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**Working Paper**

## Price Dynamics in Central and Eastern European EU Accession

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A detailed, classical-style illustration of three figures in historical attire. The figure on the left is a man in a white tunic and a tall, pointed hat, holding a long staff. The figure in the center is a woman in a white dress with a high collar and a dark shawl, also holding a staff. The figure on the right is a woman in a white dress with a high collar and a dark shawl, holding a staff. The background is a light, textured surface.

WORKING PAPER 61  
PRICE DYNAMICS IN CENTRAL  
AND EASTERN EUROPEAN  
EU ACCESSION COUNTRIES

PETER BACKÉ, JARKO FIDRMUC, THOMAS REININGER  
AND FRANZ SCHARDAX

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## **Editorial**

The authors of this paper review the developments of prices in the Central and Eastern European EU accession countries between 1990 and 2001. The paper starts with an analysis of the short-term and long-term (dis)inflation dynamics. This is complemented by an appraisal of price level convergence. The major driving forces of price formation in the accession countries are found to be related to price liberalization during the transition to a market economy, to the prospective EU accession, and to the catching-up process (Balassa-Samuelson effect). Finally, the paper draws conclusions about future monetary and exchange rate policy options in the run-up to EU accession and beyond.

February 28, 2002



# Price Dynamics in Central and Eastern European EU Accession Countries\*

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## Abstract

This paper reviews price dynamics in the Central and Eastern European EU accession countries between 1990 and 2001. The paper starts with an analysis of the short-term and long-term (dis)inflation developments. This is complemented by an appraisal of price level convergence. The major driving forces of price formation in the accession countries are found to be related to price liberalization during the transition to a market economy, to the prospective EU accession, and to the catching-up process (Balassa-Samuelson effect). Finally, the paper draws conclusions about future monetary and exchange rate policy options in the run-up to EU accession and beyond.

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Keywords: Price liberalization, core inflation, Balassa-Samuelson effect, EU enlargement.

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# Price Dynamics in Central and Eastern European EU Accession Countries

Peter Backé, Jarko Fidrmuc, Thomas Reininger and Franz Schardax

## 1 Introduction

The discussion about price developments in the Central and Eastern European EU accession countries (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) has gained fresh momentum in recent years. This can be attributed to several factors. First, macroeconomic issues have received added attention in the accession process lately. Second, there has been a growing interest in exploring the links between the price developments and the catching-up process with European Union income-per-capita levels upon which most accession countries have embarked. Third, disinflation paused in Central and Eastern Europe from mid-1999 until very recently.

This paper raises a set of questions that relate to the topic of price dynamics in accession countries. The paper covers all ten Central and Eastern European accession countries. However, some parts of the analysis could be performed only for a subset of these countries, which is essentially due to data availability constraints. This entails that the country focus of the paper is not fully uniform in all its sections. Nevertheless, this inclusive approach appears preferable to a much narrower country focus that fully neglects the analysis of a number of candidate countries, as such a constricted focus would greatly reduce the comparative value of several empirical parts of the study.

This paper consists of three main parts. Section 2 comprises a short and selective account of consumer price inflation developments in the accession countries to date and an analysis of short-term and long-term inflation and disinflation dynamics. This is complemented by an appraisal of price level convergence. Section 3 deals with selected driving forces of price dynamics related to the completion of the transition to a market economy, prospective EU accession and the catching-up process. In doing so, the focus is on the completion of price deregulation and adjustment, productivity developments and wage developments. Building on this background, section 4 explores policy implications in general and for monetary policy in particular. The paper ends with a short summary of the main findings.



## 2 Inflation Developments and Price Level Convergence to Date

### 2.1 Consumer Price Inflation: Stylized Facts

A natural starting point for analyzing price dynamics is to examine the development of consumer prices. Table 1 gives an overview of annual average consumer price inflation in the Central and Eastern European EU accession countries since the beginning of transition.

The data series presented in table 1 suggest that consumer price developments during the transition process so far can be divided into five phases for the Central and Eastern European accession countries except Bulgaria and Romania. First, in the early stages of transition, almost all Central and Eastern European countries experienced a corrective inflation phase associated with sweeping price and trade liberalization coupled with substantial exchange rate depreciation at the beginning of transformation. The size of the initial price level surge was diverse among individual countries. This phase was associated with substantial initial adjustments of relative prices.

**Table 1: Consumer Price Inflation in the Central and Eastern European EU Accession Countries (annual average, in %)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Bulgaria	23.8	338.5	91.2	72.8	96.0	62.1	123.0	1082.3	22.3	0.3	9.9
Czech Rep.	9.7	56.6	11.1	20.8	10.0	9.1	8.8	8.5	10.7	2.1	4.1
Estonia	n/a	210.5	1076.0	89.8	47.7	28.8	23.1	10.6	8.2	3.3	4.0
Hungary	28.9	35.0	23.0	22.5	18.8	28.2	23.6	18.3	14.3	10.0	9.8
Latvia	n/a	172.0	951.2	108.8	35.9	25.0	17.6	8.4	4.6	2.4	1.8
Lithuania	n/a	224.7	1020.5	410.2	72.2	39.7	24.6	8.9	5.1	0.8	1.0
Poland	585.8	70.3	43.0	35.3	32.2	27.8	19.9	14.9	11.8	7.3	10.1
Romania	5.1	170.2	210.4	256.1	136.8	32.3	38.8	154.8	59.1	45.8	45.7
Slovakia	10.4	61.2	10.0	23.2	13.4	9.9	5.8	6.1	6.7	10.6	12.2
Slovenia	549.7	117.7	201.3	32.3	19.8	12.6	9.7	9.1	8.6	6.6	8.9

Source: WIIW (collected from national sources), EBRD Transition Report for the Baltic countries 1991 and 1992. It should be noted that inflation data, in particular consumer price inflation data, may be upward-biased. Some argue that there is a substantial upward bias in the case of Central and Eastern European countries (see e.g. Skreb 1998 and Ferenczi et al. 2001).

Second, as stabilization took hold in most accession countries, annual inflation was fairly quickly and substantially reduced to moderate rates (high-single or low-double digits).<sup>2</sup> These inflation rates then proved to be persistent in a number of transition economies. In this phase, relative price adjustments became less turbulent and began to exhibit a typical pattern in which nontradables prices increased faster than tradables prices.

<sup>2</sup> Stabilization policies were much less successful in Bulgaria (until 1997) and in Romania.

Third, further headway towards disinflation, though to a different extent, was made after the onset of the Russian crisis in the fall of 1998. This is attributed to a combination of negative demand shocks (lower foreign demand by Russia and the European Union) and positive supply shocks (very low oil prices which actually started to fall already in the wake of the Asian crisis; constant or falling food prices, as food exports to Russia were redirected to the domestic markets).

The fourth phase began in the spring and summer of 1999, when disinflation came to a halt in most, if not all accession countries. Subsequently, a number of applicant countries registered a pick-up of inflation. These less favorable developments are ascribed to a combination of positive demand shocks (increasing growth dynamics mainly due to additional demand from the European Union until the second quarter of 2000 and higher demand from Russia) and probably far more important negative supply shocks (rising import prices due to the surging oil price and to euro/U.S. dollar developments in conjunction with the euro-linked or euro-oriented exchange rate policies of various accession countries; growing food prices mainly due to bad harvests).

Finally, around mid-2001, inflation again began to fall in some accession countries, with Bulgaria, Hungary and, in particular, Poland recording substantial disinflation. In fact, in Poland, the turning point towards lower inflation rates was already reached in the fall of 2000.

Apart from this general pattern of developments that applies in its essence to most accession countries, the disinflation process in each individual applicant country displays country-specific peculiarities as well. Typically, temporary bouts of inflation reflect the short-term impact of stabilization packages (e.g. Hungary 1995, Slovakia 1999) or major reforms in the indirect tax system (e.g. the introduction of VAT in the Czech Republic and Slovakia in 1993 or in Slovenia in 1999), while disinflation dynamics have been enhanced by recession (Czech Republic 1998–99).

Bulgaria, after experiencing a financial crisis in 1996–97 associated with a sudden and sharp upturn in inflation and even a short period of hyperinflation, undertook a major turnaround in its policies and has made very substantial progress in disinflation in more recent years. Romania stands out as the only accession country which has not yet succeeded in reducing its inflation rate to moderate or low levels.

## **2.2 Long-Term and Short-Term Inflation Dynamics**

In order to analyze and assess the inflation process to date more deeply, it is useful to identify an inflation measure which can mirror the underlying inflation trend, i.e. the persistent component of overall inflation. Typically, this is done by constructing some measure of core or net inflation. Central and Eastern European EU accession countries use different definitions of underlying inflation. These concepts are particularly important for countries which follow a monetary policy strategy that relies on a target or an indicative band for net or core inflation. This is the case for the Czech Republic (inflation

targeting with a target for net inflation which excludes regulated prices and the impact of tax changes)<sup>3</sup> and for Slovakia (eclectic strategy with an indicative band for core inflation defined as annual inflation adjusted for regulated prices, indirect taxes and subsidies). Underlying inflation concepts are also used in Hungary and Poland, both of which follow inflation targeting strategies with a (headline) consumer price inflation target.<sup>4</sup>

Each core inflation concept has its merits and shortcomings, if it comes to analyzing the disinflation process in Central and Eastern Europe. The approach in this paper is to compare underlying consumer price inflation developments in selected accession countries by using the Hodrick-Prescott (HP) filter to compute a variable trend for price developments in selected countries.<sup>5</sup> The HP filter method corresponds to the concept of core inflation as introduced by Eckstein (1981), who defined this component of inflation as trend increase in the cost of the factors of production, and by Bryan and Cechetti (1993), who denoted core inflation as the long-run component of the price index. One key advantage of the HP filter approach is that it allows to examine not only short-run but also long-run inflation dynamics, i.e. to distinguish analytically between changes of long-term factors, which include policy changes and other more permanent factors (like lasting changes in oil prices), and short-term factors.

The HP filter has become a standard method for uncovering the trend from macroeconomic series, applied mainly in the business cycle literature. Although this method has been subject to criticism (see e.g. Harvey and Jaeger, 1993), Ravn and Uhlig (2001) conclude that the HP filter "has withstood the test of time and the fire of discussion remarkably well." Thus, applying the HP filter to extract the trend of CPI indices (rebased to 100 in December 1992) and short-run movements around this trend in selected countries seems to be sufficiently justified, while keeping in mind that this procedure may have some drawbacks and limitations.

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<sup>3</sup> From 2002 onward, the Czech monetary strategy will switch to a consumer price inflation target.

<sup>4</sup> In Hungary, the core inflation index of the Central Statistical Office excludes unprocessed and other seasonal foodstuff prices as well as market and administered energy prices. The central bank used to use a different core inflation concept until early 2001 but has discontinued the publication of this indicator since. Currently, only the indicator of the statistical office is being made public, while a new uniform core inflation measure is being established; the new indicator will be published from early 2002 onward. In Poland, the central bank uses five concepts of underlying inflation to analyze the inflation process, namely core inflation excluding controlled prices, net inflation excluding food and fuel prices, core inflation excluding the most volatile prices, core inflation excluding the most volatile prices and additionally the prices of fuel, and core inflation using the trimmed mean method (trimming 15% of the groups of goods and services on both tails of the distribution).

<sup>5</sup> The Hodrick-Prescott filter was proposed in a working paper which circulated in the 1980s (Hodrick and Prescott, 1980, published in 1997).

Technically, the HP filter smoothes the price level,  $p_t$ , to  $\tilde{p}_t$  by minimizing the variance of  $p_t$  around  $\tilde{p}_t$ , subject to the second difference of  $\tilde{p}_t$ . That is, the HP filter chooses  $\tilde{p}_t$  to minimize

$$\sum_{t=1}^T (p_t - \tilde{p}_t)^2 + \lambda \sum_{t=1}^T ((\tilde{p}_{t+1} - \tilde{p}_t) - (\tilde{p}_t - \tilde{p}_{t-1}))^2, \quad (1)$$

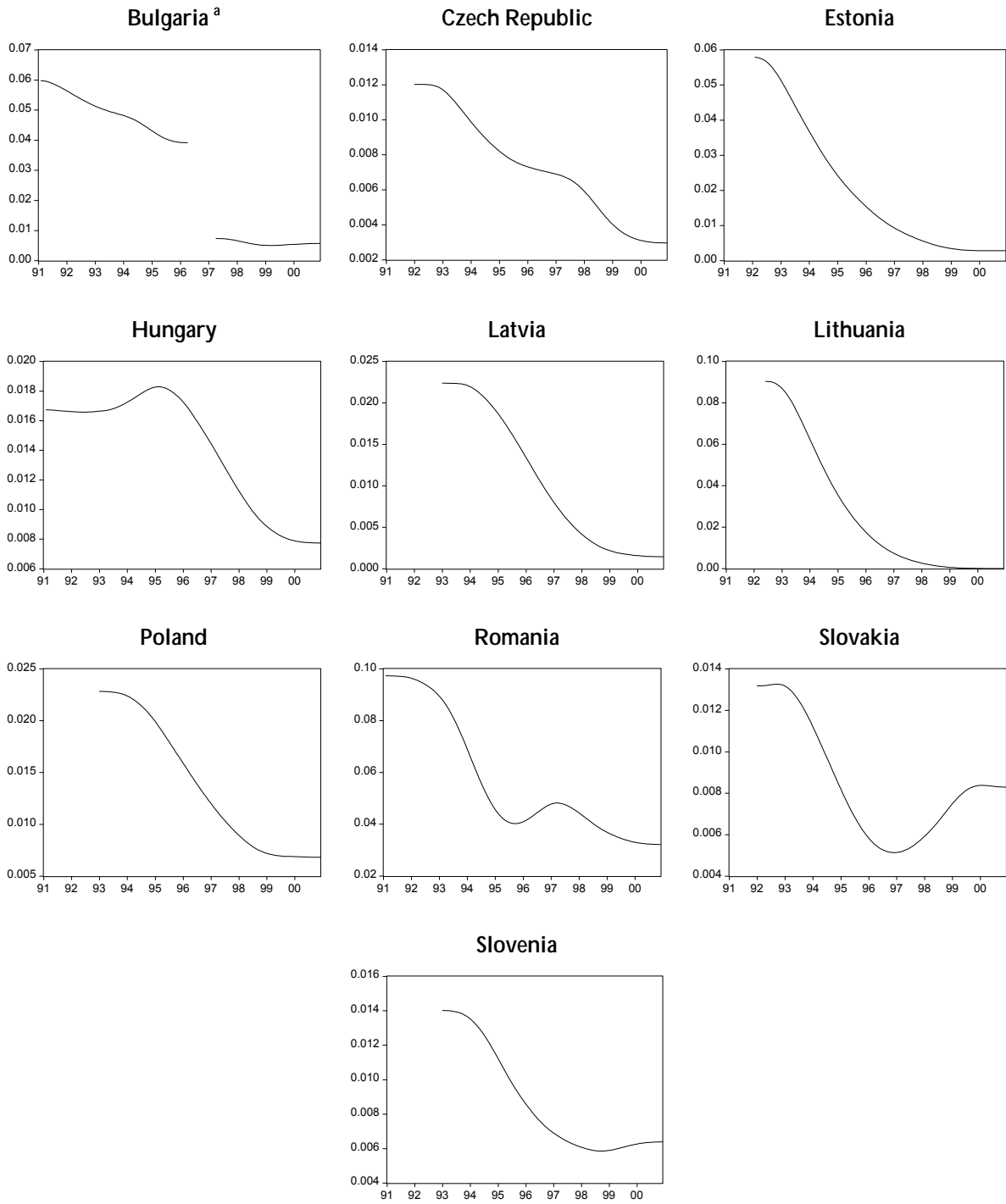
where a standard assumption of the parameter  $\lambda = 14,400$  for monthly data. The results are robust with respect to the alternative specification for quarterly data, but here monthly data are used given that time series would be very short otherwise. Alternative choices of the parameters do not significantly change the results presented below either.

One drawback of the HP filter is that it cannot deal with structural breaks and major level changes which occur at a particular point in time (for example during a financial crisis). A simple visual inspection of price developments in the Central and Eastern European accession countries reveals that there is only one such case of a major level change, namely Bulgaria's high-inflation episode of 1996–97 which was not indicated at all by previous inflation figures. After the decision to adopt a currency board was taken in February 1997, inflation came down very rapidly. Thus, one can observe an almost instantaneous major change of the price level in Bulgaria from the precrisis to the postcrisis level. Because the crisis period in Bulgaria can be delineated fairly exactly (high-inflation period between May 1996 and March 1997), one can compute an HP trend for the periods before and after the crisis. With this adaptation, the analysis for Bulgaria can be continued in the same manner as for the other applicant countries.

The deviations from the HP trend are identified as short-run disturbances, while the changes in the HP trend show the long-run price dynamics. In the analysis, monthly consumer price indices between January 1991 and December 2000 are used (base period: December 1992). The data sources are the WIIW (for Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia), the IMF (for the Baltic States) and Eurostat (for the EU). While data are available for the whole period for Hungary, data series for the other accession countries begin in 1992 or 1993.

Figure 1 shows monthly changes in the HP trend of the consumer price indices (in logs) in the individual transition countries and thus displays the long-run dynamics. In other words, this indicator corresponds to the underlying (monthly) inflation in these countries.

**Figure 1: Monthly Changes of the HP Trend (Underlying Inflation) in Central and Eastern European Accession Countries**



Note: The charts display monthly changes in the HP trend of price level in logs.  
<sup>a</sup> The high-inflation episode between May 1996 and March 1997 is excluded.

It is important to note the differences between this concept of price index trends and the concepts of core or net inflation, as applied by a number of Central and Eastern European EU accession countries. While the latter exclude price increases due to administered prices, energy prices, seasonal foodstuffs and/or the most volatile prices, the concept

used here includes all these factors if and in as much as they display long-run tendencies (e.g. the gradual abolition of price controls). Therefore, the HP filter-based concept tends to yield higher figures for trend inflation than the core or net inflation figures reported by Central and Eastern European central banks and statistical offices. For the obvious reason that there are both positive and negative residuals from the trend line, the estimates displayed here are lower than (headline) consumer price inflation in some periods and higher in others. This also reflects the fact that the HP-filter concept is insensitive to the temporary delays or spurts of price adjustments (e.g. due to electoral cycles) which have frequently been observed in transition countries. In an overall perspective, the HP-filter method appears to be more appropriate for comparisons between various countries than other concepts of underlying inflation, which moreover cannot be applied uniformly to the ten countries with their diverse methods of data collection.

How has underlying inflation, as exhibited in figure 1, developed since the early 1990s? At the beginning of transition, all accession countries faced high inflation. As stabilization took hold, inflation pressure was significantly reduced (see section 2.1). At the beginning of 1993 (when data become available for all ten countries under review), trend inflation stood between 1% and slightly above 2% monthly in the Czech Republic, Hungary, Latvia, Poland, Slovakia and Slovenia. In the other countries, underlying inflation was markedly higher at that point in time (5% to 9%).

The decline of trend inflation was rather continuous for most Central and Eastern European accession countries, with a few (temporary) exceptions. Hungary faced an increasing trend inflation between 1993 and 1995, but subsequent developments have run in parallel with those in the other accession countries. Slovakia displayed a steeper reduction of trend inflation in the middle of the 1990s, but trend inflation rose again in 1998 and 1999, and remained comparably high in 2000. Romania also faced increased inflation pressures from 1996 to 1998. Bulgaria is a specific case, due to high inflation in 1996–97. In the postcrisis period, changes in trend have been comparatively small and fairly steady.

The added direct and indirect disinflation effects from the Russian crisis which several accession countries experienced are not visible in the charts of figure 1, as they proved to be short-lived. The latest values of trend inflation show a slight increase in nearly all ten countries (and also in the EU). However, it should be kept in mind that the HP filter may provide somewhat biased trend estimates for the last available observations.

By the end of 2000, the change in adjusted prices ranged from 0.5% to 1.0% a month in Bulgaria, Hungary, Poland, Slovakia and Slovenia, while it was slightly lower in the Czech Republic, Estonia and Latvia and close to zero in Lithuania.<sup>6</sup> Romania, in turn, recorded an underlying monthly inflation of about 3%.

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<sup>6</sup> Due to the very low inflation in Lithuania in 1999 and 2000, the data points for this period practically coincide with the horizontal axis of the chart on Lithuania in figure 1.

For comparison, monthly underlying inflation in the EU ranged from 0.1% to 0.3% during the period 1991 to 2000.

In addition to overall stabilization policies, inflation in the accession countries has been affected by a high number of short-term factors. These factors can be either country-specific (for example changes in indirect tax systems or the liberalization of controlled prices), region-specific (probably some effects of the Russian crisis), or common to both the accession countries and the European Union (e.g. the short-term development of import prices and of the exchange rate between the euro and the U.S. dollar).

Actually, one can see that common factors are becoming increasingly important for some Central and Eastern European economies. The deviations from the HP trend in Hungary, Latvia, Poland, Slovenia and, to a lesser extent, also in Estonia, were strongly correlated with the deviations from the long-run trend in the EU (correlation coefficients between 0.44 and 0.52 for the first four countries and 0.32 for Estonia, all significant at the 1% level). In general, this relation gains in strength if the analyzed period is restricted to more recent years.

Country-specific factors still dominate short-run price dynamics in Bulgaria, the Czech Republic, Lithuania, Romania and Slovakia. Region-specific factors do not seem to be important for the Central and Eastern European accession countries. Deviations from the HP trend mostly show significant regional correlations for countries whose deviations already correlate strongly with the EU. Possible exceptions are Bulgaria, the Czech Republic and Romania. For example, the short-run price deviations in Bulgaria display a significant correlation to those in Poland (correlation coefficient 0.38), while the movements of the consumer price index in the Czech Republic are similar to those in Estonia (0.39). Furthermore, these countries show a trend inflation behavior which is similar to that of several countries with strong comovements with the EU. However, there are no obvious structural fundamentals which could explain this particular grouping. Therefore, the high correlations between short-run price deviations in Bulgaria, the Czech Republic and Romania are likely to be outliers.

### 2.3 Price Level Convergence

To put inflation developments into a broader perspective, it is useful to complement the preceding analysis by shedding some light on price level convergence. In the long run, accession countries can be expected to experience far-reaching price level convergence with the EU/euro area as the result of the catching-up process in income levels and the trend real appreciation it entails.

Both inflation convergence and price level convergence matter in the context of the EU integration process of accession countries. According to the EU accession criteria, as interpreted by the European Commission, "macroeconomic stability... including

adequate price stability" is a condition for entry into the European Union.<sup>7</sup> It should be noted that this criterion is not specified in quantitative terms. For participation in the euro area, the Maastricht inflation criterion has to be met, according to which the harmonized consumer price inflation rate must not exceed inflation in the three best-performing EU countries by more than 1.5 percentage points. Price level convergence is neither a condition for EU nor for euro area accession. Still, there is a case for discussing price level convergence, as it will accompany Central and Eastern Europe's catching-up to European Union income-per-capita levels. Integration of accession countries into the EU and the euro area, if well managed, will spur their catching-up process and thus also give additional impetus to price level convergence.<sup>8</sup> This, in turn, raises the question of the implications of this process for economic policies in general and monetary and exchange rate policy in particular, an issue which will be discussed in section 4 of this paper.

A convenient way to approach the issue of price level convergence is to look at the development of the comparative price levels which relate (market) exchange rates to purchasing power parities.<sup>9</sup> A comparative price level of 100% means that, at the given (market) exchange rate, price levels are the same in the country under examination and in the reference country. Figures below 100% indicate that the price level in the country under examination is lower than the price level in the reference country. More specifically, they imply that the (market) exchange rate assigns a lower value (in currency units of the reference country) to one local currency unit than the purchasing power parity. Starting from such a position, price level convergence is a process of real appreciation of the local currency against the currency of the reference country.

How far has price level convergence of Central and Eastern European EU accession countries proceeded so far? Table 2 reports the development of GDP-based comparative price levels relative to Germany between 1989 and 2000, focusing mostly on the early and the most recent years of transition. It therefore provides information about price level deviations of accession countries and selected EU countries from the German level. Germany's price level is taken as a numeraire because the country is the most important trading partner for the accession countries. Furthermore, this choice facilitates the comparison between accession countries and catching-up economies that are European Union members. Finally, for the period until 1998, the Deutsche mark appears to be a

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<sup>7</sup> European Commission (1997).

<sup>8</sup> For a survey of studies on the effects of the European Union's enlargement to Central and Eastern Europe see Fidrmuc and Nowotny (2000). Apart from a number of other studies, this review covers the first seminal article on this issue by Baldwin, Francois and Portes (1997). Further eminent contributions to the debate have recently been made by the European Commission (2001a), by Keuschnigg and Kohler (2001) and by Breuss (2001).

<sup>9</sup> The comparative price level is the ratio of the (market) exchange rate to purchasing power parity, both denominated in currency units of the reference country per one local currency unit.



preferable numeraire to the ECU (which would be the alternative), given its de facto anchor-currency role in the European Monetary System.

**Table 2: GDP-Based Comparative Price Levels (in % of the German Price Level), 1989 to 2000 (Selected Years)**

	1989	1990	1991	1992	1995	1998	1999	2000
Bulgaria	88.0	99.3	15.7	16.3	20.6	26.3	27.0	28.7
Czech Republic	31.9	24.3	21.4	21.4	29.5	37.2	37.2	39.1
Estonia	n/a	n/a	n/a	9.1	27.2	39.3	40.6	42.9
Hungary	32.9	32.2	34.0	35.5	34.6	38.7	39.6	41.5
Latvia	n/a	n/a	n/a	8.9	26.6	37.1	41.8	48.8
Lithuania	n/a	n/a	n/a	6.3	21.3	38.8	41.6	49.3
Poland	33.5	24.6	34.1	33.3	34.5	42.7	41.9	47.5
Romania	35.7	20.6	19.3	13.1	17.9	26.7	24.1	28.8
Slovakia	38.2	28.3	23.2	24.4	28.6	33.2	31.4	34.9
Slovenia	49.3	62.7	50.1	47.4	53.7	58.9	59.7	59.9
Austria	95.5	95.6	96.2	96.2	96.9	96.9	97.5	99.1
Greece	66.9	68.7	70.1	67.5	62.4	70.4	72.4	75.0
Ireland	91.9	88.6	85.4	82.2	72.4	89.7	90.9	95.6
Portugal	54.4	56.3	60.3	64.7	56.0	62.4	63.4	65.7
Spain	80.3	83.1	84.2	84.7	69.6	76.4	77.4	80.3

Source: WIIW database and WIIW (2001), OECD (2001), OeNB calculations. Note: These values were calculated by extrapolating with GDP deflators the benchmark results of the international comparison of price levels for 1996 conducted by Eurostat and OECD.

Regarding price level convergence to date, as displayed in table 2, four observations are noteworthy: First, apart from Hungary, comparative price levels fell considerably at the start of transition, reflecting the real devaluations undertaken at that stage. Second, as a result, exchange rates were strongly undervalued in relation to purchasing power parities in the early 1990s. Third, the degree of undervaluation was reduced considerably during the 1990s, but fourth, (with the exception of Slovenia) these undervaluations are still significantly larger than in the catching-up economies in the Euro-12 area.

Within the euro area, there is a strongly negative correlation between the level of inflation rates and relative consumer price levels (European Central Bank, 1999). In its analysis, the ECB concludes that "price level convergence does indeed play an important role in explaining different rates of ... inflation across the euro area countries".<sup>10</sup> This raises the question whether a comparable relationship can also be observed in the case of the Central and Eastern European EU accession countries. Figure 2 displays the relation between the consumer price inflation rate (average 1993 to 2000) and the comparative price levels of 1992 in the Central and Eastern European EU accession countries. As expected, the correlation is negative. For all ten countries, the correlation coefficient is

<sup>10</sup> European Central Bank (1999).

-0.43; if the two outliers Bulgaria and Romania are excluded, it amounts to -0.60, which is only slightly lower than the coefficient the ECB reports for the euro area (-0.7).

**Figure 2: Initial Comparative Price Levels and Average Inflation, 1992 to 2000**

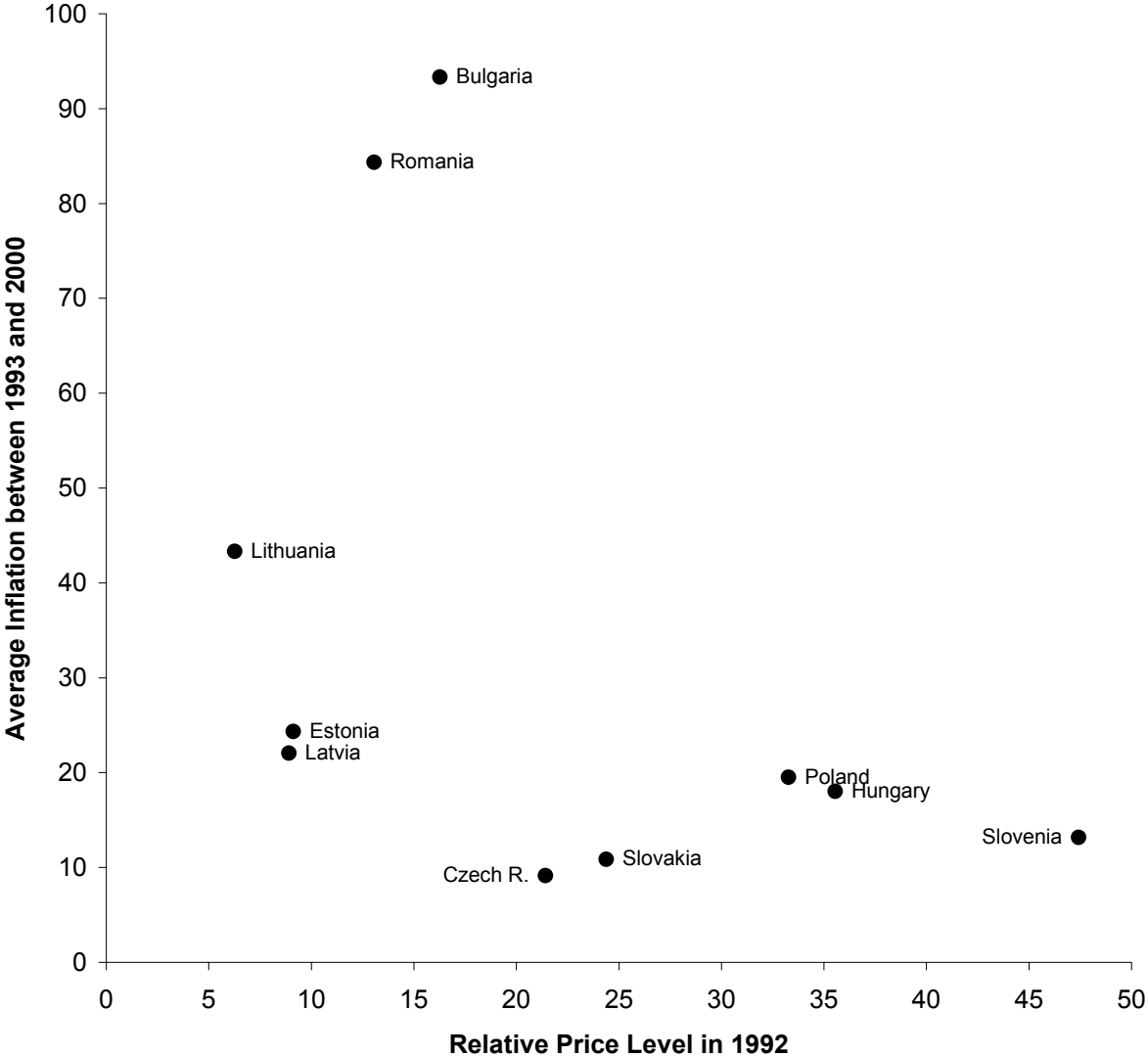


Figure 2 looks at the relation between GDP-based comparative price levels and inflation, while the ECB relates inflation rates to relative consumer price levels. However, relative consumer price levels are not available for most EU accession countries. Furthermore, the approach chosen here appears to be justified, given that Pelkmans et al. (2000) find in an analysis of 29 OECD countries that GDP-based comparative price levels are a good proxy for relative consumer price levels. Moreover, in calculating the correlation coefficients for the accession countries, data points for which annual average consumer price inflation exceeded 100% were excluded in order to eliminate possible distortionary effects of extremely high inflation on correlation results.

Clearly, a correlation does not imply causality. Still, one can conclude that Central and Eastern European countries with low comparative price levels will tend to register inflation rates that are above those of countries with higher comparative price levels.

Differences in comparative price levels between EU countries and most Central and Eastern European EU accession countries are still considerable and will be reduced only gradually. Such price level differences may therefore play a tangible role in inflation developments Central and Eastern European EU accession countries for the longer period of time.

### 3 Present and Future Driving Forces of Price Dynamics

Since 1996, a number of econometric studies have been published on the main determinants of inflation in Central and Eastern European economies. These studies<sup>11</sup> convey one key message: Nonmonetary factors – in particular relative price adjustments – are of paramount importance in explaining not only short- but also medium-term inflation developments in the accession countries. Relative price changes are seen as having lasting upward effects on inflation, as the distribution of the size of relative price changes in all sectors of the economy is typically positively skewed and the number of times a sector's price changes are large and positive is strongly correlated with this sector's sustained increase in relative prices. Furthermore, the behavior of wages is found to exert an important influence on inflation in Central and Eastern Europe.

It is reasonable to suppose that these general features will continue to characterize the inflation and disinflation process in the accession countries. However, the individual sources of inflation will continue to undergo dynamic change, as economic structures and the institutional environment are evolving with considerable speed. In such a context, past relationships among variables tend to become misleading. For the purpose of the essentially forward-looking analysis undertaken in this paper, it appears to be more promising to examine what key driving forces of current and future inflation arise from the completion of transition, the prospective entry into the European Union and the ongoing catching-up process in Central and Eastern European countries.

A basic proposition of this paper is that EU accession and integration is an important anchor and incentive for sound macroeconomic and structural policies. This will mitigate or do away with several factors that currently drive inflation in accession countries, even though accession itself may entail some one-off price adjustments. In particular, any potential inflationary bias of monetary, exchange rate and fiscal policies will be reduced to a large extent under the EU economic policy coordination and surveillance framework. In fact, already now, applicants are exposed to a string of policy dialogue and surveillance instruments.

In a similar vein, transition will still impact on inflation in accession countries, but only for a limited period of time in the most advanced transition economies. Catching up, in turn, is a long-term process which will impact on inflation developments in accession countries for a many years to come.

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<sup>11</sup> Brada and Kutun (1999), Cottarelli et al. (1998), Coorey et al. (1998), Moore (2001), Pujol and Griffith (1998), Tzanninis (2001), Van Elkan (1996), Wozniak (1998).

Against this backdrop, three main sources of current and future price dynamics in accession countries are singled out and dealt with in more detail in this chapter, namely (i) the completion of price deregulation and the adjustment of agricultural prices upon EU membership, (ii) productivity developments, and (iii) wage developments in the tradables sector.

### 3.1 Completing Transition and Acceding to the European Union

This section is about those sources of inflation that relate to the completion of the transition process and the accession of advanced transition economies to the European Union. The two main factors that feature in this twin context are explored in more detail, namely price deregulation and agricultural price adjustments.

The liberalization of administered prices or their adjustment to cost-recovery levels has reached an advanced stage in most accession countries. However, it is not yet complete. Administered prices still have a share of approximately 13% to 24% in the accession countries' consumer baskets.<sup>12</sup> Also, the portion of administered prices that already cover costs varies among individual countries. Thus, the order of magnitude of "repressed" inflation due to price caps appears to vary among individual accession countries.

In any case, the final steps towards price liberalization and adjustment will still have a bearing on the price dynamics in accession countries in the next years. These adjustments are very much "transition-related" dynamics, as they emanate from the legacy of central planning in Central and Eastern Europe.

It should be noted that the liberalization of administered prices or their adjustment to cost-recovery levels should essentially be completed before EU accession. The Copenhagen criteria, as interpreted by the European Commission in its *Agenda 2000* (July 1997), require that "prices... are liberalised" as a precondition for EU accession. Consequently, this issue should principally be settled when EU accession takes place. Two qualifications have to be added here. First, in some specific areas (like e.g. public transportation in urban areas), a case can be made for keeping prices below cost-recovery levels. Second, in the area of public utilities, capital costs will typically increase over time, as old production and distribution facilities, which have already been depreciated (close to) zero in the books of utility companies, are being replaced. This process will extend beyond EU accession.

Furthermore, if prices remain regulated, transparent and effective price-setting formulas have to be put in place which ensure that administered prices, once adjusted to cost-recovery levels, will be regularly altered in line with ongoing cost changes. The surge in

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<sup>12</sup> According to European Commission (2000) and European Commission (2001b), the share of administered prices in the consumer basket in 2001 is 20.6% in Bulgaria, nearly 18% in the Czech Republic, 15% in Estonia, 18.5% in Hungary, 22% in Latvia, 20.5% in Lithuania, about 24% in Poland (figure for 2000), 18% in Romania, 19.3% in Slovakia (figure for 2000) and 12.7% in Slovenia (figure for 2000).

energy prices in 1999 and 2000 has shown that existing formulas do not always live up to these needs and that political interference in the price-setting process has remained significant.

The adjustment of energy prices for households is the most significant task outstanding in this area of regulated prices. A recent analysis of energy price developments in four Central and Eastern European accession countries yields the following picture:<sup>13</sup>

There has been some convergence between energy prices in four selected Central and Eastern European accession countries and energy prices in the EU during the period 1992 to 1999. For industrial use, the candidate countries under review have largely reached EU energy price levels in most (but not all) types of energy. However, energy prices charged on households are still low, as compared to those in the European Union, even if they are higher than in the EU when compared to relative levels of GDP per capita. Major adjustments in household energy prices are needed to reach the levels of EU economies.

It follows that the expected adjustments of energy prices will mainly affect the consumer price index, while the direct influence on the industrial producer price index and, hence, on tradables inflation will be relatively less important. Thus, price competitiveness should not suffer much from these energy price adjustments.

However, the upward push on the CPI triggered by the adjustment of energy prices for households will be considerable, as energy constitutes a sizeable share – typically on the order of around 15% – of the accession countries' consumer baskets. This, in turn, may lead to higher wage claims, which may result in indirect upward pressure on tradables prices.

The overall upward adjustment of energy prices will probably be mitigated by increasing productivity and efficiency in the energy sectors that may result from the process of restructuring and liberalizing these sectors in Central and Eastern Europe, which is often linked to privatization to foreign strategic investors. In particular, the level of energy prices for industry may even decrease relative to the corresponding level in EU countries.

In fact, this latter point applies to other sectors of the economy as well. Further privatization, deregulation and liberalization measures which are taken to complete transition will tend to increase competition and thus have a dampening effect on inflation. To what extent these factors will offset, in the individual countries, the upward pressures on inflation discussed earlier is an open question.

The most obvious case of specific "EU accession-related" price dynamics pertains to agricultural and food prices. The entry into the European Union will, in all likelihood,

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<sup>13</sup> For more details, see Reiningger (2000a). Due to data availability constraints, the analysis of Reiningger (2000a) had to be restricted to the Czech Republic, Hungary, Poland and Slovakia.

involve temporary upward pressures on the level of agricultural prices, which are, on the whole, considerably lower in the accession countries than in the EU. However, it should be noted that there is some variation of agricultural price levels among accession countries, but also among EU Member States. Among the former, agricultural producer price level convergence has progressed farthest in Slovenia, followed by the Czech Republic, Slovakia, Poland and Hungary. Rough estimates show that the comparative agricultural price levels in these countries are between half and three quarters of the EU average. As regards key agricultural commodities, prices in these five countries are particularly low, compared to prices in EU countries, for livestock products and some selected crop products like sugarbeets or apples.<sup>14</sup>

Changes in agricultural prices have an impact on food prices, which constitute a sizeable share of accession countries' consumer baskets (typically around 30% or more, as compared to 16% in the European Union), while they are on average roughly one third to one half of food prices in the European Union. The size and phasing of this potential source of inflation will crucially depend on the integration concepts in the agricultural sector. If the newly acceding countries are integrated into the common agricultural policy (CAP) and its price system upon their accession to the EU, this adjustment will take place faster than if there is a phasing-in period with two different price systems for the incumbent Member States and the newly acceding countries.<sup>15</sup>

As in the case of energy prices, the adjustment of food prices as a consequence of EU accession and CAP integration holds the risk of second-round inflation effects and a weakening of external competitiveness, if it spills over to wage developments.

Clearly, EU accession will have additional impacts on price formation. On the fiscal side, bringing VAT and excise tax regulation in line with EU requirements may lead to price rises for certain categories of goods and services. On the monetary side, reducing mandatory reserve rates, which are high in most accession countries (in preparation for prospective euro area accession), will constitute a challenge for monetary policy;<sup>16</sup> in particular in the currency board countries, where other monetary policy instruments are not available, such a move may lead to additional inflationary pressures. Furthermore, rising capital (in)flows in the context of the full liberalization of capital flows, a precondition for EU entry, will probably complicate monetary management and may well have an impact on inflation performance (depending on policy frameworks and responses to such flows).

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<sup>14</sup> Own calculations based on WIIW and Eurostat figures. Comparable data for the other accession countries were not available, which restricts the analysis to the five countries covered above.

<sup>15</sup> Losoncz (2001) broadly concurs with this assessment for the case of Hungary.

<sup>16</sup> Apart from the high mandatory reserve rates, most accession countries have already brought their monetary instruments largely in line with those of the euro area. An obvious exception to this are the currency board countries (which basically dispose of the mandatory reserve instrument only).

Conversely, EU accession will also have dampening effects on inflation. In particular, added competition in the European Union's Single Market and the effects resulting from the adoption of the EU tariff system have to be mentioned in this context.<sup>17</sup>

### 3.2 Productivity Developments and Price Dynamics

The catching-up process of Central and Eastern European countries is associated with a trend real appreciation. Most of the analytical work on how this appreciation comes about has focused on the Balassa-Samuelson effect.<sup>18</sup> Under this effect, the price ratio ( $P_r$ ) between nontradables ( $P_n$ ) and tradables ( $P_t$ ) develops, in formal terms, as follows (all variables are in logs)<sup>19</sup>:

$$P_r = P_n - P_t = \frac{\delta}{\gamma} a_t - a_n \quad (2)$$

where  $\gamma$  and  $\delta$  represent labor elasticities of production in the tradables and nontradables sectors, respectively, while  $a_t$  and  $a_n$  stand for the respective sectoral productivities. In other words, this effect results from differential productivity developments between tradables and nontradables, while wages are assumed to develop uniformly across sectors, with wage increases being driven by productivity increases in the tradables sector. Consequently, nontradables inflation is higher than tradables inflation, leading to a trend appreciation of the real exchange rate and to a convergence of comparative price levels.

In order to investigate this issue in somewhat more detail, it is useful to start by taking a look at inflation and productivity growth differentials between tradables and nontradables in selected accession countries. Before doing so, four points have to be clarified. A first delicate issue which arises in this context is the definition of tradability. In the following analysis, manufacturing is taken as a rough but often used proxy for tradables. Second, the investigation is based on gross value added figures. The nominal values of these data series are used as weightings for the tradables and the nontradables sectors, and the implicit deflators of gross value added capture sectoral (tradables and nontradables) inflation. Third, labor productivity developments are taken as a proxy for total factor productivity developments, which are not on hand either. Fourth, labor elasticities of production in the tradables and the nontradables sectors are taken as being equal to the share of the total wage sum in gross value added in the respective sectors, as the production functions are assumed to be linearly homogeneous (i.e. exhibiting constant

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<sup>17</sup> The inflation outlook for the first few years of the post-EU-accession period is further blurred by the uncertainties about the short-term impact of EU membership on aggregate demand developments in the accession countries and also about the room for maneuver of macroeconomic policies to deal with internal and external imbalances in this period.

<sup>18</sup> Sometimes, this effect is also called Harrod-Balassa-Samuelson effect.

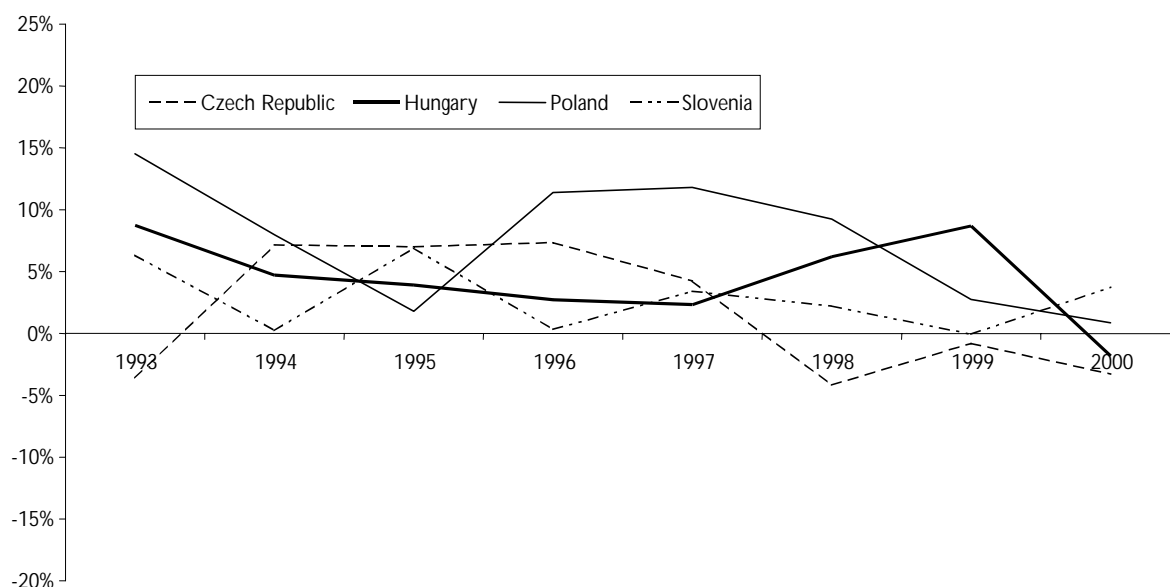
<sup>19</sup> For a derivation of this formula from standard linearly homogeneous Cobb-Douglas production functions for the tradables and for the nontradables sectors, see e.g. Rother (2000).

returns to scale) and each input is assumed to be paid by the amount of its marginal product.<sup>20</sup>

The following analysis is confined to four of the ten Central and Eastern European EU accession countries, namely the Czech Republic, Hungary, Poland, Slovenia. For the other countries, data were either not fully available (especially at the sectoral level) or time series exhibited serious breaks which could not be dealt with in a satisfactory manner.<sup>21</sup>

Inflation and productivity growth differentials between tradables and nontradables in the Czech Republic, Hungary, Poland, Slovenia are depicted in figure 3 and figure 4. A first visual inspection of the data shows that, as the Balassa-Samuelson mechanism would suggest, productivity advances in the tradables sector were typically larger than productivity increases in the nontradables sector (figure 4); furthermore, nontradables prices have usually risen faster than tradables prices (figure 3). It should be noted that the share of manufacturing in GDP, the proxy for the share of the tradables sector in GDP, ranged between one fifth and one third in these four countries during the 1990s.

**Figure 3: Inflation Differential: Nontradables/Tradables, 1993-2000**



Note: Figure 3 is based on implicit sectoral deflators of gross value added.

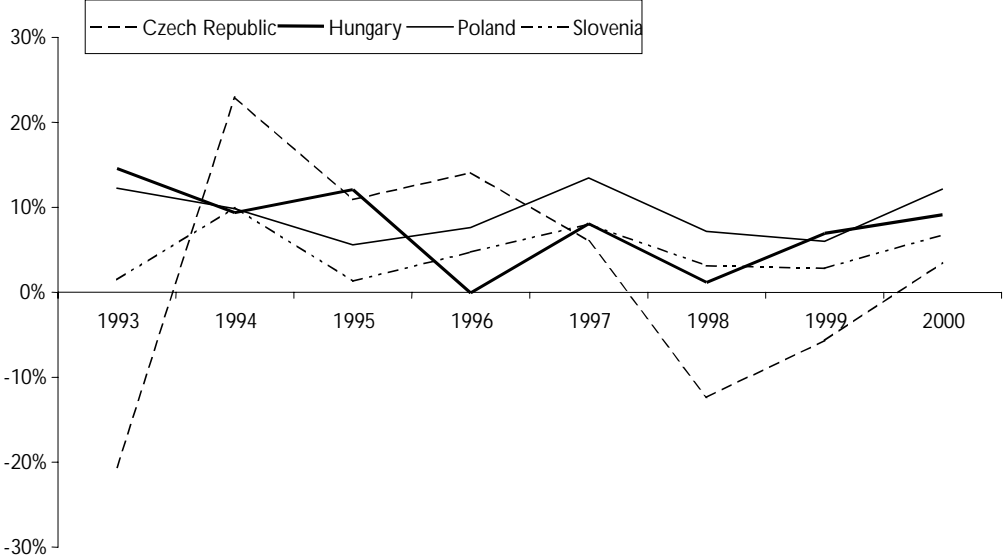
Source: WIIW, OeNB calculations.

<sup>20</sup> See Chiang (1984).

<sup>21</sup> For Bulgaria and Slovakia, data series on gross value added at a sectoral level are available but contain major statistical breaks in 1996 and 1995, respectively. For the Baltic countries, time series on gross value added at a sectoral level could not be obtained; a notable exception is Estonia, where all necessary data exist but were acquired too close to the editorial close of the study to thoroughly examine and fully process them. A future extension of the analysis on Estonia is intended. The needed data series for Romania are not fully complete either.



**Figure 4: Productivity Differentials Tradables/Nontradables, 1993-2000**



Note: Figure 4 is based on sectoral labor productivity growth figures.  
 Source: WIIW, OeNB calculations.

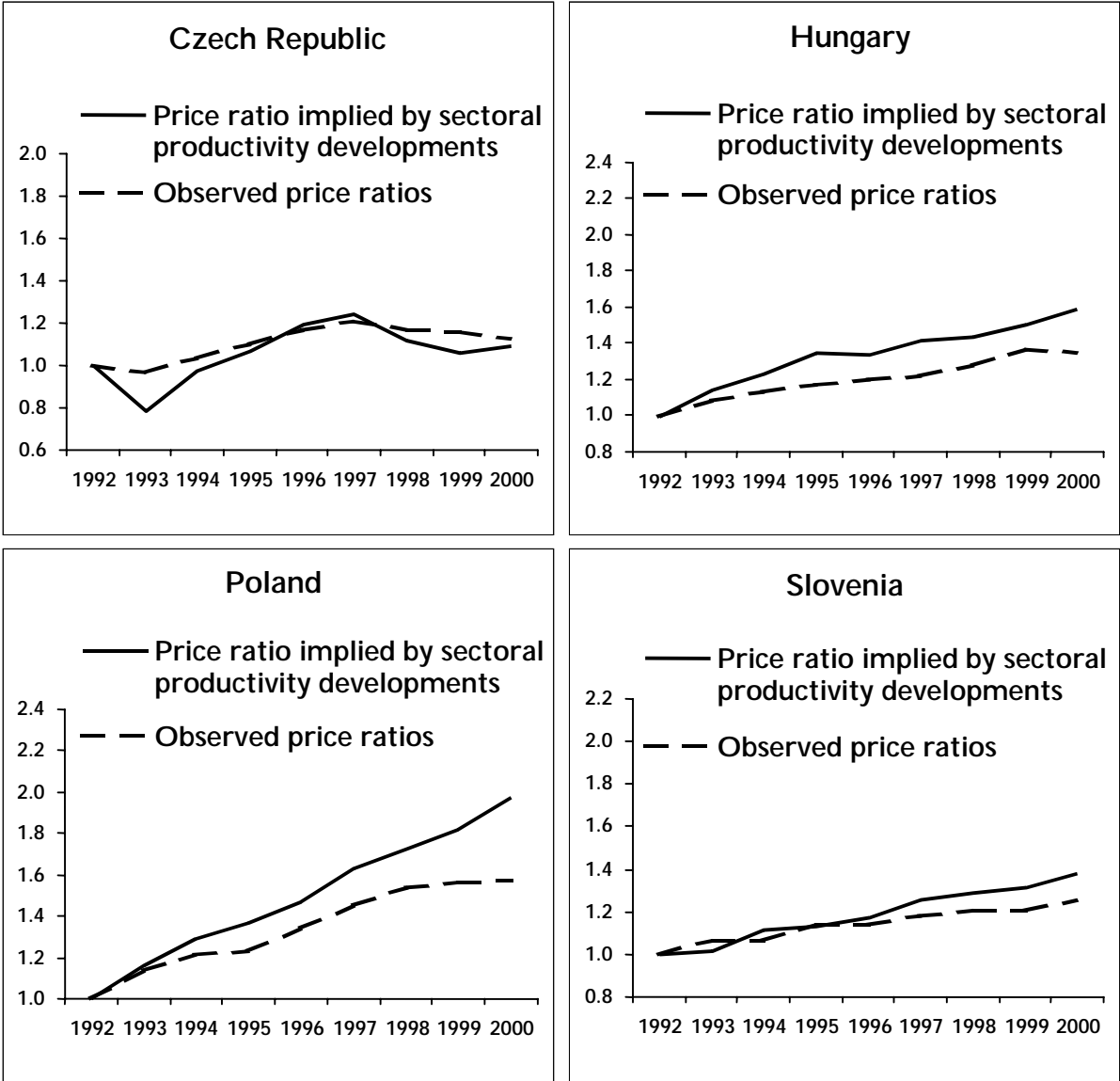
**How do these inflation differentials fit with the Balassa-Samuelson hypothesis?**

A closer examination of the data presented shows that the Balassa-Samuelson effect appears to explain an important part of relative price changes between tradables and nontradables observed in practice.<sup>22</sup> Figure 5 demonstrates this finding by comparing the relative price ratio of tradables and nontradables which is implied by sectoral productivity developments and sectoral labor shares according to equation (2) with actually observed sectoral inflation differentials. Except for the Czech Republic, actual outcomes are typically below implied differentials, which is in accordance with other studies that examined different country samples.<sup>23</sup>

<sup>22</sup> However, as argued later in the paper, this relatively strong correlation does not necessarily mean that the Balassa-Samuelson effect is the only important force that determines inflation differentials between tradables and nontradables.

<sup>23</sup> See e.g. Canzoneri et al. (1996).

Figure 5: Relative Prices: Nontradables/Tradables (Price Ratio), 1992=1



Note: Labor productivities were used instead of total productivities (for sectoral productivities). The labor shares  $\gamma$  and  $\delta$  were computed as the share of total wage sum in gross value added in the respective sectors. Source: WIIW, OeNB calculations.

The question to what extent relative price changes between nontradables and tradables (i.e. sectoral inflation differentials) contribute to the overall inflation rate is to be addressed next. To tackle this issue, table 3 displays weighted inflation differentials between nontradable and tradable inflation in percentage points: The average inflation differential between nontradables and tradables for the years 1992 (1995) to 2000, which is calculated on the basis of implicit sectoral deflators of gross value added, is weighted by the share of nontradables in gross value added.<sup>24</sup>

<sup>24</sup> The change in the overall price level in the economy can be presented as the sum of the changes in the price levels of traded and nontraded goods, weighted by the respective output shares:  $p = s_n p_n + (1 - s_n) p_t = p_t + s_n p_r$  where  $p$  represents inflation,  $p_t$  tradables inflation,  $p_n$  nontradables inflation,  $p_r$  the differential between nontradables and tradables inflation and  $s_n$  the share of nontraded goods in gross value added, see Rother (2000).

**Table 3: Contribution of Relative Price Changes to the Change in the Implicit Deflator of Total Gross Value Added from 1992 (1995) to 2000 (average per year, in percentage points)**

<b>Inflation differentials between nontradables and tradables (weighted by the share of nontradables in the implicit deflator of total gross value added)</b>	<b>Poland</b>	<b>Slovenia</b>	<b>Czech Republic</b>	<b>Hungary</b>
Inflation differentials observed, 1992 to 2000	5.57	1.99	1.15	3.28
Inflation differentials observed, 1995 to 2000	5.34	1.36	0.40	2.66
Inflation differentials implied by sectoral productivity developments and sectoral labor shares according to equation (2), 1992 to 2000	9.43	3.48	0.79	5.58
Inflation differentials implied by sectoral productivity developments and sectoral labor shares according to equation (2), 1995 to 2000	9.76	3.88	0.35	3.84

Source: WIIW, OeNB calculations.

These differentials indicate the size of the overall annual inflation differential that would have prevailed between the accession countries and their main trading partners in the period 1992 (1995) to 2000 as a consequence of nontradable/tradable inflation or productivity differentials if two further conditions had been fulfilled, namely (i) uniform tradables inflation between accession countries and their main trading partners and (ii) no productivity/inflation differentials between tradables and nontradables in the accession countries' main trading partners.<sup>25</sup>

The former does not necessarily have to hold true, given the sizeable deviations between tradables prices of accession countries from international levels. The latter is a simplification, which largely holds true for the reference country (Germany) during the period under consideration, but is not fully correct for the broader European Union, where the Balassa-Samuelson effect has had a certain upward impact on annual inflation.<sup>26</sup> If taken into account, this would reduce the sectoral inflation differentials displayed in table 3 correspondingly.

If the exchange rates had been nominally stable in the period under consideration, these inflation differentials would have been equal to the size of annual convergence of comparative price levels between the accession countries and their main trading partners.

<sup>25</sup> As regards the latter, it should be mentioned that relative price changes and productivity growth differentials of nontradables/tradables were small in Germany in the period 1992 to 2000.

<sup>26</sup> According to Rother (2000), a rough (annual) estimate of the Balassa-Samuelson effect for the "core European countries" is around 0.8 percentage points.

Alternatively, these measures can also be taken to indicate the magnitude of the annual nominal appreciation of the exchange rate that the accession countries would have had to accomplish to achieve an inflation rate as low as that prevailing in their main trading partner countries. To be precise, a further condition must be fulfilled for this to hold true, namely swift and full adjustment of tradables prices *and* wages to that nominal appreciation (implying a possible need for downward nominal flexibility). In particular, this condition implies that the productivity differential between tradables and nontradables must not increase in reaction to that nominal appreciation.<sup>27</sup>

Such a magnitude of annual nominal appreciation combined with an inflation rate as low as that prevailing in the main trading partner countries would have rendered the same size of annual convergence of comparative price levels in the period under consideration as under the fixed exchange rate scenario discussed above.

When assessing the figures displayed in table 3, the extremely high inflation differentials implied by sectoral productivity developments and labor shares for Hungary and Poland attract attention. These figures reflect mainly the massive gains in productivity in the tradables sector that have been achieved during the 1990s in these two countries. Are these value good benchmarks for future developments, in particular for the longer run? Presumably, they are not, for two main reasons: First, they were derived from a relatively short time period that may have been characterized by unusually large productivity gains in the tradables sector because of the recovery from the early recession and particularly large gains associated with the transition to a market economy. One may suppose that the high figures implied by sectoral productivity developments and labor shares for Hungary and Poland are due to the period chosen, in other words that one-time effects in the early years of the period 1992 to 2000 were particularly high. If one looks at the period 1995 to 2000 instead, one sees, however, that this proposition does not hold for Poland while it does seem to have some relevance for the case of Hungary. One possible interpretation for this difference is that Hungary started microeconomic reforms already before 1990 and made very substantial additional headway in this area in the early 1990s. This may explain why the Balassa-Samuelson effect was particularly high in Hungary between 1992 and 1994.

The second reason for supposing that past figures are probably not a good guide for the future in this case relates to the concept of conditional beta convergence (see e.g. Barro, 1991) which suggests that productivity increases will tend to decelerate as higher productivity levels are reached. More moderate sectoral productivity differentials in the future will, *ceteris paribus*, translate into a reduction of observed sectoral inflation

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<sup>27</sup> Otherwise, if price and/or wages do not adjust fully, the magnitude of the nominal appreciation would need to be higher. In particular, if tradable prices adjust, but the adjustment of wages in the tradables sector is incomplete, the productivity differential between tradables and nontradables would probably increase and the size of nominal appreciation would have to be higher to achieve an inflation rate as low as that prevailing in the main trade partner countries.

differentials and thus of the real appreciation of the exchange rate. Furthermore, as mentioned above, when interpreting the results, it should be recalled that sectoral productivity-based estimates of relative price developments tend to overpredict actual relative price developments.

Moreover, when assessing the sectoral inflation differentials of the years 1992 to 2000, the role of demand-side factors should not be underrated, in particular for the case of Poland, which recorded very buoyant aggregate demand growth for most of this period. Clearly, demand-side factors may be important for determining differentials between tradables and nontradables inflation in the short to medium run. In fact, in the case of the catching-up economies of Central and Eastern Europe, deep structural change and substantial rises in income may set off a cascade of important demand changes, so that demand-side effects may prove to be rather persistent. The relevance of demand-side factors is also supported by the rising share of nontradables in total output in a number of accession countries during the observation period (namely in the Czech Republic, Poland and Slovenia; not, however, Hungary, which recorded a small increase in the share of tradables in GDP in the period), while the Balassa-Samuelson effect should produce falling shares of nontradables in total output.<sup>28</sup> Rising shares of nontradables, in turn, may be due to the initially low share of services in aggregate supply and demand and to higher income elasticities for these goods (in particular for services) than for tradables. The resulting increase of demand for labor in that sector will spur wage growth in the nontradables sector. Normally, these pressures will contribute to elevating wage growth in this sector towards wage growth in the tradables sector, thus supporting wage growth equalization, as postulated by the Balassa-Samuelson effect. However, there may be periods of comparatively low productivity advances in the tradables sector coupled with high wage growth in the nontradables sector, which may then propel wage growth in the tradables sector beyond productivity improvements.<sup>29</sup>

How do the results reported in table 3 square with those of other studies that aim at quantifying the Balassa-Samuelson effect? Rother (2000), who estimates the Balassa-Samuelson effect in Slovenia using a very similar methodology as this paper but different data, arrives at somewhat lower estimates for productivity-implied inflation differences between Slovenia and the EU (1.5 to 2 percentage points).<sup>30</sup> The results of Simon and Kovács (1998) for Hungary are based on a slightly different classification of sectors. Presenting results for different assumptions about developments in agriculture, their

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<sup>28</sup> Higher factor productivity in the tradable sector should induce labor and capital to move out of the nontradables sector, reducing the supply of nontradables and increasing the supply of tradables (Rother, 2000).

<sup>29</sup> Compare Cincibuch and Vavra (2000).

<sup>30</sup> This result is based on an estimated annual magnitude of the Balassa-Samuelson effect on the order of 2.6 percentage points in Slovenia minus the size of the same effect in "core European countries" indicated above.

main scenario assumes a sectoral productivity-induced appreciation of the real exchange rate (based on the GDP deflator) of 2.9% a year.

Pelkmans et al. (2000) use a different approach to quantify the Balassa-Samuelson effect for the ten Central and Eastern European accession countries. The authors proceed in four steps. First, they regress the deviation of inflation rates of euro area countries from the euro area average on the relative consumer price levels of these countries. Then, they regress the relative consumer price levels of 29 OECD countries on the GDP-based comparative price levels of these countries (i.e. on ratios of the GDP measured in PPP and at current exchange rates). As expected, the coefficients of the independent variables in both equations are negative, and both are highly significant. In a third step, Pelkmans et al. calculate the relative consumer price levels of the ten Central and Eastern European accession countries, based on their comparative price levels and the coefficient estimated for the OECD countries in the second equation. Finally, the authors use the coefficient estimated in the first equation for the euro area countries to compute the accession countries' inflation differentials from the average euro area, which are implied by their relative consumer price levels. Their results show on average an inflation differential of 3.8 percentage points between the accession countries and the euro area average due to estimated differences in the price levels.

Schardax (2001) presents estimates for the impact of differences in price levels on inflation in the Czech Republic, Hungary, Poland and Slovenia based on the coefficients calculated by Pelkmans et al. (2000) and on the actual GDP-based comparative price levels of the accession countries in 1999, as calculated by the WIIW (see also table 2 of this paper). His estimates for the Balassa-Samuelson effect, following this approach, range from 2.4% to 4.3% annually for these four countries.

Halpern and Wyplosz (2001) estimate the Balassa-Samuelson effect for a panel of nine Central and Eastern European countries (including Russia). In addition to the variables suggested by equation (2) they include demand factors, which in part accounts for differences in comparison with the results reported in lines (3) and (4) of table 3. Depending on the exact specification of their equation, they estimate an average annual real appreciation (defined as the ratio between tradeables and nontradeables inflation) of about 3% for a panel of nine CEECs for the time period 1991 to 1999.

Coricelli and Jazbec (2001) do a panel study of 19 transition economies for the period 1990 to 1998. They add not only demand variables to the variables represented in equation (2), but also a variable capturing structural misalignments in transition countries. Coricelli and Jazbec define the real exchange rate as the relative price of tradables in terms of nontradables and find "an elasticity of the real exchange rate with respect to [sectoral] productivity differentials of about  $\frac{1}{2}$ . If we take the typical 2 percent yearly rate of convergence for CEE countries [Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia] relative to EU countries, the pressure

on the real exchange rate due to the Harrod-Balassa-Samuelson effect should [ceteris paribus] be on the order of one percent a year in the medium to long run."<sup>31</sup>

De Broeck and Sløk (2001) regress real effective exchange rates on different measures of productivity in tradables and nontradables sectors for the ten Central and Eastern European accession countries from 1991 to 1998, using panel data estimations. Productivity increases in the tradables sector which imply an appreciation of the exchange rate are interpreted as evidence in support of the Balassa-Samuelson effect. De Broeck and Sløk find that an increase in the relative productivity differential by one percent leads to an increase in the real exchange rate of slightly above 0.3 percent for the Central and Eastern European EU accession countries. According to Deutsche Bundesbank (2001), the analysis by De Broeck and Sløk (2001) would translate into an annual Balassa-Samuelson effect on the order of 1.4% to 2%. Finally, provisional results of a study of the Deutsche Bundesbank itself put the magnitude of the Balassa-Samuelson effect for the ten Central and Eastern European EU accession countries at 1.9% to 2.6% annually for the period 1994 to 1999. As the study has not yet been published, the methodology applied is not yet known.<sup>32</sup>

Taking these studies together, it emerges that there is a considerable degree of uncertainty about the size the Balassa-Samuelson effect has had in recent years in Central and Eastern European EU accession countries. This calls for prudence in the assessment of developments so far and even more so for any projections of future developments.

### 3.3 Wage Developments in the Tradables Sector

Another source of inflation may arise from wage developments in the tradables sector. There will be an inflationary bias if wage-setting mechanisms do not work well. If wage increases in the tradables sector tend to systematically exceed productivity increases, they may be accommodated by a reduction in profit margins for a certain time. However, eventually such a development will have to lead to higher prices of tradables. If prices of tradables are already uniform across countries (i.e. conform to the "law of one price"), a nominal depreciation of the domestic currency will be needed to maintain the competitive position.<sup>33</sup> Such a depreciation, however, will not cure the underlying

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<sup>31</sup> Coricelli and Jazbec (2001). Apparently, Coricelli and Jazbec use the term "convergence" to denote the difference between the CEE countries and the EU countries in the change in the sectoral productivity differentials, with CEE countries typically showing a higher rate of change.

<sup>32</sup> The provisional results are quoted in Deutsche Bundesbank (2001), indicating that the internal study will appear shortly as a Discussion Paper of the Research Centre of the Deutsche Bundesbank.

<sup>33</sup> It should be noted that tradables prices of Central and Eastern European countries, in particular those of domestically produced goods, actually are often considerably below international levels (see e.g. Hosek, 2000). It is difficult to assess whether the observed deviations in tradables prices really constitute empirical evidence against the "law of one price." Part of the price gaps may be due to differences in quality which statisticians have been unable to capture.

imperfections in wage setting by itself. Moreover, it will have broader implications if it sets in motion a wage-price spiral in the respective economy.

It goes beyond the scope of this paper to examine the wage-setting mechanisms that are in place in the accession countries and to assess their current and potential future operation, not the least because good and comprehensive up-to-date reviews of labor market institutions and wage bargaining frameworks in Central and Eastern European countries are rare.<sup>34</sup> Therefore, this paper chooses an alternative way of exploring this issue further, namely to relate developments of unit labor cost (ULC) in Deutsche mark terms to the development of the real exchange rate (deflated by the prices of tradables) against the Deutsche mark. Again, manufacturing is taken as a proxy for the tradables sector. Such an exercise, done for the period 1992 to 2000, yields the results that are displayed in table 4. Due to data availability reasons, the analysis had to be restricted to five accession countries, namely the Czech Republic, Hungary, Poland, Romania and Slovenia.<sup>35</sup>

**Table 4: Unit Labor Cost in the Tradables Sector and Real Appreciation (from 1992 to 2000, cumulated)**

	Poland	Slovenia	Czech Republic	Hungary	Romania
<b>Unit labor cost, DEM</b>	4.4%	3.9%	110.3%	-26.6%	35.5%
<b>Real exchange rate against the DEM (based on the implicit deflator for gross value added of the tradables sector)</b>	-0.8%	13.2%	72.7%	-8.2%	68.9%

Source: WIIW, OeNB calculations. Note: Unit labor cost, expressed in Deutsche mark, are calculated as the cumulative change of nominal wages in manufacturing divided by the cumulative change of output per employee in this sector times the cumulative change of the nominal exchange rate. For Romania, the calculation period extends from 1992 to 1998 (as more recent data on gross value added in manufacturing are not available).

Labor cost factors may have contributed to real appreciation in the Czech Republic, Romania and to a much smaller extent also Slovenia, because these countries experienced both a rise in unit labor costs (expressed in Deutsche mark) and an appreciation of the real exchange rate against the Deutsche mark. This seems to indicate that producers in the tradables sector in the Czech Republic, Romania and in Slovenia were successful in

<sup>34</sup> Two recent publications which cover part of the ground are Riboud et al. (2001) and the Transition Report 2000 (EBRD, 2000), which contains a concise overview chapter on labor market issues.

<sup>35</sup> For a more detailed account on data availability constraints and related issues regarding the other Central and Eastern European EU accession countries, see footnote 21. In the case of Romania, the analysis had to be restricted to the period 1992 to 1998 (see note to table 4).



passing on rising wage costs to customers. In contrast, in Poland unit labor costs (expressed in Deutsche mark) increased slightly, while the real exchange rate against the Deutsche mark was at the same level in 2000 as in 1992.

In the Czech Republic, despite the sizeable real appreciation resulting from tradables price increases, the profitability in the tradables sector must have declined substantially in the period under observation, as the rise in unit labor costs (expressed in Deutsche mark) exceeded the change in the real exchange rate against the Deutsche mark. Although one should be aware of the importance of the choice of the base year, the development of wages in the Czech Republic between 1992 and 2000 thus negatively affected the tradables sector of this country. A continuation of these developments into the future would increase upward pressures on tradables prices and may ultimately lead to a nominal depreciation of the exchange rate. Poland appears to be a borderline case, as the profitability of its tradables sector may have suffered a bit from wage developments but the size of the effect is probably too small to arrive at any strong conclusion. Unlike in the Czech Republic, wage developments did not cause a decline in tradables sector profitability in Hungary, Romania and Slovenia, as the rise in unit labor cost in Deutsche mark terms was smaller than the real appreciation against the Deutsche mark in Romania and Slovenia, and as Hungary recorded a ULC decline in Deutsche mark terms that was more pronounced than the real depreciation against the Deutsche mark.

It was only in Hungary that the real exchange rate against the Deutsche mark was lower in 2000 than in 1992, thereby strengthening the external price competitiveness of the tradables sector. In the Czech Republic and Romania, the strong appreciation of the real exchange rate against the Deutsche mark weakened the competitive position of the tradables sector to the extent that it was not offset by improvements in product quality or, more broadly, by upstream movements in the international division of labor. However, even if competitiveness had indeed declined in any of these two countries, it should be noted that tradables prices in Deutsche mark terms were at a low level in 1992.<sup>36</sup> Therefore, the deterioration in the period from 1992 to 2000 does not necessarily imply that the current competitive positions of either the Czech Republic or Romania should be considered unsound.<sup>37</sup>

As in the case of productivity developments, historical wage growth patterns may be poor guides for judging prospective developments. Nevertheless, this analysis is still interesting because it provides some information about how far wage setting in the tradables sector will have to be adjusted to shake off any potential inflationary bias in the future.

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<sup>36</sup> This is also indicated by the low GDP-based comparative price levels of these two countries in 1992 (see table 2). In 1992, prices of tradables were apparently not yet at internationally uniform levels suggested by the "law of one price".

<sup>37</sup> For a recent assessment of competitive positions of Central and Eastern European EU accession countries see International Monetary Fund (2000), Box 4.4.

## 4 Policy Implications

### 4.1 The Overall Policy Mix

Economic policymakers in the accession countries face the challenge of reducing inflation at the lowest possible cost (in terms of lower real growth), while avoiding excessive current account imbalances and financial instability (and, in particular, sudden reversals of capital flows). In this perspective, with a view to preserving external competitiveness, it is more important to achieve disinflation in tradables than in nontradables.

In view of the manifold potential sources of inflation, it becomes very clear that responses are needed in a number of policy fields, not least to achieve fully adequate policy reactions to particular factors driving inflation. Moreover, a balanced approach that relies on measures in several policy fields helps to avoid the excessive use of a particular instrument, with potentially decreasing marginal rates of return or growing negative side effects.

The concrete design of the overall policy mix is case- and time-dependent. Nevertheless, one can make a few general observations that pertain to most or all Central and Eastern European accession countries at the current stage.

In the area of fiscal policy, a careful handling of changes in indirect taxes and charges seems to be important. Moreover, a prudent conduct of fiscal policy will support the avoidance of excessive aggregate domestic demand and thus external imbalances and/or (additional) inflationary pressures, hence leaving monetary policy more room for maneuver.

In countries which have experienced wage inflation, the question arises whether incomes policies can and should play a role in containing wage growth in line with productivity developments. This also poses the question of institution building, for instance, the development of a (better) functioning tripartite mechanism.

In the realm of structural policy, efforts to speed up restructuring and privatization in sectors whose product prices are (partly) still administered could turn out to be a tangible contribution to disinflation. The resulting boost in productivity could dampen the size of the necessary adjustments of administered prices. Moreover, this would facilitate earlier full liberalization of these sectors, including an unlimited opening to imports, which should further support the disinflation trend. Finally, decisive measures in these sectors and the phasing out of administered prices would probably dampen expectations of future inflation.

In the field of agricultural policy, a timely and comprehensive substitution of shortfalls in domestic production by imports in the case of adverse weather conditions (perhaps combined with schemes of direct income compensation payments to farmers) may contribute to limiting the associated inflationary pressures. In a medium-term perspective, there is a need, in a number of accession countries, to design and pursue a

reliable and transparent policy of restructuring the agricultural sector and of developing rural regions, not least in order to resist calls for price policy measures whenever adverse weather conditions affect crops.

The speed of disinflation and of prospective adjustment paths to future inflationary shocks are, to a great extent, conditioned and predetermined by the design and the consistency of the overall policy mix.

## 4.2 The Role of Monetary and Exchange Rate Policy

The main task of the accession countries' central banks is to contribute to the process of disinflation while maintaining a reasonable degree of external balance. A key precondition for successful disinflation is to reduce inflation expectations and anchor them at low levels.

In practice, most Central and Eastern European EU accession countries are currently following two alternative basic monetary strategies to achieve these goals, namely either exchange rate-based strategies or direct inflation targeting strategies. Monetary targeting, in turn, is the policy of choice only for Slovenia (which, however, at the same time places considerable de facto weight on exchange rate developments).

The selection of the most appropriate strategy is both country-specific and time-dependent. There is no single strategy that is a priori optimal for all countries at all times. Moreover, one has to distinguish between the pros and cons per se of a certain monetary policy strategy and the potential costs involved in a regime change. The potential credibility losses of a switch in regimes and the resulting repercussions in the financial markets have to be assessed carefully. Any regime shift certainly needs a very active communication policy.

The basic advantages and disadvantages of both principal strategies are well known and do not have to be recapitulated here at length. In a nutshell, a fixed exchange rate regime is conducive to cross-border trade and investment, but it carries the risk of exchange rate misalignments, which may be difficult and costly to correct without nominal exchange rate changes. Furthermore, such a regime tends to be more exposed to major and sometimes sudden swings in capital flows that are unrelated to changes in fundamentals. Direct inflation targeting in accession countries, in turn, is fraught with the difficulty of forecasting inflation, and a lack of knowledge about the relationship between the instruments and the target. Moreover, it carries the risk of large exchange rate swings and exchange rate overshooting (due to potentially sizeable capital inflows).<sup>38</sup>

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<sup>38</sup> Apart from possible negative effects on trade and investment, such exchange rate swings may put pressure on companies with sizeable net foreign currency-denominated liabilities. Reininger and Scharfax (2001) show that the exposure of the corporate sector to foreign currency-denominated loans is rather high in several Central and Eastern European EU accession countries.

Monetary policymaking in accession countries is made even more challenging by the uneven functioning of monetary transmission channels. Three recent empirical studies<sup>39</sup> find that central bank stabilization efforts in Central and Eastern Europe still have to rely mainly on the exchange rate channel, while the interest rate and the credit channels are not well developed yet. Certainly, the situation differs from country to country, depending, for instance, on the level of domestic credit relative to GDP. In any case, it follows that one important task for monetary policy consists in strengthening the interest rate and the credit channels via structural reforms within the financial sector and measures to deepen domestic fixed-income markets. The growing share of foreign strategic interests in the domestic banking sector as well as further progress with disinflation may speed up changes in the functioning of the interest rate and the credit channels. However, as the Central and Eastern European accession countries are generally small and open economies, the exchange rate still has a major impact on inflation performance in these countries, irrespective of the monetary strategy chosen.

From the preceding analysis of price dynamics in accession countries, two major points emerge that have a direct bearing on the prospective monetary policy courses of accession countries.

First, if and as long as there is tangible potential for tradables-sector wage inflation or other – mainly transition-related – cost-push factors create inflationary pressures or if the fiscal position is not yet consolidated, it may be risky to move on to a rigid (nonadjustable) fixed peg. In such a situation, some downward nominal exchange rate flexibility may still be needed to preserve price competitiveness. Under these conditions, a case for a fixed peg could only be made if such a regime change altered wage formation and enhanced fiscal prudence. However, such changes cannot be taken for granted, and even if they do occur, the change in behavior may not be sufficient to make a fully fixed rate sustainable in the longer run. In a similar vein, any monetary strategy that would allow for nominal appreciation in an inflationary environment likewise carries major risks.

Second, if and when the inflation bias resulting from transition and imperfect wage formation is basically overcome and price dynamics are mainly driven by factors that relate to the catching-up process, in particular differentials in sectoral productivity developments, the transition countries have (in pure conceptual terms) two basic options: either a nominal-appreciation/low-inflation strategy or, alternatively, a strategy of maintaining a stable nominal exchange rate with somewhat higher inflation. It should be noted that both of these strategies can be followed under different exchange rate regimes. While the nominal appreciation strategy can be implemented both in a flexible

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<sup>39</sup> See Christofferson and Wescott (1999), Fidrmuc and Schardax (2000) and Gottschalk and Moore (2001). For a different view, see Orłowski (2000), who argues that monetary transmission tends to be a function of the monetary policy strategy adopted. Compare also Rybinski (2000), who finds that the interest channel works in Poland but with long lags.

exchange rate context (in the case of the Central and Eastern European accession countries, typically under direct inflation targeting) and under a tighter exchange rate regime (e.g. a tightly managed float or a fixed but adjustable peg), a stable nominal exchange rate can be achieved both under a fixed regime or under a managed float.

Whether a nominal-appreciation/low-inflation strategy or a stable nominal exchange rate with somewhat higher inflation is the more appropriate option depends on a whole range of issues, like a possible unsettling of expectations as a consequence of nominal appreciation (e.g. if this would imply a major exchange rate regime shift), the potential for exchange rate overshooting or the existence of price and/or wage rigidities in the tradables sector. Moreover, even if such rigidities do not exist, the more restrictive monetary policy stance needed to move to nominal appreciation/low inflation may (at least) temporarily affect real growth.

Turning to institutional issues, the European Union, including the Eurosystem, has outlined a three-step approach to the monetary integration of candidate countries. The applicants will first join the EU, then enter the exchange rate mechanism (ERM II) of the European Union and finally, after fulfillment of the Maastricht convergence criteria, accede to the euro area, i.e. participate fully in Economic and Monetary Union (EMU).

How do the two monetary strategies outlined fit from an integration viewpoint? Both strategies seem to be equally viable for EU accession. The same appears to be true for subsequent participation in the ERM II. Joining the exchange rate mechanism can take place from any preceding monetary and exchange rate regime, while participating in ERM II presupposes a fixed (but adjustable) peg to the euro or a tightly managed float with the euro as the reference currency.

To eventually join the euro area, inflation has to be reduced to low levels in the year that is relevant for the convergence examination. It has been argued that the inflation criterion is too tight for fast-growing countries which typically experience higher inflation than countries that have already achieved high GDP-per-capita levels. Were these countries to fulfill the criterion, they would have to incur nonnecessary temporary losses in output and employment (and thus a delay in GDP-per-capita convergence).<sup>40</sup> How valid is this line of argument? Clearly, it is primarily relevant for countries that grow quickly and do not want to accept some nominal exchange rate appreciation as a reaction to the catching-up process. However, reducing inflation to Maastricht levels in the run-up to full membership in the euro area would not necessarily inflict temporary output and employment costs. After all, the real appreciation associated with the shift toward higher income-per-capita levels is a *trend* appreciation and thus a medium- and longer-term phenomenon. In the short run, inflation fluctuates around its trend level, as a host of other factors, a number of them being policy variables, drive inflation and inflation

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<sup>40</sup> Based on these arguments, several proposals have been made in the discussion to soften the inflation convergence criterion.

differentials.<sup>41</sup> Clearly, in the medium and longer term, inflation in such euro area countries will be higher than in the single currency area as a whole, as the catching-up process will lead to adjustments in relative price levels over time.

## 5 Conclusions

This paper has looked into selected aspects of price dynamics in accession countries. The main findings can be summarized as follows:

So far, accession countries have made substantial headway in lowering inflation, despite the pause in the disinflation process that was recorded between mid-1999 and early 2001 and was due above all to supply shocks. Disinflation has proceeded at a fairly similar pattern in most accession countries. In some accession countries, short-term price dynamics have increasingly been driven by factors that are common to both Central and Eastern Europe and to the European Union. Price level convergence between the accession countries and the EU has proceeded fairly swiftly in the course of the 1990s and in 2000. As expected, there is a strong negative correlation between initial comparative price levels and average inflation rates in Central and Eastern European EU accession countries between 1992 and 2000.

There are numerous potential driving forces of price dynamics in the accession countries. Three selected factors which will be of major importance for relative price formation and inflation developments in the future are explored in the study in more detail, namely (i) the completion of price deregulation and the adjustment of agricultural prices upon EU membership, (ii) productivity developments, and (iii) wage developments in the tradables sector.

The adjustment of administered prices has been studied by reviewing the situation in the field of energy prices. The analysis suggests that major upward adjustments of energy prices for households can be expected. In a similar vein, agricultural and food prices in accession countries will rise in the context of EU accession and integration into the Common Agricultural Policy of the European Union. In both cases, it will be crucial for future inflation developments whether these price rises will feed into wage inflation.

Catching up-related factors have constituted a major force driving overall price dynamics and will continue to do so. Rising per capita income levels are associated with a trend real appreciation. The Balassa-Samuelson effect, which explains how this appreciation can come about, is analyzed in detail in the paper. This effect results from differential productivity developments between tradables and nontradables, while wages are assumed to develop uniformly across sectors, with wage increases being driven by productivity increases in the tradables sector. Consequently, nontradables inflation is higher than

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<sup>41</sup> For a similar view see Pelkmans et al. (2000) and Szapáry (2001), who in this context points toward the experience of Portugal, Spain and Greece, which succeeded in fulfilling the inflation criterion without any perceptible sacrifice in output. Compare also Szapáry (2000) for an earlier and somewhat different assessment of this issue.

tradables inflation, leading to a trend appreciation of the real exchange rate. The paper finds that the Balassa-Samuelson effect can explain a considerable portion of relative price changes between tradables and nontradables observed in practice; in addition, changes in demand have apparently also played a role in relative price changes. The Balassa-Samuelson effect will be at work for a long time, although probably with less intensity than in the 1990s, as there are good reasons to expect sectoral productivity differentials to become more moderate in the future. As in the past, demand-side effects will continue to influence the development of inflation differentials between tradables and nontradables and, in part, these effects will presumably be persistent, given that demand tends to shift toward nontradables as per capita incomes rise.

Finally, imperfections in wage setting in the tradables sector may create an inflationary bias in some Central and Eastern European EU accession countries. However, only in the case of the Czech Republic and Romania, wage developments during the 1990s seem to have contributed considerably to inflationary pressure in the tradables sector. This, in turn, implied a strong real appreciation of the exchange rate (against the Deutsche mark) and thus a deterioration in the external price competitiveness, at least to the extent that the real appreciation was not offset by improvements in product quality or, more broadly, by upstream movements in the international division of labor. In as far as non-quality-related price deviations have not been overcome yet and in as far as existing quality-related deviations can be reduced over time, differentials in tradables inflation between the accession countries and the euro area will not necessarily lead to a deterioration in the competitive position of candidate countries.

Given the wide variety of potential sources for inflation, any effective disinflation strategy has to rely on a broad set of measures from different policy fields. Monetary policy is only one of these areas, and probably not the most important one in all cases. There is no single monetary policy strategy which is best for all candidate countries at all times. If and when the inflation bias resulting from transition and imperfect wage formation is overcome and price dynamics are mainly driven by catching up-related factors, in particular differential productivity developments, the accession countries may either opt for a nominal-appreciation/low-inflation strategy or, alternatively, for a strategy of maintaining a stable nominal exchange rate with somewhat higher inflation. Which option is more appropriate depends on a whole range of issues, like a possible unsettling of expectations as a consequence of nominal appreciation (e.g. if this would imply a major exchange rate regime shift), the potential for exchange rate overshooting or the existence of price and/or wage rigidities in the tradables sector. Moreover, even if such rigidities do not exist, the more restrictive monetary policy stance needed to move to nominal appreciation/low inflation may (at least) temporarily affect real growth.

From an integration viewpoint, both strategies seem to be equally viable for EU accession. The same appears to be true of a subsequent participation in the ERM II. For the later joining of the euro area, accession countries will have to fulfill the Maastricht convergence criteria. From today's perspective, it is too early to assess whether the

inflation criterion would tangibly constrain temporary growth dynamics in a catching-up economy which intends to qualify for participation in the euro area without being willing to allow a nominal appreciation of the exchange rate.

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1) vergriffen (out of print)

2) In abgeänderter Form erschienen in Berichte und Studien Nr. 4/1990, S 74 ff

3) In abgeänderter Form erschienen in Berichte und Studien Nr. 4/1991, S 44 ff

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