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Why Did Southeastern European Countries Experience Low Inflation Rates in the Beginning of This Century?[1]

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Abstract

In the last decade, the inflation rates of Southeastern European (SEE) countries - Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, and Serbia - have been more comparable to those in the euro-currency area than to the inflation rates in otherwise similar emerging economies; the only exception is Serbia. This low inflation rate is only partly explained by initial price levels. The exchange rate regime is also of paramount importance. Our analysis also explores additional differences between the SEE region and other regions.

JEL Classification Numbers: E31, F3, F15

Keywords: inflation, price level, exchange rate regime, Southeastern Europe

1. Introduction

The purpose of this paper is to analyze inflation in the Southeastern European (SEE) countries - Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, and Serbia - using a large cross-country panel dataset that includes approximately 120 emerging and developing countries. This motivation comes from very low inflation rates in the SEE region as a whole in the beginning of this century[4]. Due to the short history of these countries after independence (except for Albania), we focus on the period between 2001 and 2007.

We start by comparing the inflation rates across various regions of the world. Table 1 shows the average annual inflation rates of several regions. In this paper, all of the inflation rates are constructed using the consumer price index (CPI) reported in the World Economic Outlook (WEO), which is produced by

[1] This research was started while the first author was at the International Monetary Fund. The author would like to thank Albert Jaeger and all other participants at the IMF internal seminar. The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy.

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[4] Kosovo is excluded due to the data limitation.

the International Monetary Fund[5]. In Table 1, we show two inflation rates for each region: a simple average of annual inflation rates and inflation rates averaged over a 6-year period. Due to the exceptionally high inflation rates experienced by Serbia compared with those of other countries in the same region, we show the average inflation rates for the SEE region with and without Serbia. We later show to what extent Serbia deviates from other SEE countries in terms of inflation rates.

Table 1. Cross-Region Inflation Rate Comparison
(percent, 2001—07)

	Average of annual change of CPI		Annualized CPI change [ln(CPI_2007)-ln(CPI_2001)]/6	
SEE	5.17	(5.74)	4.54	(4.08)
SEE (excl. Serbia)	3.83	(4.78)	3.02	(1.86)
Other East and Central Europe (CEE)	6.72	(5.77)	6.33	(4.36)
Sub-Sahara Africa	7.19	(6.67)	11.9	(32.16)
Asia	5.19	(3.67)	4.98	(2.41)
Middle East/North Africa/Central Asia	6.06	(5.86)	5.81	(3.94)
Latin America and Caribbean	7.51	(6.60)	7.23	(4.54)

Notes:
(1) Standard deviations are in parentheses.
(2) Observations with change of more than 40 percent are excluded in computing annual CPI change.

On average, the inflation rate in the SEE region is the lowest of any region. If Serbia is included, the annual average SEE inflation rate is 5.17 or 4.54 percent, depending on the method used to calculate the inflation rate. Under both methods, the inflation rate of the SEE region is the lowest any other region, although the difference between SEE countries and Asia, which has the second lowest average rate, is not large. However, once Serbia is excluded, the average rates decrease to 3.83 or 3.02 percent. This adjustment increases the difference between SEE countries and Asia to greater than 1.3 percent.

Another notable fact is that the inflation rate of SEE countries is much lower than that of the combined Eastern and Central European countries (CEE hereafter)[6]. The difference in the inflation rates between these two regions

[5] Most of the main economic indicators between 2001 and 2007 used in this paper are available in the WEO database for the Republic of Serbia and Montenegro separately, although there is less availability for Montenegro.

[6] Central and eastern European countries include Belarus, Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Moldova, Poland, Romania, Russian, Slovak Republic, Slovenia, and Ukraine.

is approximately 3 percentage points. So, SEE region's inflation rate is lower than its nearest region.

These numbers document that inflation in the SEE region between 2001 and 2007 is much lower than inflation in other emerging and developing countries.

Table 1 also shows that the within-region variation in the annualized CPI change in SEE is smaller than that of other regions. The standard deviation of the variable for SEE excluding Serbia is 1.86, which is the smallest value found for any region. We check the within-SEE-region heterogeneity in inflation rates. Table 2 reports the annual inflation rate of each year between 2002 and 2007 for 6 countries in the region. To place their inflation performance in context, we also show the CPI inflation rates of the euro-currency area in the same table. Notably, four (Albania, Bosnia and Herzegovina, Croatia, and Macedonia) out of the six countries experience low and stable annual inflation rates, and their rates are even comparable with those of the euro-currency area. Montenegro had high inflation rates in 2002 and 2003, but the rates were stabilized between 2004 and 2007. Serbia is clearly an exception in the region, experiencing double-digit inflation in every year but 2007. Although this is not shown in the table, the inflation rate of Serbia in 2008 reverted to a double-digit rate (12.4 percent) then decreased to 8 percent in 2009. In comparing the SEE region as a whole to other regions, Serbia's exceptionally high inflation rate may confound our analysis. Consequently, in the analysis hereafter, we exclude Serbia from the sample of SEE countries, where necessary.

Table 2. SEE Countries—Annual CPI Percentage Change

	2002	2003	2004	2005	2006	2007	Average (2002—07)
Albania	5.2	2.3	2.9	2.4	2.4	2.9	3.0
Bos. and Herz.	0.3	0.5	0.3	3.6	6.1	1.5	2.1
Croatia	1.7	1.8	2	3.3	3.2	2.9	2.5
Macedonia	2.2	1.2	-0.4	0.5	3.2	2.3	1.5
Montenegro	19.7	7.5	3.1	3.4	2.1	3.5	6.6
Serbia	19.5	11.7	10.1	17.3	12.7	6.5	13.0
Euro-currency area	2.3	2.1	2.2	2.2	2.2	2.1	2.2

The low inflation rate experienced by the SEE region during the beginning of this century leads to two questions. First, does the SEE region truly follow the global trend of inflation convergence? Second, what background economic factors, if any, make the SEE region different from other regions?

To answer the first question, we rely on the relationship between the initial price (or economic) levels and subsequent inflation rates. We confirm that price convergence holds in the whole sample and the sab-samples according to regions.

In particular, if we examine all of Eastern and Central Europe (including the SEE region), price convergence holds. We thus argue that price convergence still holds in the beginning of this century and this argument, which is based on the initial price, can partially explain the low inflation rates of SEE countries. However, it cannot completely explain the low inflation in the entire SEE region.

For the second question, we need to determine what types of economic variables, other than the initial price level, affect (or do not affect) the SEE region differently than in other regions. We focus on annual observations and econometrically show that the exchange regime plays a role. Specifically, all of the SEE countries, other than Serbia, have either a fixed, inflation targeting, or "de facto"-fixed regime, all of which yield a lower inflation rate than intermediate or flexible regimes. We also find that a positive channel from broad money growth to inflation rate does not exist in SEE countries, while this channel exists in Serbia, CEE and all other regions.

The rest of the paper is organized as follows. The next section explores issues regarding convergence and initial price levels. Section 3 econometrically explores inflation performance using a large cross-country data set. Section 4 examines policy implications and presents several conclusions.

2. Inflation Convergence Across Regions

The first step of our approach is to determine whether the inflation experience of the SEE region follows the global trend. There is a general empirical convergence in inflation, i.e., a negative relation between the initial price level and the inflation rate thereafter[7]. Following the literature, we estimate the following specification:

$$\left[\ln(CPI_{i,2007}) - \ln(CPI_{i,2001})\right]/6 = \alpha_1 + \beta_1 * price\_level_{i,2001} + \varepsilon_{1i}, \qquad (1)$$

where $CPI_{i,2007}$ is the CPI of country i in 2007, while $CPI_{i,2001}$ is the CPI in country i in 2001. Here, the dependent variable is the average annual consumer price inflation rate over 6 years. $price\_level_{i,2001}$ is the price level in 2001. This is interpreted as the initial price level of country i. In general, constructing or obtaining price-level data that are suitable for cross-country comparisons is challenging. We obtain the data on the price level, which is comparable across countries, from Penn World Table 2001[8]. A price level is defined as the ratio of

[7] See, for instance, Chen, Choi and Devereux (2008).

[8] World Bank's International Comparison Program published the data on price level, whose definition is the same as the one used for the 2001 Penn World Table. These two are on the same line of a project, while there seem to be large variations between the 2001 and 2005 data for some countries. In

purchasing power parity (PPP) to the market exchange rate of the numeraire currency. The value of the price level for the United States is set equal to 100. α_1 and β_1 are coefficients to be estimated, and ε_{1i} is an error term. If the convergence hypothesis is true, estimates of β_1 are negative[9].

Using the initial income level instead of the initial price level as an explanatory variable should yield similar results because of the positive correlation between GDP and prices (mainly due to the Balassa-Samuelson effect found in theory and empirical work). We can thus use either the initial income or price level in the analysis. Figure 1 shows a strong and positive correlation between GDP per capita at PPP and the price level index in 2001. Therefore, one can also estimate the following:

$$\left[\ln(CPI_{i,2007}) - \ln(CPI_{i,2001})\right]/6 = \alpha_2 + \beta_2 \ln(GDP_{i,2001}) + \varepsilon_{2i}, \quad (2)$$

where $GDP_{i,2001}$ is the PPP-evaluated GDP per capita of country i in 2001 (taken from the WEO), which for the current analysis is interpreted as the initial income[10]. Again, convergence requires negative estimates of β_2[11].

this paper, we use the 2001 Penn World Table because (1) its coverage in terms of the number of countries is larger than that of the World Bank's project, and (2) the price level in 2001 is more suitable for our purpose in this paper as a proxy of the initial price level.

[9] This represents the well-known "beta" price-level convergence, which does not always imply "sigma" convergence. The latter means a decline in cross-sectional dispersion through time. In practice, however, the two are closely related (Chen, Choi and Devereux (2008)). We leave a discussion on sigma convergence aside due to the short time period of the sample.

[10] For Montenegro, the starting point (initial period) is 2003 because the GDP per capita at PPP is not available before 2002. As the price-level data of 2001 for Montenegro are not available, we exclude Montenegro in specification (1).

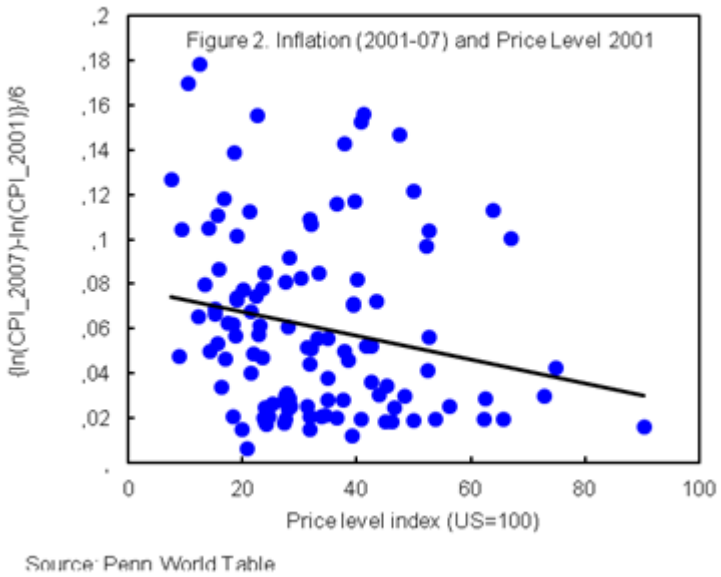
[11] For robustness checks, we also used real GDP and nominal GDP (in US$) per capita instead of GDP per capita evaluated using PPP. The qualitative results do not change.

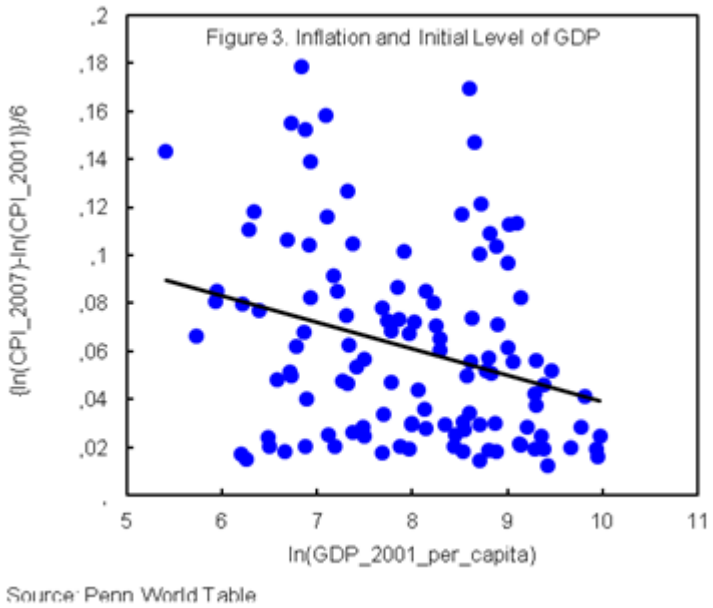
Table 3 shows the estimation results of specifications (1) and (2) for the full sample and various sub-samples. Similar qualitative convergence results are obtained, irrespective of the choice of the initial price or income level as a regressor. First, the result for the full sample is consistent with our prediction. The estimates for β_1 and β_2 are negative and statistically significant. Figures 2 and 3 plot the relationship between the 2001 initial price level or the initial levels of income and subsequent annual average inflation rates, respectively. The fitted lines for the whole sample results using (1) or (2) are also shown and depict a clear downward trend.

Table 3. Estimates of Beta

	Beta1 in (1) Estimate		R-squared	Beta2 in (2) Estimate		R-squared
Whole sample	-0.0005	(2.32)	0.042	-0.008	(2.42)	0.047
SEE+CEE	-0.0019	(2.42)	0.304	-0.31	(3.33)	0.193
Sub-Sahara Africa	-0.0010	(2.45)	0.102	-0.014	(2.39)	0.076
Asia	-0.0011	(3.05)	0.278	-0.013	(3.41)	0.186
Middle East/North Africa/Central Asia	-0.0007	(2.36)	0.131	-0.015	(1.84)	0.181
Latin America and Caribbean	-0.0007	(2.19)	0.134	-0.029	(2.20)	0.156

Note: (1) t values are in parentheses.

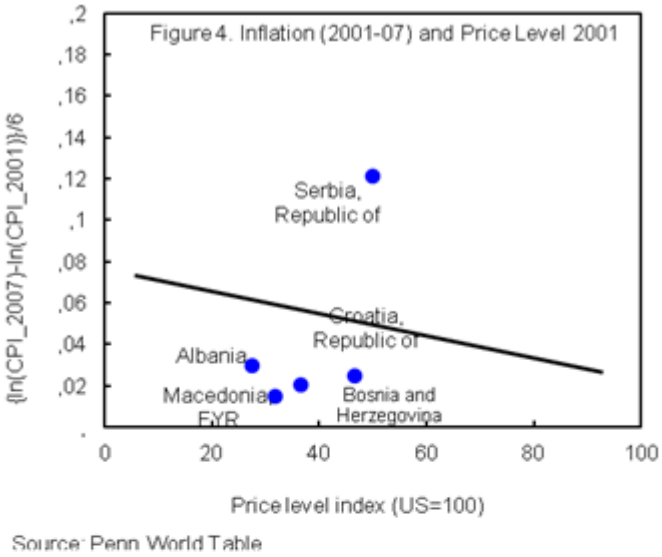




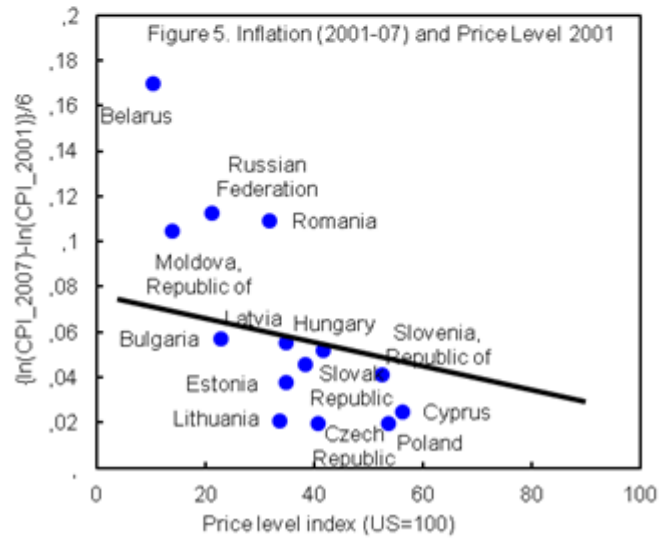
Next, we split the whole sample into sub-samples according to regions in the world. Due to the small sample size of SEE countries, we pool the SEE and CEE samples. In Table 3, we show the estimates for β_1 and β_2 of several regions in the world. We observe a convergence of inflation rates in all the developing and emerging regions (i.e., negatively significant β_1 and β_2), although the estimates for the β_2 coefficient of the Middle East, North Africa, and Central Asia is significant at only 10 percent. In the sample of SEE and CEE countries, the models fit best, providing R-squared values of 0.304 for (1) and 0.193 for (2).

However, even if we accept that price convergence generally occurs in emerging and developing countries, the story does not fully explain the low inflation rates of SEE countries. In fact, SEE countries have low inflation rates even *after* controlling for the initial price levels. We can confirm this in Figure 4, in which the horizontal and vertical axes are the same as those in Figure 2. Figure 4 shows plots for SEE countries and a fitted line of price level convergence using specification (1) for the entire sample. All of the plots for SEE countries, except one for Serbia, are located far below the fitted line. A similar figure can be obtained even when we use specification (2). This implies that SEE countries have lower inflation rates even *after* controlling for the initial price (or income) levels. The inflation rates of SEE countries are much lower than what would be explained by convergence alone. The SEE region is also the only region where this pattern holds. Although not shown except for CEE countries (Figure 5) due to space limitations, we construct similar figures for each of the other regions. In all other regions, individual countries' observations are scattered both above and below the (whole sample) fitted line.

The next section explores what factors other than initial price levels or the convergence process may explain this outperformance.



Source: Penn World Table



Source: Penn World Table

3. Determinants of Nonconvergence of Inflation

In the previous section, we show that price convergence holds in the entire sample while this cannot explain why the inflation rates of SEE countries are lower even after controlling for the initial level of the economy. The next question is thus "What kinds of economic background and structure, other than initial conditions, make the SEE region different from other regions?" We examine the annual observations of countries to investigate short-term annual inflation determinants to identify the anomalies of SEE countries.

3.1 Data, econometric specification, and estimation issues

All data, except for the price level index, are taken from WEO produced by the International Monetary Fund. The sample period is 2001-2007. A total of 120 emerging/developing countries are included in the sample.

The dependent variable, $\eta_{i,t}$, is each country i's annual inflation rate in year t constructed from consumer price index. Following the literature on inflation, it is defined as "the depreciation rate in the real value of money" using

$$\eta_{i,t} = \frac{\pi_{i,t}}{1+\pi_{i,t}}, \tag{3}$$

where $\pi_{i,t}$ is the decimal CPI inflation rate of country i in year t. Additionally, following the standard procedure in the literature, we exclude annual observations with annual inflation rates above 40 percent from the sample. A panel unit root test from Levin, Lin, and Chu (2002) reveals that this dependent variable is a stationary process (t-value is -32.3 and Prob>t-value is 0.000). The short time series of the sample does not permit individual unit root tests for each country.

The number of explanatory variables is kept as small as possible to mitigate potential econometric issues emanating, inter alia, from complex interactions or model selection, concentrating on variables frequently used in the literature of inflation determinants.

Explanatory variables are the following: (i) output gap (GDPGAP, in percent), measured as the difference between the log of actual real GDP and the log of GDP from a country-specific linear time trend; (ii) broad money growth (BMGROWTH, in percent); (iii) trade to GDP ratio (TRADEP, in percentage) to measure the degree of openness; and (iv) the change in terms of trade (TOTGROWTH, in percentage). Dummy variables for the exchange rate regime are also included; they are classified as fixed, intermediate, or flexible according to the 1999-vintage IMF classification[12]. Furthermore, countries with an inflation target (IT) regime are identified by Rose (2007) and Freedman and Laxton

[12] The IMF adopted a modified system in 1999, distinguishing between various types of pegged regimes and classifying exchange rate regimes based on countries' de facto policies (see IMF, 1999 for details). The classification is, in effect, a hybrid classification system that combines data on actual flexibility with information on the policy framework. In the IMF classification, there are eight categories: (1) exchange rate arrangement with no separate legal tender, (2) currency board arrangement, (3) other conventional pegged arrangement, (4) pegged exchange rates within horizontal bands, (5) crawling pegs, (6) crawling bands, (7) managed floating with no predetermined path for the exchange rate, and (8) independently floating rate. Hereafter, I reclassify them into the following three categories: (A) fixed regime ((1), (2), (3)), (B) intermediate regime ((4), (5), (6)), and (C) flexible regime ((7), (8)).

(2009). There are a considerable number of studies describing how Albania adopted an inflation-targeting regime as early as 1998 (Muço et al., 2004, Blejer, 2002, and Stone, 2003)[13] [14].

Due to the likely heterogeneity between Serbia and the other SEE countries, we group four countries (Albania, Bosnia and Herzegovina, Croatia, and Macedonia) into one group to create an SEE dummy[15]. We create another dummy for Serbia alone. A CEE dummy includes all other eastern and central European countries.

Importantly, two types of interaction terms are considered. One is the interaction between SEE, Serbia, or CEE dummies and all of the four explanatory variables. With these interaction terms, we investigate how each determinant of inflation differently impacts SEE countries, Serbia, CEE countries, and other regions. As the dataset is a panel, this specification enables an explanation of the components of the fixed effects.

The other interaction term is between year dummies and the initial price level. This is to capture the convergence process discussed in the previous section. By interacting these variables, it is implicitly assumed that the impacts of initial price levels may differ depending on how many years have passed since the measurement of the initial price levels (here they were measured in 2001). This is a better specification than one simply including the initial price levels as a regressor. Yearly fixed effects or time trends were also considered. However, neither of them is significant nor impacts other estimated parameters qualitatively or statistically. Once the yearly fixed effects are interacted with initial price level, most are statistically significant, as we see below. We decide to include only the interaction terms in our specification.

A linear specification is implemented. Specifically, we use feasible generalized least squares with panel-corrected standard errors. In the estimation, the error process is assumed to be each panel-specific AR(1), and the estimated parameters are used to correct the standard errors. Due to the short panel, a dynamic panel approach is not pursued.

[13] Particularly, Muço et al, (2004) report that, since 1998, the Central Bank has announced a clear quantitative target for annual inflation at the start of each year, usually within a fairly narrow band (e.g., 2-4 per cent).

[14] There is inconclusive discussion on the exact date on which each country adopted an inflation-targeting strategy (de Mendonça H., and G. de Guimarães e Souza, 2012). However, the concern is not as important in this paper because we focus on annual observations over a recent period (between 2001 and 2007).

[15] Kosovo and Montenegro are not included in the sample because of some missing data and the countries' short history as independent nations.

3.2 Basic results and the importance of exchange rate regimes

Table 4 reports the estimation results. Specification (A) is the baseline estimation, which includes main economic variables and interaction terms between year dummies and the initial price level as regressors. We find that BMGROWTH is positively correlated with higher inflation rates. This result is intuitive. A rapid growth in the money base may quickly raise the price level. On the other hand, neither the output gap nor the change in the terms of trade is statistically significant. Moreover, openness is positively correlated with inflation rates although marginally, which is in contrast to some theoretical and empirical evidence in the literature (e.g., Romer 1993), which predicts a negative relationship between openness to trade and inflation.

What about the convergence process discussed earlier? In specification (A), interaction terms between year dummies and the initial price levels are included. The coefficients of all these interaction terms are negative, implying price convergence. However, their statistical significance depends on the specific years. Additionally, the magnitude of the coefficients suggests that the impacts of initial price levels could be nonlinear depending on the time passed since the measurements of the initial price levels (although the impacts are monotonically negative).

Table 4. Results of the Estimation on Determinants of CPI Inflation

	(A)	(B)
GDPGAP	-0.0001	-0.0004
	(0.33)	(1.00)
BMGROWTH	0.0006	0.0005
	(3.44)	(2.92)
TRADEP	0.0001	0.0001
	(1.77)	(3.24)
TOTGROWTH	0.0001	0.0001
	(0.64)	(0.75)
Exchange rate regime dummies		
Intermediate	0.0272	0.0249
	(4.05)	(3.32)
Flexible	0.0347	0.0362
	(5.30)	(5.15)
Inflation targeting	0.0045	0.0045
	(1.39)	(1.42)
Interaction: (year dummy) * (initial price level)		
2002	-0.0123	-0.0124
	(3.30)	(2.63)
2003	-0.0102	-0.0140
	(2.28)	(1.87)
2004	-0.0165	-0.0185
	(3.39)	(3.18)
2005	-0.0078	-0.0109
	(1.48)	(1.80)
2006	-0.0185	-0.0204
	(3.03)	(3.04)
2007	-0.0114	-0.0127
	(1.78)	(1.79)
Interaction terms		
(SEE dummy) * (GDP GAP)		0.0001
		(0.43)
(SEE dummy) * (BMGROWTH)		-0.0005
		(1.78)
(SEE dummy) * (TRADEP)		-0.0003
		(1.90)
(SEE dummy) * (TOTGROWTH)		0.0005
		(0.85)
(Serbia dummy) * (GDP GAP)		0.0001
		(0.86)
(Serbia dummy) * (BMGROWTH)		0.0086
		(1.89)
(Serbia dummy) * (TRADEP)		-0.0039
		(1.46)
(Serbia dummy) * (TOTGROWTH)		-0.0007
		(0.34)
(CEE dummy) * (GDP GAP)		0.0002
		(1.64)
(CEE dummy) * (BMGROWTH)		0.0006
		(1.91)
(CEE dummy) * (TRADEP)		-0.0003
		(2.57)
(CEE dummy) * (TOTGROWTH)		0.0003
		(0.47)
Constant	0.0286	0.0241
	(4.99)	(3.94)
Obs	743	743
Wald chi-squared	86.77	121.73

Notes: (1) z-statistics are in parentheses.
(2) For each independent variable, see the data section in the text.

The exchange rate regime makes an important difference. A fixed regime provides a significantly lower inflation rate than an intermediate or flexible regime, while an IT regime provides similar levels of inflation as a fixed regime[16]. Note that this finding can shed some light on the SEE region's low inflation. Table 5 shows an exchange rate regime for each of the SEE countries. Three (Bosnia and Herzegovina, Macedonia, and Montenegro) of the six countries listed have fixed exchange rate regimes, while Albania pursues inflation targeting.

Table 5. Exchange Rate Regime—SEE Countries

	2001	2002	2003	2004	2005	2006	2007
SEE countries							
Albania	Flexible/IT	Flexible/IT	Flexible/IT	Flexible/IT	Flexible/IT	Flexible/IT	Flexible/IT
Bosnia and Herzegovina	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Croatia	Flexible	Flexible	Flexible	Flexible	Flexible	Flexible	Flexible
Macedonia	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Montenegro						Fixed	Fixed
Serbia			Flexible	Flexible	Flexible	Flexible	Flexible

Source: IMF and reclassification by the author.

Moreover, even for Croatia and Serbia, countries that do not fall into the "fixed" or "IT" buckets, there is evidence of the importance of the exchange system for inflation. Although Croatia is classified as a flexible regime, its actual exchange rate has been fairly stable and hardly distinguishable from the more fixed regimes. Table 6 shows annual national currency/Euro exchange rate change (in percent) and the correlation between the exchange rate of the local currency/SDR and the Euro/SDR.

Table 6. Annual National Currency/Euro Exchange Rate Percentage Change

							Annual Average	Correlation between local currency/SDR, and Euro/SDR
	2002	2003	2004	2005	2006	2007	2002-2007	(monthly data,2002-2007)
Albania	3.0	4.1	-7.3	-2.8	-1.1	0.7	-0.6	0.90
Bosnia and Herzegovina	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00
Croatia	-0.5	2.0	-1.1	-1.2	-1.1	0.3	-0.3	0.97
Macedonia	0.1	0.5	0.1	-0.1	-0.2	0.0	0.1	1.00
Montenegro					0.0	0.0	0.0	1.00
Serbia	1.9	7.0	11.4	14.5	1.1	-4.6	5.2	-0.37

[16] Here, it is implicitly assumed that there is no self-selection into a certain exchange rate regime, so the estimated parameter is an average impact of choosing the regime for the population. Obviously, this self-selection mechanism represents a concern in the literature on the impact of exchange rate regimes on inflation. The literature uses more sophisticated methods to deal with the self-selection mechanism and broadly supports our qualitative results. See the results using linear econometric specifications (including instrumental variable methods) in Bleaney and Francisco (2007), Ghosh, Gulde, and Wolf (2002), Ghosh, Gulde, and Wolf (2003), Husain, Mody, and Rogoff (2005), International Monetary Fund (2009), Levy-Yeyati and Sturzenegger (2001), and more recent studies using propensity score matching in Lin and Ye (2009) and Yamada (2012) and de Mendonça H., and G. de Guimarães e Souza (2012).

In Croatia, the exchange rate of the local currency against the euro remains fairly constant. As the result, the correlation between the two currencies is 0.97. This means that in Croatia, the classification of the exchange rate may not represent the actual de facto regime, at least in the period of 2001-2007. The actual regime behaves as though it were a fixed regime. Additionally, if the market is aware of this fact, it is unsurprising that this "de facto" regime of Croatia provides low inflation rates. To formally check this, an interaction term between the dummy variable for a flexible exchange regime and that for Croatia is introduced, and the following hypothesis test is conducted:

$$Flexible + Flexible^{*} Croatia = 0 .$$

With a test statistic (chi-squared) of 1.65, the hypothesis cannot be rejected. In other words, for Croatia, the stated "flexible" regime does not necessarily yield higher inflation rates than the fixed regime.

On the other hand, Serbia's exchange rate is very volatile, evident from the dinar-euro correlation of -0.37. Serbia's exchange rate regime thus appears to be flexible. We conduct a similar hypothesis test:

$$Flexible + Flexible^{*} Serbia = 0 .$$

The test statistic (chi-squared) is 26.22, strongly rejecting the hypothesis. These findings indicate the clear heterogeneity between the two "flexible" exchange rate regimes in the SEE region.

In sum, all of the SEE countries, other than Serbia, have either a fixed, inflation targeting, or "de facto"-fixed regime, all of which yield a lower inflation rate than intermediate or flexible regimes.

3.3 Comparison of the SEE region with CEE region and Serbia

The next step focuses on differences between SEE countries, Serbia, or CEE countries and other regions in the world. Table 7 depicts the results of statistical tests using the estimation results of specification (B), which allows for regional heterogeneity.

The impact of money on inflation is very different in SEE countries. The interaction coefficient between the SEE dummy and BMGROWTH is negative in Table 4, although it is only marginally significant. However, with this negative coefficient of the interaction term, the hypothesis that the impact of BMGROWTH on inflation in the SEE region is null cannot be rejected (chi-squared value of 0.14). This is consistent, for example, with Cukierman's (1992)

observation that a fixed exchange regime increases the private sector's willingness to hold the currency, leading to lower inflation for a given rate of monetary expansion. Furthermore, the annual average of BMGROWTH in SEE region is one of the lowest (about 14 percent) among developing and emerging regions as well as less volatile. This fact, together with the choices of exchange rate regimes, could explain why the impact of BMGROWTH on inflation in the SEE region is not statistically significant.

Table 7. Results of Hypothesis Tests Using Specification (B) in Table 4

	chi2 stats.	Prob>chi2
Each determinant significant for SEE, Serbia, and CEE?		
GDPGAP		
GDPGAP+SEE*GDPGAP=0	1.14	0.285
GDPGAP+Serbia*GDPGAP=0	1.01	0.315
GDPGAP+CEE*GDPGAP=0	1.45	0.228
BMGROWTH		
BMGROWTH+SEE*GMGROWTH=0	0.14	0.712
BMGROWTH+Serbia*GMGROWTH=0	3.92	0.046
BMGROWTH+CEE*GMGROWTH=0	14.24	0.000
TRADEP		
TRADEP+SEE*TRADEP=0	2.20	0.137
TRADEP+Serbia*TRADEP=0	1.92	0.166
TRADEP+CEE*TRADEP=0	2.38	0.123
TOTGROWTH		
TOTGROWTH+SEE*TOTGROWTH=0	0.97	0.325
TOTGROWTH+Serbia*TOTGROWTH=0	0.10	0.757
TOTGROWTH+CEE*TOTGROWTH=0	0.32	0.570
Difference between SEE (excluding Serbia), Serbia, and CEE?		
SEE vs Serbia		
SEE*GDPGAP=Serbia*GDPGAP	0.52	0.47
SEE*BMGROWTH=Serbia*BMGROWTH	3.51	0.061
SEE*TRADEP=Serbia*TRADEP	2.41	0.121
SEE*TOTGROWTH=Serbia*TOTGROWTH	0.30	0.582
SEE vs CEE		
SEE*GDPGAP=CEE*GDPGAP	2.12	0.145
SEE*BMGROWTH=CEE*BMGROWTH	8.62	0.003
SEE*TRADEP=CEE*TRADEP	1.46	0.227
SEE*TOTGROWTH=CEE*TOTGROWTH	0.04	0.848

Contrarily, the effect of BMGROWTH in amplifying inflation is indeed higher in Serbia and CEE countries than in other regions in the world. The coefficient of the interaction between Serbia or the CEE dummy and BMGROWTH is positive and statistically significant. Note that the coefficient of solo BMGROWTH (without any interaction) is already positive and statistically

significant. Thus, BMGROWTH may have a much stronger impact on inflation rates in Serbia and the CEE region than on those in any other regions including SEE region. This finding is consistent with the higher BMGROWTH of Serbia and CEE region than those of other regions during the periods. The annual average of BMGROWTH in Serbia and CEE region are 41 percent and 27 percent respectively while those of all other regions are less than 20 percent.

The direct test on comparison between SEE and Serbia or CEE region on money growth in Table 7 confirms the findings above. That is, the impact of money on inflation is very different between SEE region and Serbia or CEE region.

Trade openness does not factor into Eastern European inflation. Although it is positively correlated with inflation rates in the entire sample, this is not the case in SEE countries, Serbia and CEE countries. The coefficient of the interaction between the SEE dummy and openness is negative and statistically significant. As a result, the impact of openness on inflation in SEE countries is not significantly different from zero (chi-squared value of 2.20). Similar to the SEE region, and unlike all other regions, inflation is not related to openness in Serbia and the CEE region. The relevant coefficient of the interaction for Serbia or CEE countries is negative and large enough to nullify the positive relationship between openness and inflation observed in other regions.

Finally, the output gap and terms of trade are not significant determinants of inflation in any region examined.

One concern is that heterogeneity within CEE countries could potentially contaminate the results. However, excluding low-inflation countries (such as the Czech Republic, Cyprus, Poland, Slovakia, and Slovenia) does not change the results. Neither does the exclusion of countries with a high inflation experience (e.g. Belarus, Moldova, and Romania). Therefore, there seems to be systematic difference and similarities (in terms of econometrics) between SEE and CEE countries.

4. Conclusion, policy implication, and prospect FOR FUTURE

In this paper, we explore the inflation performance of SEE countries at the beginning of this century. The inflation rates of SEE countries, with the notable exception of Serbia, have been comparable with those found in the euro-currency area. We also explore common factors that can explain the uniformly low inflation rates of SEE countries, except Serbia. These low inflation rates are due less to high initial price or income levels than to the exchange rate regimes these countries employ. Furthermore, broad money growth does not appear to affect inflation in the SEE region (except Serbia). The paper also provides a partial answer for why Serbia is an exception in the SEE region: Serbia appears to be the

only country with a "de-facto" flexible exchange rate in the SEE region and with a channel from money growth to inflation with its high broad money growth.

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Appendix Table 1. List of Countries in the Sample

Albania	Eritrea	Morocco
Algeria	Estonia, Republic of	Mozambique, Republic of
Antigua and Barbuda	Ethiopia	Nepal
Argentina	Fiji	Nicaragua
Armenia, Republic of	Gabon	Niger
Azerbaijan, Republic of	Gambia, The	Nigeria
Bahrain	Georgia	Pakistan
Bangladesh	Ghana	Panama
Belarus, Republic of	Guatemala	Papua New Guinea
Belize	Guinea	Paraguay
Benin	Guinea-Bissau	Peru
Bolivia	Guyana	Philippines
Bosnia and Herzegovina	Haiti	Poland, Republic of
Botswana	Honduras	Romania
Brazil	Hungary	Russian Federation
Bulgaria	India	Rwanda
Burkina Faso	Indonesia	Senegal
Burundi	Israel	Serbia, Republic of
Cambodia	Jamaica	Sierra Leone
Cameroon	Jordan	Slovak Republic
Cape Verde	Kazakhstan, Republic of	Slovenia, Republic of
Central African Republic	Kenya	South Africa
Chad	Korea, Republic of	Sri Lanka
Chile	Kyrgyz Republic	Suriname
China, People's Republic of	Lao People's Democratic Republic	Swaziland, Kingdom of
Colombia	Latvia, Republic of	Tajikistan, Republic of
Congo, Democratic Republic of the	Lesotho	Tanzania
Congo, Republic of	Liberia	Thailand
Costa Rica	Lithuania, Republic of	Togo
Côte d'Ivoire	Macedonia, former Yugoslav Republic of	Trinidad and Tobago
Croatia, Republic of	Madagascar	Tunisia
Cyprus	Malawi	Turkey
Czech Republic	Malaysia	Turkmenistan
Djibouti	Maldives	Uganda
Dominica	Mali	Ukraine
Dominican Republic	Mauritania	Uruguay
Ecuador	Mauritius	Uzbekistan, Republic of
Egypt, Arab Republic of	Mexico	Venezuela
El Salvador	Moldova, Republic of	Vietnam
Equatorial Guinea	Montenegro	Zambia
		Zimbabwe