well as the assessments by the Economist Intelligence Unit (EIU 2005; 2006) suggest that central bank independence is still lacking in the CIS-West.

[13] Other unanticipated demand shocks could come via the government (unforeseen and rapid fiscal loosening), or via consumers and investors (unrelated to terms-of-trade gains, and showing up in large unexpected capital inflows). Given lags in fiscal policy formulation and implementation, we do not see unanticipated fiscal shocks as a key issue. Given our annual data, we would also expect monetary policy to be able to react to slower-to-materialize consumption and investment shocks, leaving in practice a small unanticipated component.

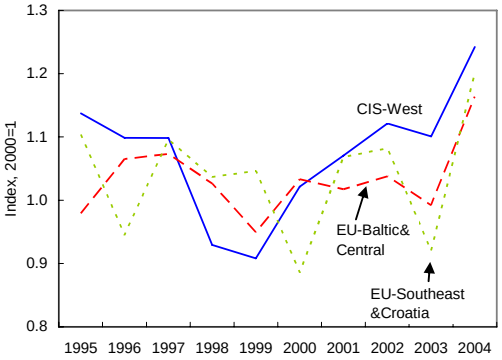
- **Terms of trade shocks.** Improvements in the terms of trade will provide a boost to domestic demand which may prove hard for a central bank to offset. For instance, rising export prices will tend to work their way back to factor prices, potentially fueling cost-push inflation. Looking at the data, there is an asymmetry in terms of trade developments between the CEEC and CIS-West, suggesting this could be an issue (Figure 2).

Figure 2. Terms of Trade



Source: IMF WEO.

Figure 3. Crop Production



Source: World Bank, World Development Indicators.

- **Agricultural harvest.** Changes in the harvest are potentially important supply shocks for economies where the agricultural sector still looms large. And these can quickly drive up overall prices, given the weight of food in transition countries' CPI. A preliminary look at the data, however, suggests that the pattern of production across country groupings does not vary greatly (Figure 3).

- **Changes in administered prices.** As long as there are downward nominal rigidities in non-administered prices, changes in administered prices will raise the price of the existing level of output. They are a direct supply shock which cannot easily be offset by central banks in the short run. In the absence of cross-country data on the impact of individual administered price increases, we capture this potential impact indirectly, via the change in the share of administered prices.

IV. Empirical Methodology and Results

18. **For our inflation measure, we follow Cukierman, Miller, and Neyapti (2002) and Mafi-Kreft and Kreft (2006) and use the depreciation rate in the real value of money**:

(1) $$d_{i,t} = \frac{\pi^{d}_{i,t}}{1+\pi^{d}_{i,t}}; \quad i = 1,\ldots, N \text{ and } t = 1,\ldots, T;$$

where $\pi^{d}_{i,t}$ is the CPI inflation rate in decimals in country *i* at time *t*. Using the depreciation rate of money rather than the logarithm of inflation avoids deflationary periods dropping out of the sample.

19. **The data for our variables cover 19 transition countries for the years 1995–2004.** One advantage of limiting the sample to transition countries is the element of a natural experiment—the countries in question share an economic and cultural legacy that would otherwise be difficult to control for. The country coverage, in particular the inclusion of the CIS-East, provides for variation along important data dimensions. The sample period does exclude the early 1990s, to avoid the complications presented by the hyperinflations that occurred in many transition countries. Appendix III gives full details about data sources.

20. **Panel unit root tests allow us to assume that the rate of depreciation of money is stationary** (Table 5). Thus we do not run into spurious correlations from neglected cointegration relationships. Tests for unit roots in other variables cannot reject stationarity.

Table 5: Panel Unit Root Tests for the Rate of Depreciation of Money

Method	Statistic	Probability	Observations	Result
Null: Assumption of a common unit root process				
Levin, Lin, and Chu *t*	-6.21	0	171	I(0)
Breitung *t*-statistic	-2.24	0.01	152	I(0)
Null: Assumption of an individual unit root process				
Im, Pesaran, and Shin W stat	-3.69	0	171	I(0)
ADF – Fisher χ^2	83.15	0	171	I(0)
PP – Fisher χ^2	197	0	190	I(0)
Null: Assumption of no common unit root process				
Hadri *Z*-statistic	6.84	0	209	I(1)

Source: authors' estimates.

21. **We estimate a panel in levels with time fixed effects.** Setting X as the vector of explanatory variables, β as the vector of parameters to be estimated, v as the time specific effect, and ε is the error term, we have:

(2) $$d_{i,t} = X'_{i,t}\beta + v_t + \varepsilon_{i,t}.$$

A country fixed-effects model could minimize the risk of omitted variables bias, but would discard information on the levels of the variables, and for our purpose it is important to preserve this information in cross-sectional differences. Time fixed effects allow us to capture the common part of the ongoing transition process, and the cross-sectional correlation stemming from international financial markets and contagion during the financial

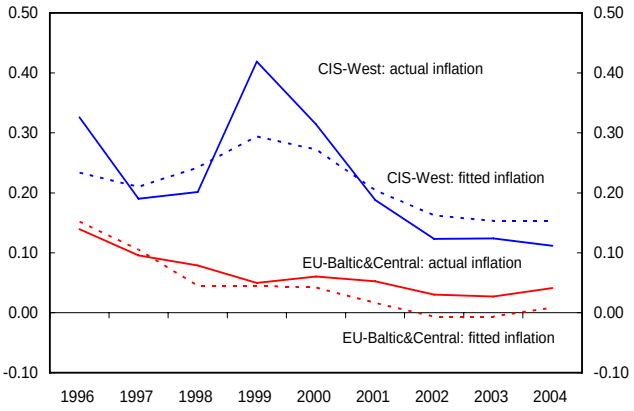
crises in Russia and earlier in Bulgaria and Romania. We consider models without time fixed effects and with country fixed effects as part of our robustness checks.

22. **We use an estimator with panel corrected standard errors**. Ordinary least squares (OLS) is optimal if error processes are homoskedastic and all error processes are independent of each other. However, in our sample we know that panel heteroskedasticity and contemporaneous correlation are likely to arise due to the financial crises in Bulgaria, Romania, Russia and Ukraine. Serial correlation (inflation persistence) may also be present due to indexation, and could be modeled in a dynamic panel. However, in our set up we would run into the problem of weak instruments, since the instrumental variables are to some extent correlated with the time fixed effects (see Stock, Wright, and Yogo, 2002). The small number for our cross section also does not lend itself to a dynamic framework (see Roodman, 2006). We thus follow Beck and Katz (1995, 2004) and Edwards (2001) and use panel corrected errors, and consider dynamic panel models as part of our robustness checks.

V. THE EMPIRICAL MODEL

23. **Our baseline specification was chosen for its reasonably high explanatory power, its parsimony and for the robustness of the results** (Table 6, column 1). The baseline model fits the data and captures the overall inflation gap reasonably well (Figure 4). It suggests a key role for fiscal sustainability considerations, for factors underlying the output-inflation trade-off, and for movements in the terms of trade in accounting for different inflation outcomes. In what follows, we discuss each set of explanatory variables, bringing in results using the additional variables discussed in Section III in turn.

Figure 4: Fitted versus Actual Inflation, 1996–2004



Source: Authors' estimates.

24. **The empirical model suggests that a central bank's incentive towards higher short-run inflation is a key reason for observed outcomes** (Table 6, columns 1-3). Countries that have not gone as far in liberalizing their internal markets, and countries that have not opened up as much externally tend to have higher inflation. The estimated impacts are robust across specifications and highly significant. They are also considerable in magnitude: all else equal an improvement of one point on the price liberalization index reduces inflation by about 12-13 percent, and an improvement of 1 point in the openness index reduces inflation by about 4½ percent. To make this concrete, the increasing price regulation in Belarus between 1997 and 2004 (from 4, representing comprehensive price liberalization, to 2.67, representing less than significant progress and a large role for non-

market state procurement) would have added some 16 percent to inflation, all else equal. Raising openness from 3 to 3.67, and removing remaining trade restrictions, as Ukraine did between 2001 and 2005, would have lowered inflation by about 3 percent, all else equal. Results with the competition variable—which is strongly correlated with the other two—were not robust, but were signed in the expected manner when the other two were excluded from the estimation.

Table 6. Results from Panel Regressions: Role of Output-Inflation Trade-off and Exogenous Factors 1/

	1	2	3	4	5
Structural features					
Fiscal sustainability	0.212 ***	0.213 ***	0.231 ***	0.211 ***	0.206 ***
	[0.024]	[0.024]	[0.027]	[0.024]	[0.040]
Output-inflation trade-off					
Price liberalization	-0.123 ***	-0.133 ***		-0.123 ***	-0.134 ***
	[0.029]	[0.028]		[0.028]	[0.045]
Openness	-0.044 ***	-0.057 ***		-0.044 ***	-0.045 **
	[0.014]	[0.014]		[0.013]	[0.022]
Competition		0.060 ***	-0.013		
		[0.015]	[0.027]		
Exogenous shocks					
Terms of trade	0.076 *	0.111 ***	0.009	0.086 **	0.122 **
	[0.035]	[0.035]	[0.046]	[0.040]	[0.049]
Harvest				-0.038	
				[0.044]	
Change in administered price share					-0.069 **
					[0.030]
No. of Observations	171	171	171	171	138
No. of Countries	19	19	19	19	16
Adjusted R^2	0.724	0.736	0.574	0.726	0.748

Sources: Authors' estimates
1/ Standard errors in brackets: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

25. **Unanticipated shocks to supply and demand are important determinants of cross-country inflation outcomes** (Table 6, columns 1-2 and 4-5). An improvement in the terms of trade of 10 percent raises inflation by about 0.8 percent, and this effect is significant and robust across various model specifications (interacting the terms of trade with the exchange rate regime did not modify this effect). The harvest has the right sign when added to the model, but was not significant. Finally, a decrease in the share of administered prices increases inflation (by about 0.7 percent for every 10 percent decrease in the change in the share). However, we cannot use this model to understand the inflation gap, since the one-fifth of the sample that drops out is heavily concentrated in the western CIS countries.

26. **The evidence on the political and institutional milieu is mixed** (Table 7):

- Consistent with Aisen and Veiga (2006), the addition of a political stability measure to the model raises explanatory power substantially. Moving one step from a stable government such as the one in Russia (scoring 11) toward a less stable government such as the one in Poland (scoring 6) increases inflation by about 1 percent. However, the larger model including political/institutional variables omitted one country (Georgia), and did not prove as robust, making it less adequate as a baseline.[14]

- De jure central bank independence, when used in place of political stability in the model, is correctly signed; however, with the same approach, our EU accession dummy is incorrectly signed. Both are imprecisely estimated. Intuition suggests that these variables are related to the openness index (which has a strong institutional component), and when this control for incentives is removed from the model, CBI becomes significant and EU accession takes the expected sign. In sum, our data and model suggest that pressures on central banks matter, and institutions may matter, but the latter may not be necessary to control inflation, if the incentive to inflate is small.

Table 7. Results from Panel Regressions: Role of Institutions 1/

	T6-1	1	2	3	4	5
Structural features						
Fiscal sustainability	0.212 ***	0.208 ***	0.214 ***	0.214 ***	0.210 ***	0.210 ***
	[0.024]	[0.027]	[0.024]	[0.024]	[0.025]	[0.025]
Output-inflation trade-off						
Price liberalization	-0.123 ***	-0.154 ***	-0.125 ***	-0.159 ***	-0.120 ***	-0.171 ***
	[0.029]	[0.032]	[0.030]	[0.037]	[0.029]	[0.035]
Openness	-0.044 ***	-0.037 ***	-0.044 ***		-0.057 ***	
	[0.014]	[0.012]	[0.016]		[0.013]	
Institutional environment						
Political stability		-0.008 *				
		[0.004]				
Central bank independence			-0.016	-0.122 **		
			[0.075]	[0.054]		
EU accession					0.034	-0.007
					[0.024]	[0.024]
Exogenous shocks						
Terms of trade	0.076 *	0.147 ***	0.077 **	0.750 *	0.079 **	0.060
	[0.035]	[0.043]	[0.038]	[0.041]	[0.032]	[0.040]
No. of Observations	171	140	171	171	171	171
No. of Countries	19	18	19	19	19	19
Adjusted R^2	0.724	0.782	0.724	0.708	0.707	0.686

Sources: Authors' estimates
1/ Standard errors in brackets: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

[14] Since average political stability in Russia, Ukraine, Belarus and Moldova does not differ greatly from average political stability in central and eastern European states, the analysis of the gap is not materially effected by using the more parsimonious model as a baseline.

27. **Fiscal considerations appear to create a stronger motivation for higher inflation, but other influences on optimal inflation and output targets do not add to the empirical model** (Table 8). The level of lagged government debt is correctly signed, varies little in magnitude, and is significant at the 1 percent level across the whole range of specifications. An increase in the government debt ratio of 10 percent would be associated with inflation 2 percent higher in the subsequent period. Financial market development—a more reformed banking system or a more developed securities market—points strongly to lower inflation across countries, but only when used without price liberalization and openness in the model, with which it is strongly correlated (columns 8-11 and Appendix IV).[15] Results with variables capturing unemployment pressures—the index of enterprise restructuring and the agricultural share—are similar: only when price liberalization is not in the model are they correctly signed (but even so they are still insignificant)(columns 3-6). Pure optimal inflation considerations—the Balassa-Samuelson effect, and tax-related labor supply distortions—have no significance (columns 1-2). Finally, considerations of external sustainability are correctly signed, but insignificant (column 7). Progress with other structural reforms has been highly correlated in transition economies with progress in internal and external liberalization, and separate effects, if they exist, cannot be distinguished in our sample.

[15] We do not find interest or exchange rate smoothing to be important influences. These results are available on request from the authors.

Table 8. Results from Panel Regressions: Role of Structural Features 1/

	T6-1	1	2	3	4	5	6	7	8	9	10	11
Structural features												
Balassa-Samuelson		-0.015										
		[0.067]										
Tax system (labor supply)			0.017									
			[0.023]									
Unemployment pressure--industry				0.021	-0.024							
				[0.020]	[0.021]							
Unemployment pressure--agriculture						-0.234 ***	0.021					
						[0.073]	[0.103]					
Fiscal sustainability	0.212 ***	0.211 ***	0.213 ***	0.217 ***	0.225 ***	0.223 ***	0.209 ***	0.208 ***	0.210 ***	0.233 ***	0.217 ***	0.219 ***
	[0.024]	[0.026]	[0.025]	[0.024]	[0.026]	[0.025]	[0.034]	[0.025]	[0.024]	[0.027]	[0.022]	[0.028]
External sustainability								0.033				
								[0.106]				
Financial market development--banks									0.006	-0.065 ***		
									[0.016]	[0.021]		
Financial market development--securities											0.031 ***	-0.037 **
											[0.008]	[0.016]
Output-inflation trade-off												
Price liberalization	-0.123 ***	-0.122 ***	-0.127 ***	-0.133 ***		-0.124 ***		-0.122 ***	-0.125 ***		-0.123 ***	
	[0.029]	[0.030]	[0.030]	[0.032]		[0.028]		[0.030]	[0.031]		[0.028]	
Openness	-0.044 ***	-0.045 ***	-0.042 ***	-0.052 ***	-0.060 ***	-0.048 ***	-0.079 ***	-0.043 ***	-0.048 ***		-0.056 ***	
	[0.014]	[0.014]	[0.015]	[0.011]	[0.014]	[0.013]	[0.021]	[0.015]	[0.014]		[0.013]	
Exogenous shocks												
Terms of trade	0.076 *	0.079 **	0.073 **	0.077 **	0.048	0.102 ***	0.037	0.069 **	0.080 **	0.009	0.096 ***	0.000
	[0.035]	[0.039]	[0.034]	[0.035]	[0.035]	[0.039]	[0.060]	[0.034]	[0.036]	[0.042]	[0.036]	[0.042]
No. of Observations	171	170	171	171	171	171	171	171	171	171	171	171
No. of Countries	19	19	19	19	19	19	19	19	19	19	19	19
Adjusted R^2	0.724	0.724	0.720	0.728	0.666	0.714	0.506	0.694	0.723	0.663	0.724	0.596

Sources: Authors' estimates

1/ Standard errors in brackets: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

28. **The overall results are reasonably robust across country groupings, time, and alternative econometric specifications**:

- Dropping eastern CIS countries does not affect the main conclusions. The coefficients keep their sign, but the terms of trade turn insignificant (Appendix V, Table 1, column 2). However, this is not unexpected considering that the excluded countries include Azerbaijan and Kazakhstan, oil-producing countries where terms of trade movements have been important.

- The model still fits the data reasonably well once we constrain the sample to the post-crises years, 2000–04, and for the most part signs and the size of coefficients are reasonably robust (Appendix V, Table 1, column 3). The exception is the government debt variable. However, this again is not unexpected, since the earlier period contained all of the government debt crises.

- Including country fixed effects does not effect the signs or significance of any of the variables. However, with the fixed effects largely negative, the size of the price liberalization and government debt impacts become larger. Excluding the time fixed effects (i.e. implementing a random effects model) does not affect the signs of any of the variables. However, the terms of trade, which can be understood as a type of time effect particular to certain countries in the sample, are no longer significant. Again, these results are understandable. See Appendix V, Table 1, columns 4-5.

- Moving to a dynamic panel[16] does not affect the significance of the fiscal sustainability and internal liberalization variables (see Appendix V, Table 1, columns 6-7). External liberalization and the terms of trade retain their sign and magnitude, but are no longer significant. The size of each coefficient falls, as would be expected. Lagged inflation is significant, but the coefficient of below 0.3 is small compared to other studies where lagged inflation is above 0.6 (see Aisen and Veiga, 2006). This latter result is not surprising given the size of our dataset and the large number of instrumental variables required in the dynamic panel set up.

VI. What Does the Model Say about the Inflation Differential?

29. **The empirical model provides a vehicle through which to address the possible sources of the inflation differential.** The difference between the CIS-West and EU (Baltic

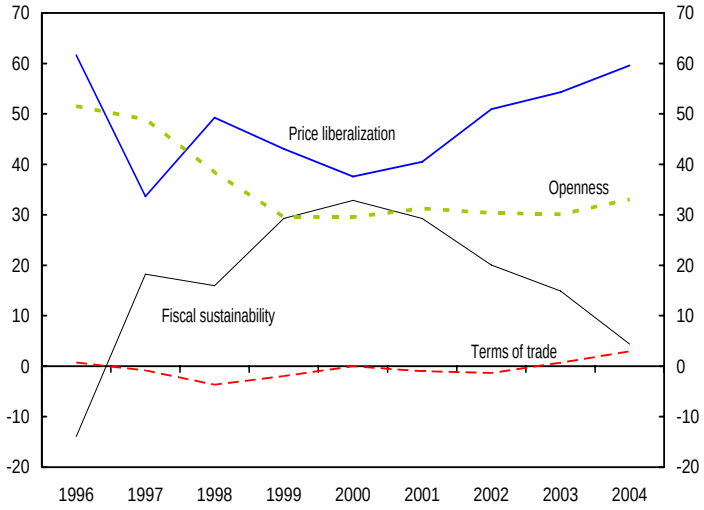
[16] All dependent variables are treated as strictly exogenous, since in other specifications the number of instruments exceeds the cross section dimension. The Arrelano-Bond test (not reported) indicates that all the dynamic panel regressions are free of serial correlation.

and Central) average for each variable, $\bar{x}$, times the coefficient, β_x, over the fitted inflation gap gives the contribution of each variable in percent:[17]

$$(3) \qquad \frac{\beta_x \cdot \left(\bar{x}_{CIS-West,t} - \bar{x}_{EU-Baltic\&Central,t}\right)}{\bar{\hat{d}}_{CIS-West,t} - \bar{\hat{d}}_{EU-Baltic\&Central,t}} \cdot 100.$$

30. **Using this decomposition, it can be seen that the key motivations for higher inflation in Russia, Ukraine, Belarus and Moldova appear to have been evolving of late** (Figure 5). Differences in the degree of price liberalization—which can broadly be understood to capture the level of internal liberalization of the economy—appear to have always been an important motivation towards higher inflation, but have grown of late to explain some 60 percent of the gap. Differences in the degree of external liberalization could explain a further 33 percent of the gap at present. Differences in the fiscal environment, once important, appear to have receded as a factor underlying the gap. The impact of terms-of-trade differences has been very mild to-date for the CIS as a whole (reflecting, in part, their diverse experiences with terms-of-trade shocks).

Figure 5: Factors Underlying Inflation Differences, 1996–2004

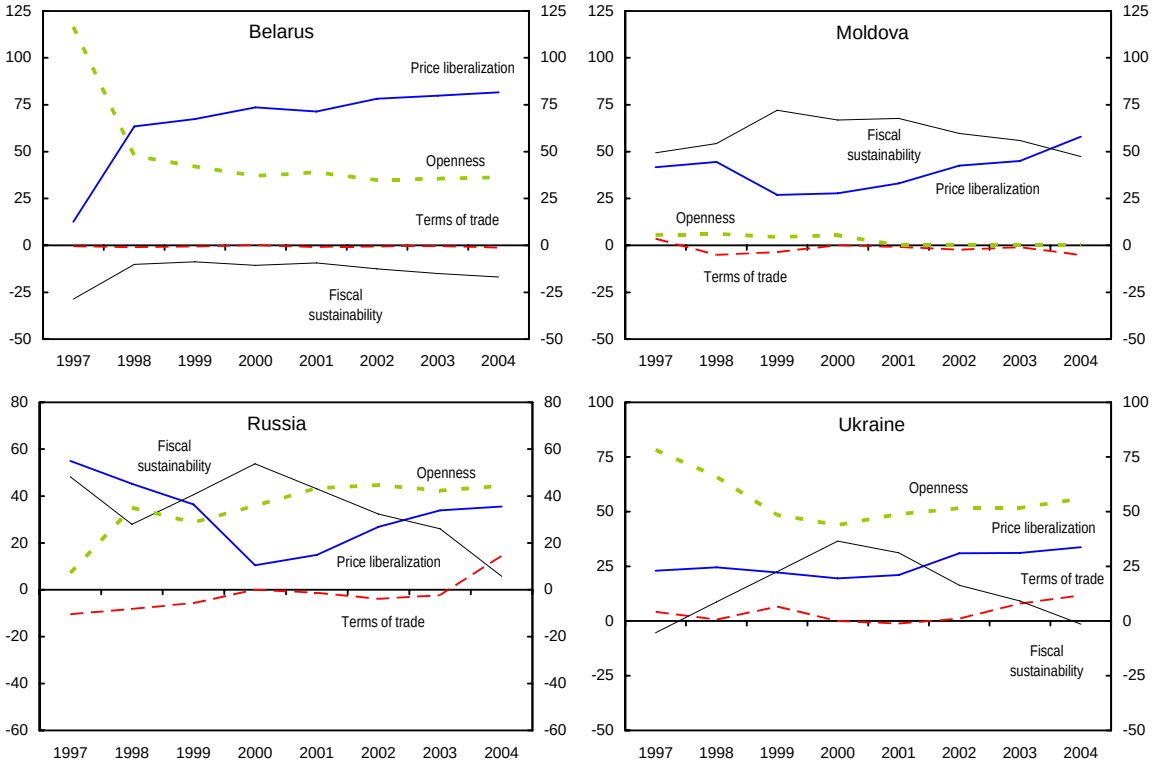


Source: Authors' estimates.

31. **The details for individual CIS-West countries reflect these findings with some nuances** (Figure 6). Belarus is very much in line with the CIS-West average. Russia and Ukraine differ to the extent that positive terms-of-trade movements are more important of late (at 30 and 25 percent of the gap respectively). In turn, a reduction in government debt appears to play a much larger role in offsetting other factors and providing an incentive towards a smaller gap. For Moldova, differences in external liberalization appear to play a limited role, while issues of fiscal sustainability and internal liberalization may be crucial.

[17] Using the actual inflation gap has no impact on the relative importance of the explanatory variables.

Figure 6: Factors Underlying Inflation Differences by Country, 1997–2004



Source: Authors' estimates.

32. **The model can also be used to assess whether CIS-West central banks would have been expected to target lower inflation beyond the estimation period.** The out-of-sample values for variables (2005-2006) reflect outturns available through the IMF's WEO database, and EBRD indicators updated through 2005. The forecasts for 2007 are based on forecasts in the September 2006 WEO (inflation, government debt, terms of trade); for other indicator variables, the last available value was simply held constant. For the time dummies, they are assumed equal to zero over the forecast horizon (very close to their actual value during the last three years of the sample period).

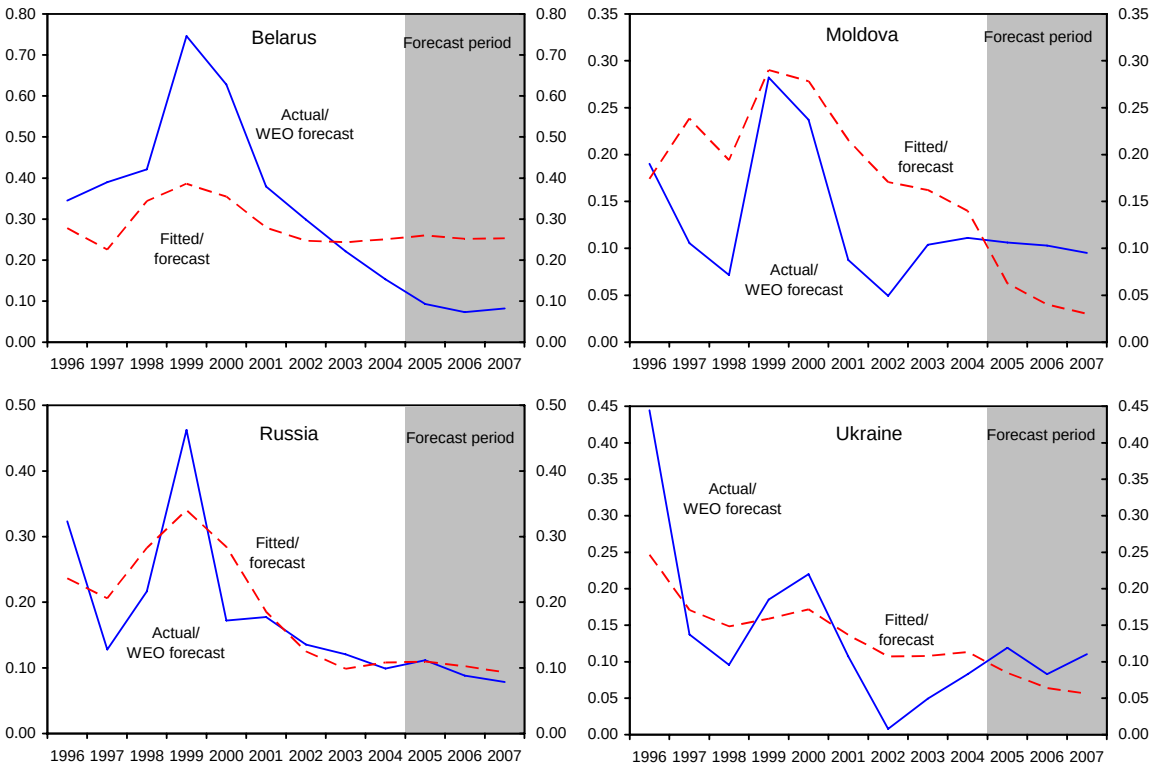
33. **For 2005-06, the model foresaw little to no inflation gap reduction in Russia and Belarus** (Figure 7, left column). The model fits the Russian data well and suggests that the central bank of Russia would have targeted inflation of about 10 percent (largely in line with the outcome), reflecting especially developments with the terms of trade. The model does not fit the Belarusian data as well. It suggests that the central bank of Belarus would have been content with continued high inflation (around 25 percent and significantly above the outcome), reflecting very slow liberalization of the economy.

34. **The model suggests that the central banks in Moldova and Ukraine would have targeted a reduction in inflation to about 5 percent in 2005-06, closing most of the**

inflation differential (Figure 7, right column). In Moldova, this would have reflected the impact of reforms undertaken in the context of an IMF program; for Ukraine, this would have reflected the impact of reforms introduced in 2005 after the Orange Revolution (especially the removal of import tariffs and of import and export restrictions). In the event, the inflation gap proved persistent for both Moldova and Ukraine. The model captures underlying inflation excluding administered price changes, and cannot pick up the large change in administered energy prices consequent on the move to market pricing for gas imports from Russia.

35. **The out-of-sample forecast for 2007 may also provide some insight into the credibility gap that the central banks in these countries may yet face** (Figure 7). The model suggests that Russia would reduce inflation only very gradually, consistent with the IMF's WEO forecasts. For Belarus, where the model fits less precisely, the inflation choice is seen as well above 2006 levels, and the then prevailing IMF forecast. The model suggests that if these countries announced near-term inflation targets at EU transition country levels, they could face a credibility problem. Moldova and Ukraine are projected by the model to want to reduce their gap considerably, even exceeding WEO forecasts. These results are again, however, subject to a caveat on administered prices, which for Belarus, Moldova and Ukraine would likely reduce the difference between model and WEO forecasts significantly.

Figure 7: Forecast Inflation, CIS-West, 1996–2007



Source: Authors' estimates.

VII. SUMMARY AND CONCLUSIONS

36. **The recent inflation differential between Russia, Ukraine, Belarus and Moldova and central European transition countries can be modeled reasonably well using a central bank incentive approach**. Panel estimation based on 19 transition countries suggests that central banks in Russia, Ukraine, Belarus and Moldova appear to have reason to choose higher inflation rates due in some cases to fiscal pressures, but mainly to make up for, and to perhaps exploit, lagging internal and external liberalization in their economies. Out-of-sample forecasts, based on projected developments in the terms of trade, in the underlying structure of these economies, and assuming no changes in institutions, suggest that incentives towards inflation may be diminishing on the back of recent reforms, but not to the point where inflation levels below 5 percent could credibly be announced as targets.

37. **Durably closing the gap will likely require some solution to these countries' incentive problems.** The empirical model, and economic theory, offer several possible approaches in the event recent progress towards this end stalls:

- Moves to liberalize the economy and encourage more openness could directly help reduce inflation in the medium term, consistent with experience in other economies, and indirectly reduce incentives for central banks to pursue inflationary policies.

- The model provides some evidence that structural reforms more generally—the data cannot distinguish which in particular, but does suggest some importance for reforms to promote faster financial market development and to eliminate labor market overhangs—could also help reduce incentives for central banks to pursue the looser monetary and credit policies which lead to higher inflation.

- As emphasized in the literature and suggested by the empirical model, political pressures also matter for inflation outcomes. Thus, efforts to improve central bank independence could also pay dividends in durably reducing CIS-West inflation. In this context, eliminating the multiple objectives CIS-West central banks now face, and providing for a stronger mandate to target inflation would be a good start.

Appendix I. Recent Studies of Inflation in Russia, Ukraine, Belarus and Moldova

Authors	Technique	Variables	Sample	Key Findings
Belarus				
Pelipas (2006)	Cointegration	- M1 - real money - CPI - real industrial production - exchange rate - refinancing rate	1992Q1–2003Q4	All monetary variables influence inflation in the short run. Monetary gap has a significant impact on inflation in the long run.
Russia				
Granville and Mallick (2006)	VECM	- CPI - exchange rate - refinancing rate - M2	1993M5–2004M5	Interest rate is not the monetary policy instrument. For the subperiod 2000 2003 inflation was determined by exchange rate policy rather than fiscal policy.
Ohnsorge and Oomes (2004)	Error correction model	- effective broad money (with foreign currency in circulation) - NEER - CPI - various monetary aggregates	1996Q4–2004Q1	De-dollarization explains increase in money aggregates without corresponding increase in inflation since 2003.
Vdovichenko and Voronina (2006)	- GMM (forward-looking monetary policy rule) - OLS - monetary policy as a system of intervention and sterilization	- CPI - industrial production - unemployment - real exchange rate - gold reserves - foreign currency reserves - external debt payments (interventions are reserves minus debt payments) - funds placed by commercial banks on central bank accounts - government's deposits placed with the central bank (both proxies for sterilization)	2000M1–2003M9	The authors find that the central bank beside anti-inflationary communication targeted the exchange rate level and its volatility.
Ukraine				
Leheyda (2006)	Cointegration VAR	- CPI and PPI - industrial production - M2 - unit labor costs - NEER and REER - foreign price level - seasonal dummies - administrative decisions	1997M1–2003M12	The author finds that inflation is determined by exchange rate, inflation inertia, and lagged money supply. Money supply depends on foreign currency inflow.
Lissovolik (2003)	Cointegration VAR	- domestic wages - nominal exchange rate - CPI (headline and services) - base and broad money - interest rates - real GDP - barter transactions	1993M1–2002M12	Cointegration found between CPI and broad money for whole sample but not for 1996-2002 subsample.
Siliverstovs and Bilan (2005)	VAR - no cointegration found - estimated in first differences - Granger causality	- CPI - average wage per capita - M2 - cash market spread as proxy for expected devaluation - seasonal dummies - 1998M9 dummy	1996M1–2003M11	The authors find that changes in devaluation expectations determine price developments, while money supply growth is negligible.

Appendix II. Recent Cross-Country Studies on Inflation.

Authors	Technique	Variables	Sample	Key Findings
Aisen and Veiga (2006)	System GMM panel, Blundell-Bond (1998)	- CPI - government crisis - cabinet changes - index of economic freedom - polity scale - agriculture - trade openness - growth in real GDP per capita - real overvaluation - growth of oil prices - U.S. treasury bill rate - seigniorage	1960–99 100 countries	The authors find evidence that inflation and seigniorage increase with different measures of political instability.
Cottarelli, Griffiths, and Moghadam (1998)	Dynamic panel, Arellano-Bond (1991)	- CPI - unemployment rate - EBRD transition indicators - IMF questionnaire on wage bargaining, wage indexation, banking sector, central bank independence, government debt - trade openness - current account - fiscal deficit - exchange rate regime - relative price changes - base money	1993–96 Countries: - 22 OECD - 10 CEEC - 15 CIS	Significant variables are fiscal deficit, exchange rate regime, wage indexation, central bank independence and from the EBRD indicators only price liberalization and banking sector reform and in a smaller subsample relative price changes.
Mafi-Kreft and Kreft (2006)	Panel (fixed effects)	- rate of depreciation in real value of money - central bank independence - exchange rate flexibility - hard peg dummy - fast track to EU dummy - fiscal balance - real GDP growth - trade openness - value added of agriculture	1995–2001 25 transition countries	The authors find that hard pegs (currency board arrangements) reduce inflation.

Appendix III. Data

Description	Source
Consumer prices index (annual average)	EBRD and IMF WEO forecast
Price liberalization index	EBRD
General government gross debt in percent of GDP	EBRD and IMF WEO forecast
Competition policy	EBRD
Change in labor productivity in industry	EBRD
Coarse exchange rate regime classification	IMF
Governance and enterprise restructuring	EBRD
Flat tax dummy	Ivanova, Keen, and Klemm (2005) and http://www.euractiv.com/en/taxation/flat-tax/article-136190
Share of agriculture in percent of GDP	EBRD and WDI
Current account in percent of GDP	EBRD
Bank reform and interest rate liberalization	EBRD
Trade and foreign exchange system	EBRD
Securities markets and non-bank financial institutions	EBRD
Exchange rate vis-à-vis key currency	IFS
Interest rate	IFS
Weighted index of central bank independence	Cukierman, Miller, and Neyapti (2002)
Terms of trade in goods and services	IMF WEO
Change in the share of administered prices	EBRD
Government stability indicator	PRS Group
Crop production index	WDI

Appendix IV. Data Correlation Matrices

Table 1. Correlations for Variables Used in Regressions in Table 6

	Inflation	Fiscal sust.	Price liberaliz.	Openness	Competition	Terms of trade	Admin. prices	Harvest
Inflation	1.00	0.33	-0.49	-0.54	-0.33	-0.10	-0.17	-0.10
Fiscal sust.		1.00	0.02	0.14	-0.02	-0.08	-0.22	-0.07
Price liberaliz.			1.00	0.68	0.37	0.03	0.02	-0.12
Openness				1.00	0.43	0.08	0.07	0.03
Competition					1.00	-0.08	-0.09	0.06
Terms of trade						1.00	0.16	0.31
Admin. prices							1.00	-0.01
Harvest								1.00

Sources: Authors' estimates.

Table 2. Correlations for Variables Used in Regressions in Table 7

	Inflation	Fiscal sust.	Price liberaliz.	Openness	Gov't stability	CBI	EU Accession	Terms of trade	Admin. prices
Inflation	1.00	0.33	-0.49	-0.54	0.03	-0.10	-0.37	-0.10	-0.17
Fiscal sust.		1.00	0.02	0.14	-0.08	0.10	-0.13	-0.08	-0.22
Price liberaliz.			1.00	0.68	-0.25	0.06	0.46	0.03	0.02
Openness				1.00	-0.32	0.21	0.53	0.08	0.07
Gov't stability					1.00	-0.23	-0.25	0.06	0.06
CBI						1.00	0.20	0.10	-0.10
EU Accession							1.00	-0.05	0.04
Terms of trade								1.00	0.16
Admin. prices									1.00

Sources: Authors' estimates.

Table 3. Correlations for Variables Used in Regressions in Table 8

	Inflation	Balassa-Sam.	Flat tax dummy	Ent. restructure	Agri. share	Fiscal sust.	External sust.	Bank reform	Sec. mkt reform	Price liberaliz.	Openness	Terms of trade
Inflation	1.00	-0.13	-0.20	-0.46	0.34	0.33	0.19	-0.50	-0.36	-0.49	-0.54	-0.10
Balassa-Sam.		1.00	0.04	-0.07	0.03	-0.12	0.11	-0.07	0.01	0.08	0.00	0.29
Flat tax dummy			1.00	0.27	-0.28	-0.30	0.08	0.25	0.17	0.28	0.14	0.01
Ent. restructure				1.00	-0.60	0.00	-0.04	0.87	0.77	0.65	0.70	0.03
Agri. share					1.00	0.32	-0.32	-0.57	-0.73	-0.19	-0.26	0.03
Fiscal sust.						1.00	0.13	-0.03	-0.09	0.02	0.14	-0.08
External sust.							1.00	-0.10	0.13	-0.17	-0.18	0.09
Bank reform								1.00	0.76	0.64	0.73	0.01
Sec. mkt reform									1.00	0.34	0.44	0.06
Price liberaliz.										1.00	0.68	0.03
Openness											1.00	0.08
Terms of trade												1.00

Sources: Authors' estimates.

Appendix V. Robustness of Econometric Results

Table 1. Panel Regressions: Robustness Checks 1/

	1 Baseline T6-1	2 without CIS-East	3 only 2000 to 2004	4 with country fixed effects	5 without time fixed effects	6 Dynamic panels	7
Structural features							
Fiscal sustainability	0.212 ***	0.221 ***	0.016	0.272 ***	0.216 ***	0.170 *	0.190 **
	[0.024]	[0.029]	[0.016]	[0.028]	[0.029]	[0.096]	[0.073]
Output-inflation trade-off							
Price liberalization	-0.123 ***	-0.117 ***	-0.128 ***	-0.177 ***	-0.157 ***	-0.091 *	-0.127 ***
	[0.029]	[0.031]	[0.032]	[0.037]	[0.031]	[0.044]	[0.041]
Openness	-0.044 ***	-0.049 **	-0.035 ***	-0.047 **	-0.040 ***	-0.024	-0.020
	[0.014]	[0.020]	[0.012]	[0.020]	[0.014]	[0.038]	[0.045]
Exogenous shocks							
Terms of trade	0.076 **	0.148	0.050	0.084 *	0.066	0.017	0.028
	[0.035]	[0.128]	[0.100]	[0.047]	[0.053]	[0.144]	[0.146]
Change in administered price share							-0.036
							[0.063]
Lagged dependent variable							
Inflation (-1)						0.290 **	0.217 **
						[0.104]	[0.101]
No. of Observations	171	135	95	171	171	171	138
No. of Countries	19	15	19	19	19	19	16
Adjusted R^2	0.724	0.678	0.706	0.689	0.620	...	...

Sources: Authors' estimates

1/ Standard errors in brackets: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

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