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### Vulnerability of inflation in the new EU Member States to country-specific and global factors

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#### Abstract

This empirical paper uses a GMM-System panel estimator to assess the vulnerability of inflation in the new EU Member States to country-specific and global factors over the period 1998 to 2007, including an assessment of the more recent 2002 to 2007 period. Using a large dataset of macroeconomic, financial and structural reform indicators, the results suggest that country-specific factors such as exchange rate movements, productivity growth, government consumption expenditure, capital growth, the current account balance, and reforms on price liberalisation have strong effects on inflation. Global factors that have a notable effect include energy prices, and particularly in the more recent period, food prices. Furthermore, inflationary effects of EU accession are apparent in the 2002 to 2007 analysis. The magnitudes of the coefficients suggest that country-specific effects dominate global influences on inflation in the CEEs.

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## **1. Introduction**

This paper provides empirical evidence for the causes of inflation in the new EU Member States. The specific countries incorporated into the analysis are as follows: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, Slovenia, and Romania. Using a rich data source over the period 1998 to 2007, the methodology is based on the GMM-System panel estimator, helping to ensure econometrically efficient results. A sub-sample analysis is also carried out for the period 2002 to 2007 to provide an insight into the dynamic driving inflation more recently. The latter period also, of course, represents the period where all of the economies are members of the EU.

This paper provides a comprehensive assessment of the causes of inflation using a quarterly dataset constructed from a range of sources. Thus, the paper adds to the literature in three key respects. Firstly, the range of indicators used ensures that all possible inflation determinants are taken into account (including country-specific and common factors comprised of macroeconomic, financial and structural variables). Secondly, the econometric technique is highly sophisticated and provides confidence in the magnitude and significance of the estimation coefficients. And, thirdly, the estimation is undertaken simultaneously not only across a wide range of indicators per country, but also across all ten CEE countries. In these three respects, the paper goes beyond previous work carried out on this issue.

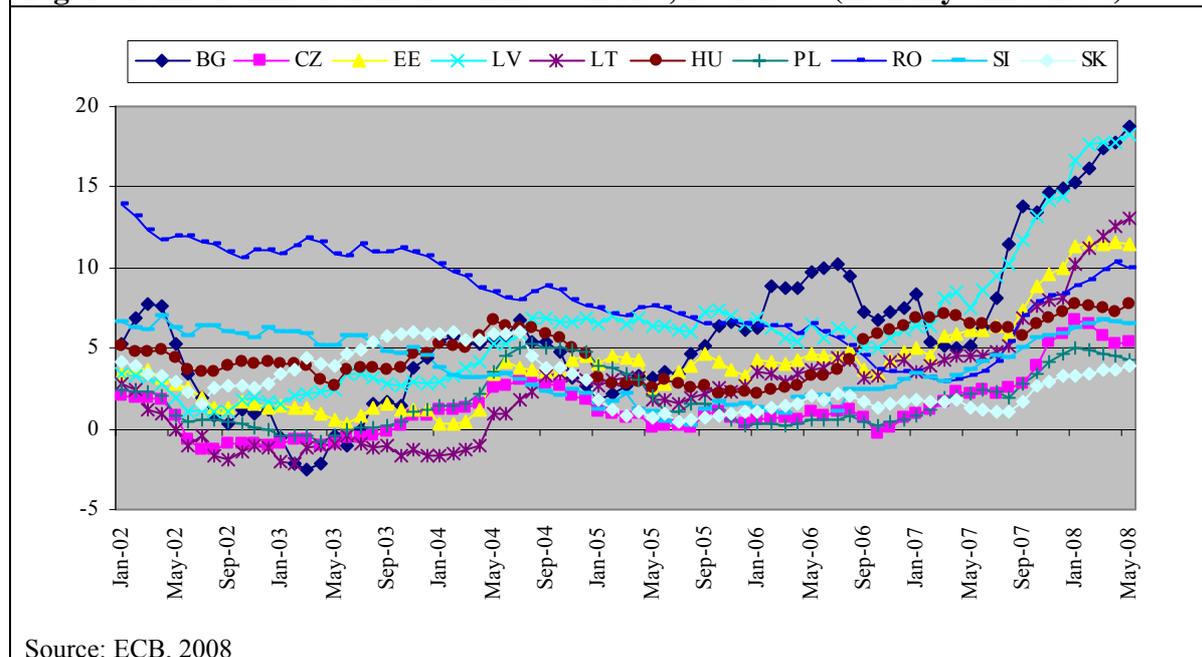
The remainder of the paper is structured as follows: Section 2 provides an overview of the context and description of findings from some previous empirical studies on the issue. Section 3 provides a description of the data and methodology. Section 4 sets out some preliminary analysis. Section 5 presents the main empirical results. Finally, Section 6 concludes.

## **2. Inflation in the Central and Eastern European countries**

This empirical paper is set against the context of a rising rate of inflation in many of the former Central and Eastern European (CEE) economies. The recent trajectory of inflation in the CEEs has been upwards. An important policy issue remains as regards the causes of the inflation surge. A better understanding of the causes of inflation in these countries helps to ensure that appropriate policy responses are implemented. Given the aim of the CEE economies to become members of EMU, high inflation has become a major obstacle given the requirement in the Maastricht criteria for low inflation. More broadly, however, it is commonly understood that high inflation can be detrimental to economies in terms of competitiveness losses. There exists a wide range of possible reasons for the rise in inflation. These include reasons that could be considered to be country-specific and other reasons that would be common to all countries. Country-specific effects, for example, would include exchange rate developments, economic growth, the size of the government, the current account balance, the tightness of the labour market, the exchange rate regime, and the degree of structural reform. Common shocks would include global rises in energy prices, global rises in food, shifts in global monetary policy, and EU accession.

While inflation has declined substantially from the relatively high levels of the late 1990s, since the period 2003 to 2005, inflation has started to rise again, particularly in Bulgaria, Estonia, Latvia, and Lithuania. In addition, the downward trend in inflation in Romania and Slovakia appears to have reversed since around the middle of 2007. Figure 1 illustrates the evolution of the HICP inflation rate in the CEE countries since 2002 (monthly annualised data).

**Figure 1 HICP Inflation in the CEE Countries, 2002-2008 (monthly annualised)**



Source: ECB, 2008

The movement in inflation is closely linked to exchange rate developments. The conventional view is that fixed regimes are most beneficial for developing economies with weak institutions. Crocket and Goldstein (1976) note that the combination of a commitment to exchange rate stability and monetary growth helps to ensure the control of inflation. On the other hand, where institutions are strong and central banks have independence, flexible regimes in combination with inflation targeting frameworks can be appropriate (Calvo and Mishkin, 2003). Across all of the CEE economies, there was a trend appreciation of the real exchange rate. In countries with a fixed exchange rate regime (Bulgaria, Estonia, Latvia, Lithuania), this appreciation was driven by inflation. Where a more flexible regime was in place (the Czech Republic, Hungary, Poland, Romania, Slovakia), the combination of inflation and nominal appreciation caused the real appreciation. This issue is examined in the empirical work by incorporating a variable to reflect the exchange rate regime.

A further common reason cited for inflation in emerging economies is the Balassa-Samuelson effect, whereby non-productivity related wage inflation takes place in the non-traded sector due to the mobility of labour between the more productive tradable sector and the less productive non-tradable sector. There remains a lack of consensus as to whether this holds for the CEE countries given that the services sector constitutes a much smaller proportion of overall consumption in these economies and also that the non-traded sector has experienced some productivity gains in recent years (e.g. Egert, 2002).<sup>1</sup>

In addition, the economies in the study have experienced strong levels of economic growth throughout the past six years or so. Strong credit growth and increasing degrees of openness have also been characteristics of the CEE economies, as well as associated widening current account deficits. All of these factors have been accompanied by a process of structural reform, including measures to develop the banking sector, measures to develop the

<sup>1</sup> Moreover, as argued by de Broeck and Sløk (2001) in a study of the Baltic countries, the real exchange appreciation caused by productivity growth in the tradable sector may not lead to competitiveness losses given that the national currencies were undervalued at the outset. A similar argument is put forward in Caporale et al (2008).

infrastructural base, and an on-going process of price liberalisation. The combination of all of these country-specific factors could make the economies more vulnerable to certain types of global price shocks, such as energy price rises or food price rises. Previous studies on inflation in the CEE countries have tended to focus either on only a few of the countries considered in this paper, or else a few of the inflation determinants, or some combination of both. Some exceptions include de Grauwe and Schnabl (2004) who examine a large sample of 18 Central European economies across a number of macroeconomic variables only (using annual data). Their focus was on the impact of the exchange rate regime on inflation and output, and making the overall finding that exchange rate stability is linked with low inflation in a low inflation environment, although this appears to break down when inflation is already at a high level. Egert (2007) also provides a comprehensive assessment of the drivers of the price level and inflation in the CEE countries, again focussing on macroeconomic variables at an annual frequency. He finds a strong role played by cyclical factors and the exchange rate in driving inflation in the transition economies. Notably, he also finds no evidence of Balassa-Samuelson effects. A further issue highlighted by Bhagwati (1984) relates the rise in the price of non-tradables as being due to a capital deepening effect whereby the capital-labour ratio rises.

The present paper amalgamates and expands the types of indicators used in previous studies in a simultaneous framework, enabling a comparative analysis to be made across the indicators as regards the impact upon the price level and inflation. The following section describes the data used, and the methodology, in more detail.

### **3. Data and Methodology**

The data period runs from 1998 to 2007, using quarterly data<sup>2</sup> for the following ten EU transition countries: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, Slovenia, and Romania. The variables gathered for each country are as follows: HICP, nominal effective exchange rate, current account deficit (%GDP), real GDP per capita, gross fixed capital formation, government consumption expenditure, relative prices (CPI/PPI), unemployment rate(%), stock market capitalisation (%GDP), domestic credit to private sector (%GDP), exchange rate regime arrangement, index of economic freedom, EBRD index of infrastructure reform, and EBRD index of price liberalisation. The main source for the macroeconomic and financial data is the IMF's IFS dataset. Stock market capitalisation, domestic credit to private sector, and various EBRD reform indices were attained from the EBRD Structural Indicators dataset. The exchange rate regime indicator was sourced from the Reinhart and Rogoff classification (coded as 1 for fully fixed, 2 for crawling peg, 3 for managed float, and 4 for free float). The index of economic freedom was sourced from the Heritage Foundation. All of these variables are predominantly 'country-specific'. As a measure of some form of global or common shocks impacting upon inflation, the following variables were constructed: energy price shock, food price shock, interest rate shock, and EU accession. The energy and food price shock variables are constructed as taking a value of 1 where the spreads of the respective energy and food price inflation rates relative to EU-27 average rates for these items are one standard deviation above mean. The interest rate shock is measured as the spread between the 3 month rate and the US Treasury Bill rate (as a proxy for global monetary policy), taking a value of 1 where the spread is one standard deviation above mean. The EU accession variable is represented as a dummy taking

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<sup>2</sup> Due to the availability of some of the variables at an annual frequency only, these have been interpolated to a quarterly frequency using either the quadratic-match average or quadratic-match sum technique, as appropriate. Also, there are some missing observations at the start of the data period, making the panel unbalanced for the 1998 to 2007 analysis.

the value of 1 after EU entry and 0 prior to EU entry. In total, therefore, the data covers 18 variables (14 country-specific and 4 global factors) across 10 countries over 10 years.

The empirical methodology to be pursued is based on the GMM-System panel estimator. The GMM approach overcomes problems with more traditional forms of panel estimation (e.g. OLS) where there is a strong likelihood the dynamic approaches will suffer from problems relating to autocorrelation, specifically that the lagged dependent variable is correlated with the error term. This would, of course, mean that the least squares estimator is inconsistent (even asymptotically).<sup>3</sup> Since the bias in least squares estimation tends to zero over time, our large number of cross-sections and relatively short time range makes it more of an issue of concern.

Using GMM, the cross-section specific fixed effects are eliminated with first-differencing. This leads to a correlation between the first-differenced error term and the lag of the dependent variable. As a result, the lagged level of the dependent variable is used as an instrumental variable. Arellano and Bond (1991) make the point that lags of the dependent variables for two and more periods are also appropriate as instruments. This approach is known as the GMM-Difference. This dynamic panel estimator uses the following specifically as instruments: levels of the dependent variables lagged two and more periods, levels of the endogenous variables lagged two and more periods, and first difference of the strictly exogenous covariates. This approach was criticised by Blundell and Bond (1998) and Arellano and Bover (1995) on the grounds that levels may be poor instruments for first differences if variables are highly persistent. They then propose a GMM-System estimator, where lagged differences of the independent and dependent variables are used as instruments for the levels equation. The empirical work is based on the following type of generalised equation:

$$Y_{it} = \alpha Y_{i,t-1} + X'_{i,t} \beta_1 + v_i + \varepsilon_{it} \quad i = 1, \dots, N \quad t = 1, \dots, T_i \quad (1)$$

where Y is the dependent variable, X represents a vector of covariates, v are country specific effects and  $\varepsilon$  is the error term.

Therefore, the empirical model pursued sets the HICP level (in logarithmic form) in the EU transition economies as a function of both the typical macroeconomic factors as well as indicators of structural reform. The added value of this type of approach lies mainly in the simultaneous nature of the estimation across a wide variety of macroeconomic and structural reform indicators. As described above, first-differencing (1) eliminates v, leading to the following Arellano and Bond GMM estimation:

$$DY_{it} = \alpha DY_{i,t-1} + DX'_{i,t} \beta_1 + DW'_{i,t} \beta_2 + D\varepsilon_{it} \quad (2)$$

where D is the first difference operator.

The key difference between the GMM-Difference and the GMM-System lies in the treatment of instruments. Whereas the former approach uses lagged levels in the difference equations, the latter estimator goes further by using lagged differences in the level equations. Blundell and Bond (1998) note that this approach is preferable particularly when T is relatively short. Moreover, when explanatory variables are persistent, the authors explain that this approach is more efficient.<sup>4</sup> In terms of model specification, the GMM estimator is subjected to tests to

<sup>3</sup> The bias associated with least squares estimators in dynamic panels was perhaps first noticed by Nickell (1981).

<sup>4</sup> For example, Blundell and Bond (1998) show that by applying the additional assumption of no correlation in the differences, more efficient estimates are attained.

examine the validity of the instruments used. Specifically, the Sargan test for over-identifying restrictions (which tests the null hypothesis that the over-identifying restrictions are valid) is conducted as well as a test of second order autocorrelation (null of no autocorrelation). As well as this, the various estimations are based upon heteroskedasticity-robust standard errors. The GMM-System models estimated are based on the one-step method due to the poor small sample properties of the two-step estimation method.<sup>5</sup> In addition, time-invariant country-specific effects are controlled for in these models.

#### **4. Preliminary Analysis**

Prior to analysing the main GMM-System results, the headline GMM-System estimations were compared with three alternative panel estimations as a means to validate the results.<sup>6</sup> To this end, pooled OLS, least squares dummy variable (LSDV), and GMM-Difference panel estimations were performed, and compared to the baseline GMM-System estimates.<sup>7</sup> The rationale for the pooled OLS and LSDV estimations this was to provide an upper and lower bound within which the GMM-System estimates should lie, while the comparison of the GMM-System and GMM-Difference results provides an indication of the presence of weak instruments.

Across both the pooled OLS (common constant) and LSDV (which allows for country fixed effects) approaches, it is known that the results are biased upwards in the case of the former approach (Hsiao, 1986) and biased downwards in the case of the latter (Nickell, 1981; Kiviet, 1995). Whilst it is understood that this bias recedes as the time dimension of the panel approaches infinity, it cannot be ignored in our sample of 12 years. From this preliminary analysis, where parameter significance is evident, the GMM-System estimates do indeed lie within the pooled OLS and LSDV boundary. The GMM-System parameter estimates are generally slightly larger than those of the GMM-Difference. But as the GMM-Difference results also lie within the pooled OLS and LSDV boundary, there is an indication that the instruments used are not weak. As a result, there is confidence in the robustness and efficiency of the GMM-System estimates. In the following section, the main results based on the GMM-System are provided and analysed. An iterative approach is followed to attain parsimony using a General-to-Specific framework.

#### **5. Empirical Results**

Having established that the GMM-System estimates are efficient, this section focuses on the results using this approach. Moreover, a sub-sample analysis is also carried out. Table 1 sets out the results for the full sample, as well as the more recent 2002 to 2007 period, in the case where the log of HICP is the dependent variable. While the price level is used as the dependent variable, the logarithmic transformation ensures that the interpretation of the coefficients is in terms of the elasticity with respect to the price level. As a result, these results can be interpreted in terms of the rate of change in the price level, e.g. in the double-log model with the log of HICP as the dependent variable, an explanatory variable coefficient of  $x$  implies that a 1% change in the relevant explanatory variable changes the HICP level by  $x\%$ , or equivalently, that the HICP inflation rate changes by  $x$  percentage points.<sup>8</sup>

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<sup>5</sup> As recommended by Arellano and Bond (1991).

<sup>6</sup> Furthermore, analysis of the correlation matrix of all variables led to the exclusion of the FDI and IBSR variables due to potential multicollinearity issues.

<sup>7</sup> These results are not reported but are available from the author upon request.

<sup>8</sup> A separate analysis was also carried out using the first difference of the log of HICP as the dependent variable, which is of course a more direct means by which to infer implications for the rate of inflation. These results are

**Table 1.** GMM-System Panel Output (Dependent Variable = Log HICP)

<b>Regressors</b>	<b>1998 to 2007</b>	<b>2002 to 2007</b>
<b>Country-Specific Factors: Macroeconomic and Financial Indicators</b>		
Lagged Log (HICP)	0.304*** [0.065]	0.683*** [0.028]
Log (nominal effective exchange rate)	-0.405*** [0.141]	-0.307*** [0.052]
Log (real GDP per capita)	-0.138*** [0.026]	-0.068** [0.030]
Current account deficit (%GDP)	0.221*** [0.066]	0.143*** [0.032]
Log (government consumption expenditure)	0.119*** [0.026]	0.112*** [0.062]
Log (relative prices)	0.327** [0.130]	0.205*** [0.095]
Domestic credit to private sector (%GDP)	0.003*** [0.001]	0.005*** [0.001]
Exchange rate arrangement	-0.009 [0.008]	-0.009** [0.004]
Log (nominal effective exchange rate) x Exchange rate arrangement	0.268** [0.134]	0.127** [0.064]
Unemployment rate	0.001 [0.001]	0.000 [0.000]
Log (gross fixed capital formation)	0.018* [0.011]	0.021*** [0.006]
Stock market capitalisation (%GDP)	0.004*** [0.001]	0.005*** [0.001]
<b>Country-Specific Factors: Structural Reform Indicators</b>		
Index of economic freedom	0.005*** [0.002]	0.000 [0.000]
Index of infrastructure reform	0.110*** [0.017]	0.049** [0.023]
Index of price liberalisation	-0.126 [0.087]	-0.105* [0.048]
<b>Global Factors</b>		
Interest rate shock	0.001*** [0.000]	0.001* [0.000]
Food price shock	0.088* [0.025]	0.108*** [0.036]
Energy price shock	0.125*** [0.025]	0.126*** [0.024]
EU accession	0.004 [0.003]	0.019** [0.010]
Countries	10	10
Observations	292	218
Country fixed effects	yes	yes
Period fixed effects	no	no
Sargan test (p-value)	0.593	0.498
Second order serial correlation (p-value)	0.334	0.297

(Notes: Robust standard errors in square parentheses. Statistical significance at the 1%, 5%, and 10% levels is denoted by \*\*\*, \*\*, and \* respectively. Instruments comprise the lagged levels of dependent and independent variables in the difference equations, and lagged differences in the level equations).

Firstly, across both sets of results, it is clear that the validity of the instruments would appear to be satisfied, based on the Sargan test of overidentifying restrictions and the test for second

not reported however given the failure to satisfy instrumentation. It is likely that the information lost through differencing (as opposed to using levels variables) may have contributed to the weakness of these results).

order serial correlation. On analysis of the full-sample results, it is clear that the price level is strongly influenced by the nominal effective exchange rate, real GDP per capita, and the current account balance (%GDP). The signs associated with the coefficients of these variables accord with priors. In relation to the structural reform indicators, the index of economic freedom and the index of infrastructure reform appear to be exerting a positive affect on the price level. As well as country-specific factors, however, there is also a significant role played by global or common shocks. Most notable of these are energy price shocks and food price shocks.

Overall, it appears that country-specific macroeconomic indicators have the most notable effects on the price level relative to other indicators (in terms of the magnitude of the coefficients). For example, a 1% fall in the exchange rate (i.e. a depreciation) is associated with a 0.405% rise in the price level. In addition, the current account deficit relative to GDP is positively related to inflation. Specifically, a one percentage point rise in the current account deficit/GDP ratio increases the price level by 0.221% (equating to a 0.221 percentage point rise in the inflation rate). This makes sense intuitively as a rise in the current account deficit implies a rise demand for imported goods, and an associated rise in inflation. In addition, a 1% rise in government consumption expenditure is associated with a 0.119% rise in the price level. In relation to the financial system, the share of stock market capitalisation has a marginal positive impact upon inflation. Also, there exists a positive relationship between the share of domestic credit to the private sector and the price level. The effect of real GDP per capita on the price level also accords with priors in terms of the direction of the effect, whereby a 1% rise in real GDP per capita is associated with a 0.138% fall in the price level. There is also some weaker evidence to suggest that a rise gross fixed capital formation results in a rise in the price level.

As regards Balassa-Samuelson effects, relative prices have a significant effect on the HICP price level. Whilst this is to be expected, the fact that the magnitude of the effect is just 0.327, this could be an indication that Balassa-Samuelson effects are evident and contributing the rising price levels in the CEE countries. Structural reform has also had a notable impact on inflation in the CEE countries. Reforms linked to a shift towards a more market-oriented economy (proxied by the index of economic freedom) and those aimed at infrastructure reform appear to have positive effects on the price level (e.g. each additional unit of reform of infrastructure is linked with a 0.11% rise in the price level). A possible explanation for this is that reforms of this nature tend to encourage a flow of inward investment and economic activity. Interestingly, we do not observe any statistical relationship between unemployment and the price level. This outcome is robust across a range of alternative estimation specifications. This could suggest that Phillips-curve based explanations for inflation are not applicable to the CEE countries. Finally, an interaction term for the exchange rate and the exchange rate regime suggests that there is a greater impact on prices via the exchange rate when the regime is more fixed. Whilst there is no consensus on this issue in the literature, it is reasonable to observe a stronger link between nominal variables (i.e. the exchange rate and prices) under a fixed exchange rate regime.

Turning to the global factors, it is clear that all four common shock variables considered in Table 1 for the 1998 to 2007 period have an impact on the price level. In terms of scale and significance, the most notable effect comes from energy price shocks, and, to a lesser extent, food price shocks. For example, when the spread of local energy price inflation and that of the EU-27 is one standard deviation above mean, this causes a rise in the price level by 0.125%.

The results for the more recent period of 2002 to 2007 provide some different results, although the overall drivers of inflation in the CEE countries appear to be broadly the same. The differences evident largely relate to the scale of the effect. For example, it is clear that country-specific macroeconomic and financial indicators dominate inflation movements in the more recent sub-period. Food and energy price shocks are also notable global factors however. Lagged HICP affects current HICP by twice the magnitude compared to that of the 1997 to 2008 period. In addition, the Bhagwati-type effect where capital growth affects inflation is more apparent in the more recent period, both in terms of scale and significance. Of the structural reform indicators, measures aimed at price liberalisation have resulted in dampening effects on inflation (a one unit rise in the price liberalisation index is associated with a 0.105% decline in the price level).

The exchange rate regime indicator in the 2002 to 2007 period is significant and negative, suggesting that a fall in the price level is associated with a shift towards a more flexible regime. However the magnitude of the effect is not very substantial, where a shift in the regime to a less fixed/more flexible category is associated with a 0.009% decline in the price level.<sup>9</sup> In terms of preparations for EMU, the result in terms of sign may be unexpected, certainly as far as it pertains to fixed exchange rate regime countries. However, it could be argued that it is not inconsistent with the preparation of these countries for euro adoption as the exchange rate stability criterion oscillates around a +/- 15% range. The result could be related to a requirement for an appropriate lever to manage capital flows (i.e. the exchange rate), certainly over the past 3-4 years. Of course, the sample of ten countries considered in the panel is comprised of four CEEs with fixed regimes, and six with flexible regimes, which makes the interpretation somewhat difficult. Specifically, the result could be driven by the greater number of flexible regime countries in the panel (i.e. the inflation-targeting countries). Also, the effect is marginal.

Nonetheless, further discussion is warranted. For the period 2002 to 2007 (see Figure 1), the rate of HICP inflation has been broadly similar across all ten countries. However, for the fixed exchange rate regime countries, it has been consistently somewhat higher. This period was also associated with a surge in capital inflows to the CEE countries which are not always consistent with maintaining a given level of stability in the nominal exchange rate. For example, a greater level of exchange rate regime flexibility may be required to enable intervention to manage the capital flows and reduce pressure on prices.<sup>10</sup> Indeed, from Figure 1, it is clear that the current surge in inflation in the period since the end of 2007 is dominated by the fixed exchange rate regime countries, which would lend further support to the view that the nature of this regime, or the degree to which it is fixed, may no longer be entirely

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<sup>9</sup> This does not imply that the fixed exchange rate regime countries should abandon fully their exchange rate management arrangements, which would be detrimental to their euro adoption plans. In any case, their institutions are arguably not strong enough to freely float in conjunction with inflation targeting. Rather, the proposition is that there may be some scope to shift to a looser form of fixed exchange rate regime arrangement. Similarly, it must be borne in mind that the result pertains to the panel as a whole, and not any one individual country. Thus, it does not necessarily imply that flexible exchange rate regime countries should be more flexible. Rather, on average, considering all of the CEEs as a whole, a degree of flexibility may be appropriate.

<sup>10</sup> As noted by Markiewicz (2006), many of the CEE countries had high inflation rates in the early 1990s and thus many opted for pegged exchange rate policies against an external anchor. As a result, the economies stabilized throughout the 1990s with inflation under control. This attracted a flow of foreign capital, which in a sense challenged the fixed exchange rate arrangements. Thus, towards the mid-1990s, some of the countries opted for more flexibility in their regimes (notably the Czech Republic, Poland, Hungary, and the Slovak Republic). Under a fixed exchange rate regime, large capital inflows oblige the Central Bank to maintain the nominal fix, which can lead to a rise in the money supply, which increases inflation and appreciates the real exchange rate (e.g. Athukorala and Rajapatirana, 2003; and Sorsa et al, 2007).

appropriate for controlling inflation in these economies.<sup>11</sup> Therefore, while fixed regimes can be useful at early stages of economic development, as economies become more developed and integrated into global trade and capital markets, a degree of greater flexibility in the exchange rate regime can be necessary.

Regarding the global factors in the 2002 to 2007 period, while the global interest rate and energy price shock effects do not change compared to the full-period results, it is apparent that the magnitude of food price shocks has increased in the most recent period. It is also more significant in the recent sub-period analysis. This would be in line with the greater relative volatility of food prices for the current period compared to the ‘smoothing’ effect of considering the entire ten year period. EU accession appears to exhibit this same sort of effect, whereby the restriction of the sample to the 2002 to 2007 period reveals that accession to the EU has had some (positive) impact on the price level.

## 6. Conclusions

This empirical paper uses the GMM-System estimator to assess the vulnerability of inflation in the new EU Member States to country-specific and global factors over the period 1998 to 2007. In terms of common shocks (i.e. global factors affecting inflation), the variables examined included interest rate shocks, food price shocks, energy price shocks, and EU accession. While all of the global factors appear to exert some influence over the price level and inflation, the results are most pronounced for energy price shocks, and, to a lesser extent, food price shocks. As regards country-specific factors, exchange rate dynamics affect movement in the price level. The exchange rate pass-through to prices is about 40% over the 1998 to 2007 period.

The current account deficit is also found to exert upward pressure on inflation. Other country-specific variables with highly significant effects on inflation include the rate of capital growth, productivity growth in the traded compared to the non-traded sector, government consumption expenditure, and reforms on price liberalisation. The direction of the effect of these variables on inflation accords with priors. In terms of the financial system, stock market development and domestic credit to the private sector appear to significantly affect the price level. Regarding structural reform indicators, measures implemented to foster price liberalisation have helped to control inflationary pressure. However, measures aimed at infrastructure reform do not appear to have the expected effects in terms of reducing inflation. This expectation is based on the perceived competitiveness gain that such reforms are associated with. It could be the case that there may be a time threshold for the effectiveness of the reforms. Alternatively, the reforms may have led to higher levels of investment and economic activity, which would have an inflationary effect.

Overall, it is clear that the main determinants of inflation in the CEE countries are country-specific. However, there also exists a role played by energy and food price shocks in particular. Of course, it must be borne in mind that the panel approach adopted may to some extent camouflage recent events regarding global food prices. For example, the modelling of a subset of countries over the period 2007 to 2008 would be of interest in this respect. Data availability, however, does not allow such an analysis to be carried out in a robust manner, certainly across the variety of variables used in this study. Given the findings, which are valid for the full-period results as well as the results for 2002 to 2007, the policy implication would appear to be that sound macroeconomic policy in conjunction with sensible structural reforms

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<sup>11</sup> Data constraints meant that the 2008 period was not part of the empirical analysis however. In addition, more conclusiveness on this issue would require a more comprehensive analysis on a country-by-country basis.

should help economies to control inflation. This may involve some fiscal tightening as well as more flexibility in exchange rate regimes where appropriate. In addition, the openness of the economies needs to be monitored in terms of exchange rate effects given the exposure of prices to exchange rate movements. As regards implications to reduce exposure to energy and food price shocks, it is difficult to prescribe active policy measures. As the CEE economies develop further, their reliance on energy and food as a share of overall GDP should decline. This may help to alleviate the extent of the exposure at least.

Going forward, it would be of interest to analyse the determinants of inflation in more detail on a country-by-country basis in order to derive more specific policy implications. Data availability makes this an arduous task however, certainly in terms of the coverage of indicators used in this paper, as many variables are only available from the mid to late 1990s at a quarterly frequency or lower.

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