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Nonmonetary Determinants of Inflation in Romania: A Decomposition

by
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Abstract:

Why is inflation, 15 years after transition started, still considerably higher in Romania than in the eight EU member states (EU-8) that joined in May 2004? Panel estimation based on ten central and eastern European countries allows us to decompose the inflation differential between Romania and the EU-8. The decomposition suggests that neither the revenue, nor the balance of payments, nor the financial stability motive are driving inflation; rather structural differences are at play. The employment motive, together with indicators reflecting the prolonged structural change, explain most of the inflation gap vis-à-vis the EU-8.

Keywords: inflation, panel data, transition economics
JEL classification: E58

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I. INTRODUCTION

The economic transition of central and eastern European countries (CEECs) involved, among other important elements, macroeconomic stabilization and disinflation. Especially from the mid-1990s, the three Baltic countries (EU-Baltics) and the five central European countries (EU-Central), which together joined the European Union (EU) in May 2004, shared a common trend toward single-digit inflation rates (Figure 1). As a consequence, the average inflation rate for these eight new EU member states (EU-8) declined to 3.3 percent by 2005.

By contrast, Bulgaria and Romania, which joined the EU in January 2007 (EU-Southeast), have lagged behind in the process of disinflation. Both countries suffered a setback when a financial crisis led to a bout of inflation in 1996-97. In response, Bulgaria introduced a currency board arrangement in July 1997 and saw inflation fall to below 10 percent soon afterwards. Romania, in contrast, chose a targeted depreciation rate of the exchange rate as a nominal anchor. With this gradual approach to disinflation, Romania is the only CEEC country where inflation was still close to 10 percent at the end of 2005 (Figure 1).

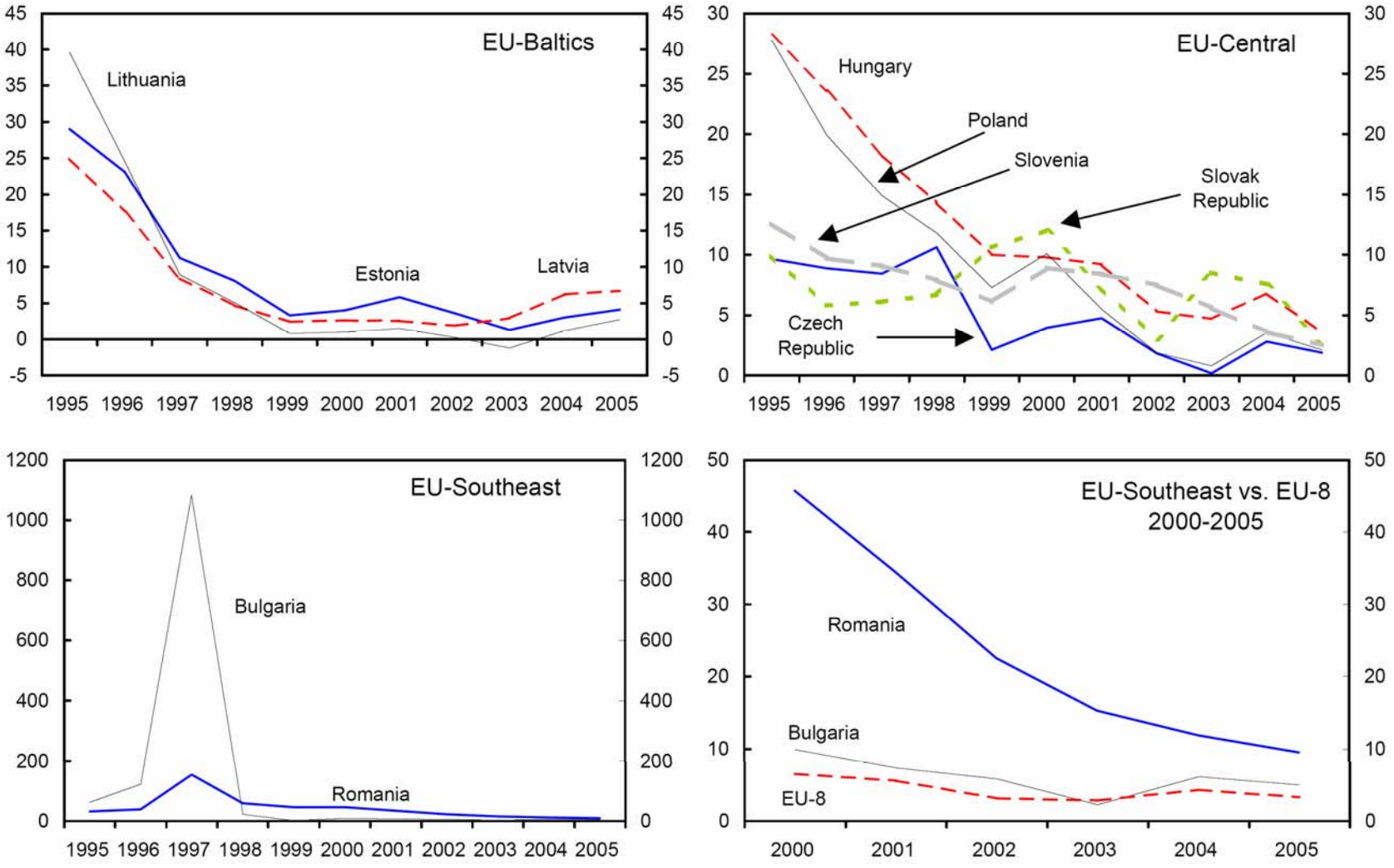
Therefore, Romania is an interesting case for studying a more general question: Why do countries choose different targets for disinflation?[1] Like most similar literature, previous studies on disinflation in Romania estimate a vector autoregressive model to illuminate the links among inflation and other macroeconomic variables (see Moore, 2001; Gueorguiev, 2004). However, these studies do not examine what motivates the central bank to choose the respective monetary policy strategy and exchange rate policy.

This paper addresses these nonmonetary determinants of inflation. This is not to suggest that money does not matter, but rather to look behind the veil and investigate what drives the central bank's choice of its monetary policy. We investigate the reasons for the inflation differential between Romania and the EU-8 by focusing on the motives and constraints of central banks. Following Cukierman (1992), we distinguish between the employment, revenue, balance of payments, and financial stability motive for inflationary policies.

The remainder of the paper is organized as follows. The second section deals with preliminary considerations such as CPI measurement issues, the Balassa-Samuelson effect, and the possible role of asymmetric shocks. The third section uses panel estimation techniques to estimate the determinants of inflation in the CEECs. The explanatory variables are structured along Cukierman's four possible motives for inflationary policies. Based on the estimated coefficients we examine the sources of higher inflation in Romania compared to the EU-8.

[1] See Cottarelli and Szapáry (1998), Cottarelli and Doyle (2001), and Dabrowski (2003).

Figure 1: Inflation in the CEECs in Percent, 1995-2005



Source: EBRD.

II. THE INFLATION DIFFERENTIAL—PRELIMINARY CONSIDERATIONS

A. Measurement of Inflation

Measuring the true rate of CPI inflation is not straightforward in any country. In the U.S., the Boskin Commission (Boskin et al. 1996, 1998; Gordon 2000) found an upward bias in the consumer price index driven by four effects:

- quality effect;
- substitution effect;
- new goods effect;
- outlet effect.

The quality effect stems from changes in the quality of a good that may lead to price increases that are misconceived as price inflation. The substitution effect relates to changes in consumption patterns: In response to relative price increases, consumers may switch to similar but cheaper products. The new consumption pattern is not always reflected in updated weights for the consumer price index. The new goods effect arises when new goods are included in the CPI consumption basket only with a delay. Finally, the outlet effect stems from the difficulties faced by official price collectors in reflecting consumers' moves towards shopping at cheap outlets such as hypermarkets.

Direct studies in the CEECs of the mismeasurement bias in the CPI are few. Filer and Hanousek (2003) find that Czech inflation during the 1990s may be overestimated by more than 4 percent annually due to neglect of new goods and a quality bias; no studies are available on other transition countries. Accounting for the level of inflation, the Czech estimate is broadly in line with relative magnitudes measured for advanced economies once divided by the average inflation rate (Table 1). Hence, 15 years after transition started and given the low level of (headline) inflation achieved, the findings by Filer and Hanousek do not appear to signal an unusually large transition economy effect in CPI mismeasurement.

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.

However, the CPI baskets differ considerably between the EU-8 and the EU-Southeast groups of countries (Table 2). In Bulgaria and Romania (EU-Southeast), the share of food is higher at the expense of services. On the one hand, this is partly explained by the fact that CPI baskets are derived from household expenditure data. A common feature of such household surveys is that expenditures on food are overrepresented. In the EU-8, Eurostat supervised the implementation of western European statistical standards, whereas Bulgaria and Romania may well lag behind in improving the quality of their CPI data. On the other hand, big differences in the level of income between the EU-Southeast and the EU-8 may well explain a higher share of food and a lower share of services in the CPI basket. As a result, up and down shocks to food prices have a larger impact on CPI inflation in Bulgaria and Romania.

Table 2: CPI 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-8	**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	**0.47**	**0.43**	**0.38**	**0.38**	**0.15**	**0.18**

Source: Eurostat.

B. The Balassa-Samuelson Effect

As Romania lags behind the EU-8 in its economic transition, a stronger Balassa-Samuelson effect may account for part of its higher inflation. The Balassa-Samuelson effect ascribes an increase in inflation to productivity increases after a country opens up to the rest of the world. As the sectors producing internationally traded goods are exposed to international competition, they become more productive and wages increase. These wage increases in the tradables sector lead to wage increases also in the nontradables sector (where productivity has grown less rapidly), and thus the overall price level increases.

Recent studies have been more skeptical about the possibility of a large Balassa-Samuelson effect in the CEECs. Égert, Drine, Lommatzsch, and Rault (2003) conclude that the composition of the consumer price index with its high share of food and administered prices overestimates the Balassa-Samuelson effect. Mihaljek and Klau (2004) point out that earlier studies do not focus on the actual inflation differential vis-à-vis the euro area and neglect the relatively high productivity growth in nontradables.

The survey by Égert, Halpern, and MacDonald (2006: 292) suggests that among the CEECs the Balassa-Samuelson effect ranges between 2 percent in Hungary and Poland and close to zero in the Czech Republic and Latvia. For Romania, Égert (2005) finds only 0.5 percent of inflation attributable to the Balassa-Samuelson effect.

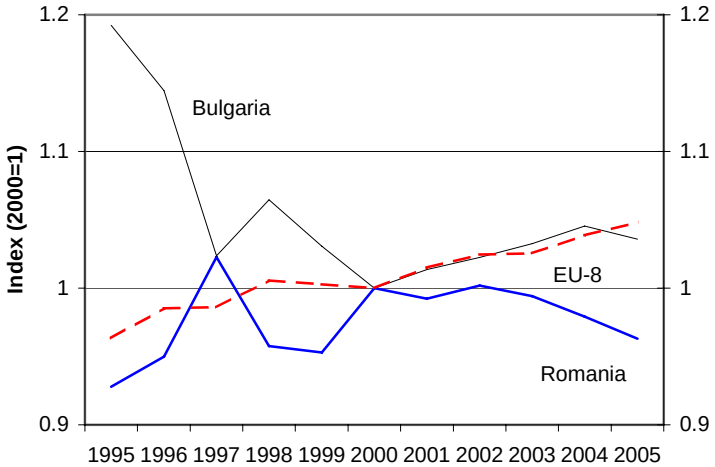
C. Importance of Asymmetric Shocks

An alternative explanation for higher inflation in Romania in contrast to the EU-8 is based on the importance of asymmetric shocks which could lead to an upward bias in inflation rates. Three types of possible shocks deserve particular consideration: terms of trade shocks, agricultural shocks, and adjustments of administered prices.

- **Terms of Trade Shocks**

  Bulgaria and Romania are less diversified than the EU-8. In both countries, the agricultural sector still contributes over 10 percent of GDP, whereas the average contribution in the EU-8 has declined to below 5 percent. Recently, Romania's terms of trade deteriorated slightly, which contrasts with developments in the EU-8 and Bulgaria (Figure 2): However, a priori it is not clear whether a deterioration in Romania's terms of trade should lead to higher inflation (e.g., due to pass-through of higher oil prices) or actually to lower inflation (e.g., due to pass-through of lower export earnings).

Figure 2: Terms of Trade

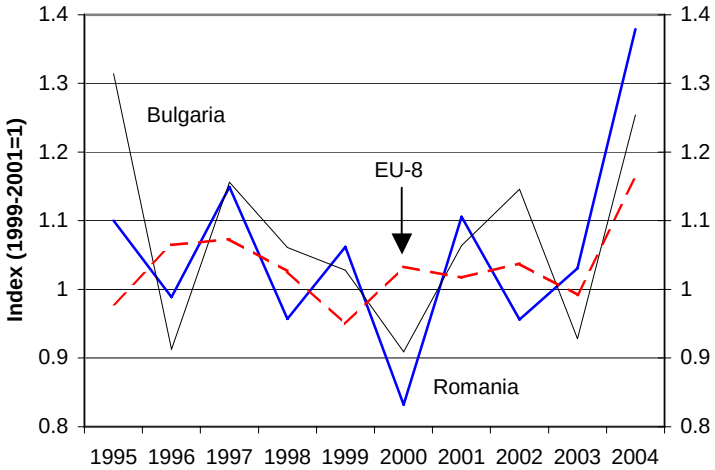


Source: WEO.

- **Agricultural Shocks**

Since the agricultural sectors in Bulgaria and Romania are quite large, asymmetric agricultural output shocks may contribute to the inflation differential, especially given the high weight of food in the CPI basket. Figure 3 shows crop production during 1995-2004 based on the World Bank's crop production index. The pattern of production across countries does not vary greatly. However, Romania was particularly hard hit in 2000 by a bad harvest, indicating potential repercussions for CPI inflation.

Figure 3: Crop Production

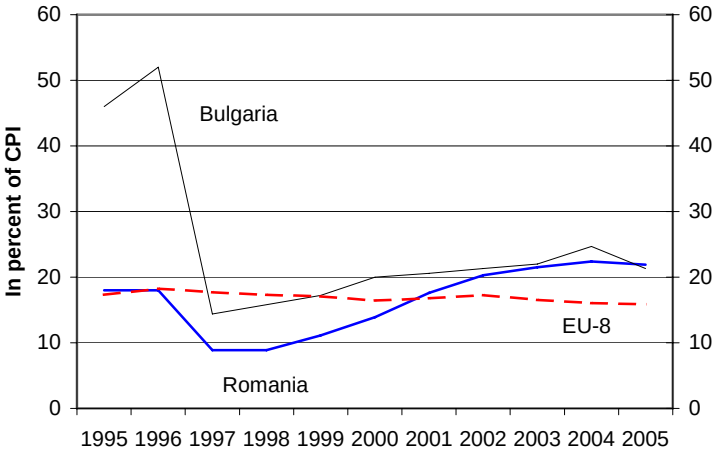


Source: World Bank.

- **Administered Prices**

Administered prices are of particular importance in transition economies. The cost-recovery hypothesis (Zavoico 1995) suggests that regulated prices did not change much during the early years of liberalization, but quite possibly may have begun to rise more rapidly ten years after independence as maintenance costs came to be fully included in the calculations (Égert, Halpern, and MacDonald 2006: 274). The share of administered prices in the CPI since 2001 shows a clear and stable gap between the EU-Southeast and EU-8 country groups (Figure 4). Such nonmarket interventions may thus have led to higher inflation.

Figure 4: Administered Prices



Source: EBRD.

Summing up, a large share of food prices and potentially asymmetric shocks should be kept in mind for the further investigation. The Balassa-Samuelson effect, however, accounts only for little inflation in Romania.

III. NONMONETARY DETERMINANTS OF INFLATION

Since inflation is higher in Romania than in other CEECs and that neither measurement errors nor the Balassa-Samuelson effect nor asymmetric shocks offer a compelling explanation, this section analyzes the determinants of the Romanian central bank's policy choices on inflation from 1993 until 2005. First, we review the possible motives underlying central banks' policy choices on inflation generally. Second, we summarize exogenous influences beyond the Romanian central bank's control. Third, based on the resulting set of explanatory variables, we estimate a panel regression of our EU-8 and EU-Southeast country groups to identify the nonmonetary determinants of inflation.

The estimation builds on Cottarelli, Griffiths, and Moghadam (1998), Aisen and Veiga (2006), and Mafi-Kreft and Kreft (2006). All three studies investigate nonmonetary determinants of inflation through panel data analysis. Aisen and Veiga (2006) explain inflation by indexes and determinants of political instability in a comprehensive sample of 100 countries for 1960-1999. Cottarelli, Griffiths, and Moghadam (1998) focus on monetary policy in CEECs (25 countries) and explain differences in inflation relative to a set of industrial countries (22 countries) during 1993-1996. Mafi-Kreft and Kreft (2006) investigate how credibility in the form of hard exchange rate pegs reduces inflation in a sample of 26 transition countries during 1995-2001. We improve on these earlier studies in several ways as we (i) take the most recent 10-year period as our sample period (1994-2005), (ii) focus on a more homogenous set of countries by looking only at the ten central and eastern European EU members, and (iii) focus on the nonmonetary determinants of inflation.

A. Central Bank's Motives for Inflationary Policies

With the ongoing structural change in post-communist transition countries, there are potentially many nonmonetary considerations that may drive central banks' monetary policies. In this empirical analysis we seek to identify the corresponding variables and their respective role for monetary policy in the CEECs.

We group the possible motives underlying inflationary policies based on Cukierman's (1992) positivistic framework where the central bank's objective function is generated by a broad set of political-redistributive considerations. Cukierman identifies four possible motives:

- employment;
- revenue;
- balance of payments;
- financial stability.

Clearly, some central banks might refrain from involvement in certain policy objectives and assign a zero coefficient to the corresponding variable in their objective function. The concept of a central bank reaction function, together with these four possible motives underlying policy choices, helps us to structure our set of explanatory variables.

Employment Motive

Against the background of the Phillips curve relationship, in one way or another central banks care not only about inflation but also about the real side of the economy. Such real variables could be the **unemployment rate**—something elected politicians would certainly be concerned about—or other real variables like output or the deviation of actual from potential output (i.e., the output gap).

Within the scope of the present paper, it is difficult to measure potential output for CEECs and in particular for the EU-Southeast countries, given the ongoing transition process and the short period for which annual data are available. Therefore, we use the following variables to relate inflation to the real side of the economy and to capture the costs and benefits inherent in the trade-off faced by each central bank:[2]

- **The share of agriculture** in GDP characterizes the structure of the economy. This variable captures each country's individual speed of transition and also any setbacks due to financial crises when the agricultural sector acts as a shock absorber. A large agricultural share implies a large resource transfer among sectors in the economy. Easy credit from the central bank smoothes adjustments leading to less costs in terms of unemployment but higher inflation.[3]

[2] No data was available for variables such as the change in relative prices or the degree of centralization in wage bargaining.

[3] Other authors like Cukierman, Edwards, and Tabellini (1992) argue that the agricultural sector is difficult to tax and therefore subordinate the variable under the revenue motive.

- **The share of administered prices** may have ambiguous effects on inflation. Administered prices might reduce inflation in the short run by price stops. However, if prices are adjusted once in a while, such adjustments may be perceived by the central bank as an unanticipated cost-push shock that increases inflation. Additionally, a high share of administered prices may indicate intransparent nonmarket interventions by the government.

- **The Balassa-Samuelson effect** may be a source for inflation in transition countries. As the transition occurs, 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 potential influence via labor productivity growth in the manufacturing sector, interacted with the exchange rate regime.

Revenue Motive

The government as a debtor may attempt to influence the conduct of monetary policy in order to improve its financial position. For central banks which lack adequate independence, the government's influence can be difficult to resist. Even when independence is guaranteed, the central bank may face implicit governmental pressures for inflationary policies.

To capture this revenue motive, we incorporate the stock of **government debt** in our regression analysis. That is, a looser monetary policy and higher inflation can loosen the government's financial constraint by devaluing fixed-rate government debt, or can help the government address a financing problem through higher central bank profits. Of course, the revenue motive may diminish to the extent that there is a well-developed **government securities market** through which the government can finance itself.

Balance of Payments Motive

The balance of payments motive relates monetary and exchange rate policy to the current account. Unsustainable **current account deficits** imply the need for a real devaluation in order to increase exports and to reduce imports. Such a real devaluation is possible with lower domestic prices. However, central banks could be tempted to avoid such a pressure on domestic prices and wages by allowing for a nominal devaluation which—all other things remaining equal—leads to a higher inflation rate.

Additionally, **trade openness,** as argued by Romer (1993), works as a countervailing force to inflation as the benefits from surprise inflation decline with openness. The expansion of domestic output after an unanticipated monetary expansion leads to a deterioration of the terms of trade. The welfare loss from worsening terms of trade increases with the share of imported goods in domestic consumption. We use only the share of trade with nontransition countries provided by the EBRD to focus on truly international trade and to avoid distortions due to old trading patterns.

Financial Stability Motive

The financial stability motive can be broken down into interest and exchange rate smoothing:[4]

- **The standard deviation of interest rates** captures interest rate smoothing originating from the central bank's desire for a stable financial system (Goodfriend 1987). One key role of financial institutions is the maturity transformation as they borrow short-term and invest long-term. A sudden increase in the short-term interest rate may disrupt the maturity transformation and hurt the entire financial system. To protect the system the central bank may delay interest rate changes so that short-term and long-term interest rates can adjust simultaneously.

- **The standard deviation of exchange rates** captures exchange rate smoothing, which is equivalent to interest rate smoothing if assets and liabilities are in foreign currency but may also be a motive in itself if the economy's export sector is a price taker (Calvo and Reinhart 2002). Exchange rate smoothing is measured by the volatility of exchange rates.

B. Exogenous Influences Beyond the Central Bank's Control

To disentangle the central bank's trade-offs from shocks that are—at least in the short run—beyond the central bank's control, we account for exogenous influences. Based on our discussion so far, the following are possible exogenous variables:

- **World market prices** capture external shocks to import and export prices and are summarized by the terms of trade. Especially in economies that rely on their export sector this variable stands for supply-side shocks affecting the entire economy.

- **Natural shocks** affecting agriculture impact food prices (see above). Depending on the weight of food in the consumer price index these shocks drive total inflation. Crop production indicates good and bad harvests.

- **A change in the share of administered prices** affects short-run inflation immediately and may therefore be perceived by the central bank as an exogenous cost-push shock that should be accommodated by monetary policy.

C. Methodology

We follow the estimation strategy by Cukierman, Miller, and Neyapti (2002) and Mafi-Kreft and Kreft (2006) who use the annual rate of depreciation in the real value of money, $d_{i,t}$, instead of unadjusted inflation rate because unadjusted inflation in the sample varies sharply:[5]

[4] In economies with very low inflation rates central banks also avoid hitting the zero lower bound of interest rate. We neglect this motive in the case of the CEECs.

[5] Also, deflationary periods, such as in Lithuania in 2003, do not drop out of the sample as when taking the logarithm.

$$d_{i,t} = \frac{\pi^{d}_{i,t}}{1+\pi^{d}_{i,t}}, \qquad i = 1,\ldots, N \text{ and } t = 1,\ldots, T, \tag{1}$$

where $\pi^{d}_{i,t}$ is the inflation rate in decimals in country *i* at time *t*.

The panel is estimated in levels with time fixed effects, v_t,

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

where X is a vector of explanatory variables, β is the vector of parameters to be estimated, v is the time specific effect, and ε is the error term.

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

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 and Romania. Serial correlation (inflation persistence) may also be present due to price convergence, 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.

The regression does not include monetary aggregates as we do not intend to investigate the role of money for inflation. Rather, the explanatory variables account for exogenous shocks and capture the underlying motives of each central bank.[6] We do not attempt to account for the medium- and long-run risks of the chosen monetary policy strategy because long-run effects cannot be identified with such a short sample period.

[6] The data sources are given in Table A1 in the Appendix.

Panel unit root tests allow us to assume that the rate of depreciation of money is stationary (Table 3) so there should be no spurious correlations from neglected cointegration relationships.[7]

Table 3: Panel Unit Root Tests for the Rate of Depreciation in Money

Method	Statistic	Probability	Observations	Result
Null: Assumption of a common unit root process				
Levin, Lin, and Chu *t*	-7.96	0	113	I(0)
Breitung *t*-statistic	0.11	0.54	103	I(1)
Null: Assumption of an individual unit root process				
Im, Pesaran, and Shin W-stat	-4.52	0	113	I(0)
ADF – Fisher χ^2	60.36	0	113	I(0)
PP – Fisher χ^2	105.59	0	120	I(0)
Null: Assumption of no common unit root process				
Hadri *Z*-statistic	6.12	0	130	I(1)

D. Results

The fit of the model is good, especially once taking into account that the economic transition is still ongoing. The R^2 measure is similar to that found in previous literature. The residual distribution does have fat tails: a couple of large outliers are the result of the independent variables' failure to fully explain the financial crises in the EU-Southeast countries in 1996-97. The estimation procedure corrects for autocorrelation and heteroskedasticity.

In the baseline specification all coefficients are significant and have the expected sign (Table 4, Regression 1). Employment motives appear to be very important, while revenue and financial stability motives also play some role. The only important exogenous shock appears to be the change in the administered price share.

- **Employment motive.** The negative sign of the coefficient of the **lagged unemployment rate** captures the Phillips curve trade-off between inflation and employment.[8] A reduction of the **agricultural share** in GDP lowers inflation indicating that a large share of the disinflation processes is correlated with the ongoing structural change. The **share of administered prices** as well as the **Balassa-Samuelson effect** have the expected sign but are insignificant (Regression 2, 3).

- **Revenue motive.** Lagged **government debt** leads to higher inflation whereas the EBRD indicator for the government **securities market** lowers inflation. The latter coefficient appears only relatively small due to the scaling of the indicator.

[7] The application of methods for nonstationary time series was not feasible. Neither the two-step procedure suggested by Engle and Granger (1987) nor a cointegrated panel VAR model suggested by Breitung (2005) could be estimated due to the short time series of the CEECs.

[8] The unemployment rate, government debt, and the current account deficit are lagged to avoid endogenous feedback from inflation.

Table 4: Results from Panel Regression, 1994-2005

	1	2	3	4	5	6	7	8	9
Employment									
Lagged unemployment	-0.97 ***	-1.005 ***	-0.898 ***	-0.971 ***	-1.008 ***	-0.306 *	-0.34 **	-0.763 ***	-0.92 ***
	[0.226]	[0.230]	[0.210]	[0.221]	[0.238]	[0.157]	[0.160]	[0.227]	[0.220]
Share of agriculture	0.929 ***	0.911 ***	0.939 ***	0.953 ***	1.017 ***	1.062 ***	1.058 ***	1.182 ***	0.967 ***
	[0.347]	[0.338]	[0.291]	[0.346]	[0.348]	[0.289]	[0.298]	[0.339]	[0.345]
Share of administered prices		0.232							
		[0.170]							
Balassa-Samuelson effect			-0.004						
			[0.015]						
Revenue									
Lagged government debt	0.159 ***	0.163 ***	0.156 ***	0.156 ***	0.16 ***	0.067 **	0.072 ***	0.133 ***	0.162 ***
	[0.032]	[0.032]	[0.034]	[0.031]	[0.032]	[0.026]	[0.025]	[0.034]	[0.032]
Securities market	-0.034 *	-0.039 **	-0.037 **	-0.035 **	-0.029 *	-0.026	-0.025	-0.018	-0.034 **
	[0.017]	[0.018]	[0.015]	[0.017]	[0.017]	[0.018]	[0.018]	[0.018]	[0.016]
Balance of payments									
Lagged current account				-0.223					
				[0.179]					
Openness					-0.074				
					[0.071]				
Financial stability									
Exchange rate smoothing	-0.006 **	-0.005	-0.005 *	-0.006 **	-0.006 **	0.001		-0.004	-0.006 **
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.001]		[0.003]	[0.003]
Interest rate smoothing						0.004 ***	0.004 ***		
						[0.001]	[0.001]		
Exogenous shocks									
Terms of trade								0.218	
								[0.206]	
Change in the share	-0.068 *	-0.097 ***	-0.069 *	-0.07 *	-0.06	-0.087 ***	-0.082 ***	-0.109 ***	-0.067 *
of administered prices	[0.036]	[0.037]	[0.039]	[0.036]	[0.038]	[0.028]	[0.027]	[0.037]	[0.035]
Harvest									-0.048
									[0.033]
No. of Observations	101	101	101	101	101	95	95	95	100
No. of Countries	10	10	10	10	10	10	10	10	10
Adjusted R^2	0.787	0.793	0.784	0.781	0.782	0.852	0.854	0.782	0.786

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

- **Balance of payments motive. Current account** improvements go together with increases in inflation. **Openness** measured by trade with nontransition countries reduces inflation. However, both variables are insignificant and do not enter our benchmark regression (Regression 4, 5).

- **Financial stability motive.** Exchange rate smoothing measured by the **standard deviation of the monthly exchange rate** vis-à-vis the euro does have a small but significant effect on inflation. Whereas interest rate smoothing captured by the **standard deviation of the monthly interest rate** fails to explain higher inflation as the coefficient indicates that periods of high inflation such as financial crises lead also to higher interest rate variability (Regression 6, 7).

- **Exogenous shocks. Changes in administered prices** reflect an unanticipated cost-push shock. A reduction increases inflation. World market prices and harvest effects are not significant but have the expected sign. An improvement in the **terms of trade** raises inflation (Regression 8). Extraordinarily good **harvests** reduce inflation (Regression 9).

E. Robustness Checks

The overall results are reasonably robust across country groupings, time, and alternative econometric specifications (Table 5). Dropping Romania does not affect the main conclusions. The coefficients keep their sign, with the exception of the now insignificant share of agriculture (Regression 10).[9] Excluding the time fixed effects does not affect the signs of any of the variables (Regression 11). Including country fixed effects does not effect the signs of any of the variables although the change in the administered price share is no longer significant (Regression 12). 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. Due to the short sample most coefficients are, however, insignificant (Regression 13).

Adding variables to control for the institutional environment confirm earlier results in the literature (Table 5). Consistent with Aisen and Veiga (2006), a more **stable government** reduces inflation (Regression 14). De jure **central bank independence**, when used in place of government stability in the regression, is correctly signed. Both variables fail to contribute to the explanatory power of the model (Regression 14, 15). The model confirms also the results of Mafi-Kreft and Kreft (2006) on the role of the EU. A dummy for the beginning of **EU accession** talks reduces inflation significantly (Regression 16).

[9] The share of agriculture is needed to gain a reasonable fit for inflation in Romania.

Table 5: Robustness Checks, 1994-2005

	10 without Romania	11 without time fixed effects	12 with country fixed effects	13 only 2000 to 2004	14	15	16
Employment							
Lagged unemployment	-0.549 ***	-0.779 ***	-0.771 ***	-0.677 **	-0.743 ***	-0.979 ***	-0.858 ***
	[0.136]	[0.235]	[0.170]	[0.303]	[0.248]	[0.225]	[0.217]
Share of agriculture	-0.097	1.014 ***	1.392 ***	0.394	1.126 ***	0.796 **	0.707 *
	[0.395]	[0.388]	[0.481]	[0.520]	[0.349]	[0.344]	[0.373]
Revenue							
Lagged government debt	0.236 ***	0.171 ***	0.236 ***	0.064 **	0.14 ***	0.163 ***	0.155 ***
	[0.030]	[0.036]	[0.036]	[0.033]	[0.035]	[0.032]	[0.034]
Securities market	-0.024 **	-0.052 ***	-0.046 ***	-0.033	-0.008	-0.027	-0.029 *
	[0.011]	[0.017]	[0.017]	[0.030]	[0.021]	[0.018]	[0.016]
Financial stability							
Exchange rate smoothing	-0.007 ***	-0.005 *	-0.004 **	-0.002	-0.003	-0.007 ***	-0.006 **
	[0.002]	[0.003]	[0.002]	[0.004]	[0.003]	[0.003]	[0.003]
Exogenous shocks							
Change in the share	-0.039	-0.082 **	-0.016	0.025	-0.105 ***	-0.068 *	-0.044
of administered prices	[0.032]	[0.040]	[0.033]	[0.035]	[0.038]	[0.037]	[0.041]
Institutions							
Government stability					-0.004		
					[0.006]		
Central bank independence						-0.095	
						[0.067]	
EU accession							-0.097 *
							[0.056]
No. of Observations	92	101	101	50	87	101	101
No. of Countries	9	10	10	10	10	10	10
Adjusted R^2	0.868	0.73	0.825	0.709	0.779	0.79	0.803

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

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

The model provides the vehicle through which to address the sources of the Romania EU-8 inflation gap. The difference of Romania and the EU-8 average for each variable, $x \in X$, times the respective coefficient, β_x, over the predicted inflation gap gives the contribution in percent:

$$\frac{\beta_x \cdot \left(x_{Romania,t} - \bar{x}_{EU-8,t}\right)}{\hat{d}_{Romania,t} - \bar{\hat{d}}_{EU-8,t}} \cdot 100. \tag{3}$$

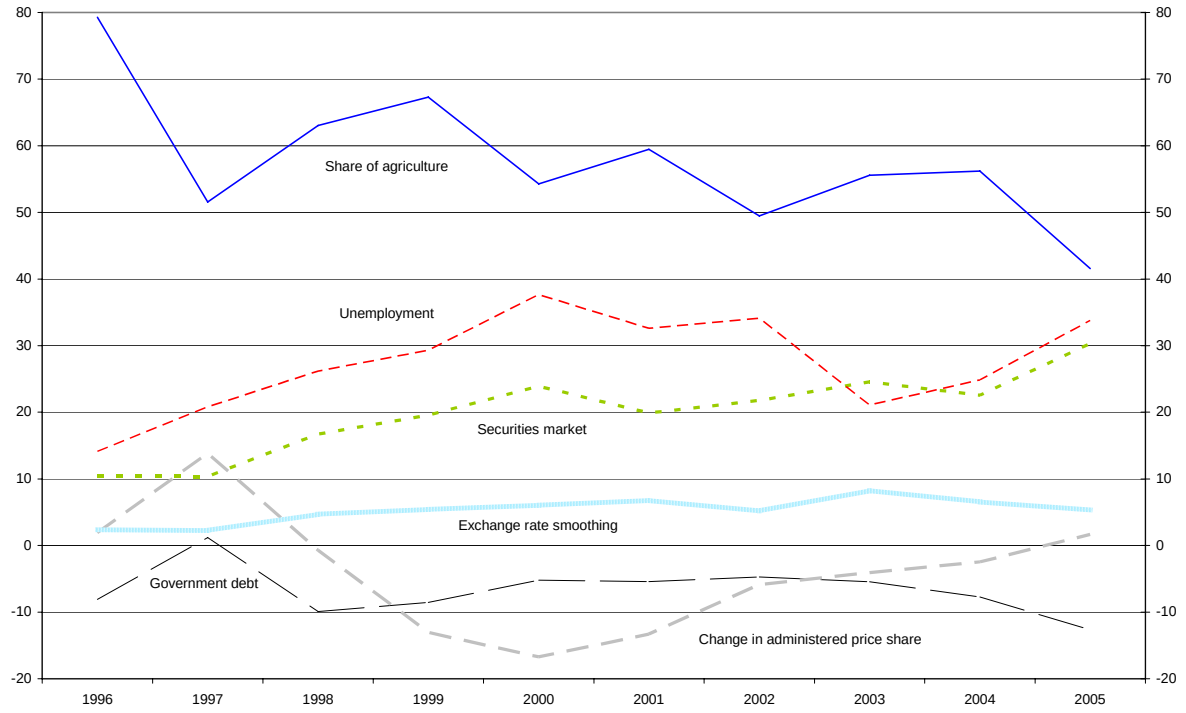
The key sources of the inflation differential based on Regression 1 in Table 4 are as follows (Figure 5):

- **Major contributors.** The share of agriculture in GDP is the single largest contributor to higher inflation in Romania. Although its contribution declines during the period of observation, this indicator for the structure of the economy is still responsible for more than 40 percent of the inflation differential in 2005. By contrast, the narrow nature of the government securities market contributed only about 10 percent of the inflation differential in 1996 and 1997, but this share grew to 30 percent by 2005. The lower Romanian unemployment rate shows a similar increase in its contribute from below to above 20 percent.

- **Minor contributors.** The financial stability motive captured by smoothing the exchange rate is only of minor importance.

- **Negative contributors.** The change in the share of administered prices in the economy catches the price liberalization that triggered the financial crisis in 1996-97. However, since 1998 this variable suggests inflation should be lower in Romania than in the EU-8. The revenue motive captured by government debt also implies—with the exception of the financial crisis—lower inflation in Romania.

Figure 5: Decomposition of the Romania – EU-8 Inflation Gap, 1996-2005



V. SUMMARY AND CONCLUSIONS

Why is inflation, 15 years after transition started, still considerably higher in Romania than in the eight EU member states (EU-8) that joined the union in May 2004? Panel estimation based on ten central and eastern European countries suggests that neither the revenue motive, nor the balance of payments motive, nor the financial stability motive are driving the Romanian central bank's policy choices with respect to inflation. Rather, structural differences reflecting central bank concern about employment play a key role.

Romania still has to deal with the heritage of the Ceausescu dictatorship. His policy of economic autarky led to a large agricultural sector and an underdeveloped industrial sector. During the economic transition, subsistence farming acted as a buffer to unemployment, keeping rates below the EU-8 average. Therefore, the employment motive, together with indicators reflecting prolonged structural change, explain most of Romania's inflation differential vis-à-vis the EU-8.

All in all, our specification of nonmonetary explanations for the inflation differential between Romania and other CEECs provides a richer set of conclusions than traditional approaches could deliver. The more gradual approach to disinflation in Romania seems to have been motivated by the comparatively low reform potential of the country. In this sense, the strategy may have had benefits in terms of lower unemployment. However, structural reforms are now urgently needed to encourage employment shifts from agriculture to services and high-value-added manufacturing and to avoid growing inflationary pressures in the future.

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APPENDIX

Table A1: Data Sources

Mnemonic	Description	Source
Inflation	Consumer prices index (annual average)	EBRD
Unemployment	Unemployment rate in percent	EBRD
AgriShare	Share of agriculture in percent of GDP	EBRD and WDI
AdminPrice	Share of administered prices in CPI	EBRD
GovDebt	General government debt in percent of GDP	EBRD
SecMarket	Securities markets and non-bank financial institutions	EBRD
CAGDP	Current account in percent of GDP	EBRD
Openness	Share of trade with nontransition countries in percent	EBRD
Change in labor productivity	Change in labor productivity in industry in percent	EBRD
Interest rate	Monthly money market interest rate in percent	IFS
Exchange rate	Monthly exchange rate vis-à-vis deutsche mark (till 1998) and vis-à-vis euro (since 1999)	IFS
FXRegime	Foreign exchange rate regime classification	IMF
ToT	Terms of trade	WEO
Harvest	Crop production index	WDI
GovStab	Government stability	PRS Group
CBindependence	Central bank independence	Cukierman, Miller, Neyapti (2002)