

## **Price level convergence and inflation in the EU-8**

### **Background paper to the EFN-Euroframe report on “Convergence and integration of the new member states to the euro area”**

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#### **1. Introduction**

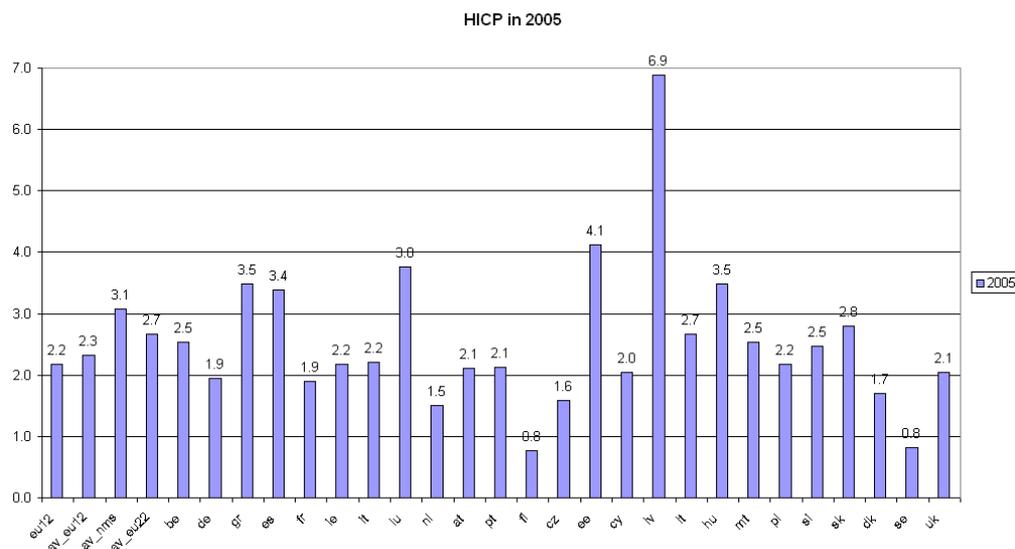
The new member states of the EU are in the process of catching up growth. They have been characterised by lower but converging income and price levels vis-à-vis the current euro area. In 2004, the income level of the new member states ranges between 20% and 70% of the euro area average in current prices and between 40% and 80% in Purchasing Power Parities. Only Cyprus had a general price level (of GDP) exceeding that of the three euro area member states with the lowest price level.

According to the Maastricht treaty, the new member states are required to fulfil the nominal convergence criteria. The inflation criterion requires a rate that does not exceed the average rate of the three countries with the lowest (positive) inflation rate in the EU by more than 1.5 percentage points. At the same time, the exchange rate should remain stable within the ERM-II for two years before entering the euro area. It is often said that because of the catching up growth process the new member states might be unable to reach these criteria simultaneously. The countries must breach one of the criteria if they do not wish to risk growth and stability (cf. e.g. de Grauwe/Schnabl 2004, Buiters 2003).

Since 2000, inflation rates have substantially declined in the new member states<sup>1</sup>. After a temporary pick-up in 2004 due to the accession related adjustments in indirect taxes, in 2005 the rates were close to the euro area average in most of the new member states (Graph 1). Inflation in the euro area was 2.2 per cent, and it ranged between 0.8 and 3.8 per cent among the euro area member states. The rates in the new member states were between 1.6 and 6.9 per cent with the average being 3.1 per cent. Except Estonia and Latvia, all new member states registered inflation rates within the range of the euro area. The Maastricht criterion in the strict sense (i.e. when all EU member states are considered) stood at 2.5, and based on euro area member states only at 2.9%. Of the new member states, in 2005 the inflation criterion was fulfilled by the Czech Republic, Cyprus, Malta, Poland and Slovenia in both cases and in addition by Lithuania and Slovakia if the criterion were based on the euro area member states.

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<sup>1</sup> Graphs A in the Appendix for the individual countries

**Graph 1: Inflation rates (HICP) in the European Union member states, 2005**

Source: Eurostat, eu12 denotes euro area of 12 member states, av\_eu12 is the simple average inflation rate of the 12 member states of the euro area, av\_nms is the simple average of the ten new member states, and av\_eu22 is the average of the current euro area of 12 countries and the ten new member states.

This article investigates in more detail the implications of price level convergence for inflation in the new member states, particularly related to the eight countries that were formerly transition economies. We start with an overview of the inflation rates and the contributions of different subclasses. In the following sections, we will give an overview of the price levels and investigate the sources of price level convergence. Particular attention is given to the question to what extent this can be reflected in the inflation rates. Section 5 contains other aspects of the inflation process and in Section 6 we discuss the implications of the trend higher inflation rates for the preparation process and the enlarged euro area.

## 2. Inflation accounting

### 2.1 Components of the HICP

To start with, we investigate how the index is composed in the new member states. The average consumption basket differs substantially from the euro area, as do the weights of different subcomponents in the HICP. Table 1 contains the weights of the major subcategories in 2005. The weight of food and of energy is significantly higher than in the euro area, whereas that of services is lower. Within the industrial goods, the weight of durables is substantially lower than in the euro area. Overall, “core” inflation components make up only half of the price index in the new member states, which is by up to 20 percentage points less than in the euro area. Table 1 also shows that the weights of food and services have been converging to the euro area’s average 2000 and 2005.

Table 1: composition of the HICP and changes between 2000 and 2005

		weight of category in HICP							difference towards euro area								
		Industrial goods	Non-energy industrial goods	Non-energy industrial goods, durables only	Non-energy industrial goods, semi-durables only	Non-energy industrial goods, non-durables only	Energy	Food including alcohol and tobacco	Services (overall index excluding goods)	Industrial goods	Non-energy industrial goods	Non-energy industrial goods, durables only	Non-energy industrial goods, semi-durables only	Non-energy industrial goods, non-durables only	Energy	Food including alcohol and tobacco	Services (overall index excluding goods)
EU12	2000=100	409.0	325.0	112.8	128.9	83.3	84.1	201.3	389.7								
	2005=100	396.3	310.3	104.9	123.2	82.2	86.0	195.6	408.1								
		-12.8	-14.7	-7.9	-5.7	-1.1	1.9	-5.6	18.4								
CZ	2000=100	439.9	293.8	79.9	129.1	84.7	146.1	287.7	272.5	30.8	-31.2	-32.8	0.2	1.4	62.0	86.4	-117.2
	2005=100	388.6	250.6	78.8	95.9	76.0	138.0	295.7	315.7	-20.5	-74.4	-34.0	-33.0	-7.3	53.9	94.4	-74.0
		-51.3	-43.2	-1.1	-33.2	-8.8	-8.1	8.0	43.2								
EE	2000=100	398.3	251.8	53.0	112.8	86.0	146.5	373.5	142.3	-10.8	-73.2	-59.8	-16.1	2.7	62.4	172.2	-247.4
	2005=100	410.1	275.4	64.4	116.1	95.0	134.7	300.7	289.3	1.0	-49.6	-48.4	-12.8	11.7	50.6	99.4	-100.4
		11.8	23.6	11.4	3.2	9.0	-11.9	-72.8	147.0								
CY	2000=100	424.0	361.0	130.1	145.7	85.3	62.9	239.8	336.2	14.9	36.0	17.3	16.8	2.0	-21.1	38.6	-53.5
	2005=100	407.7	320.8	121.9	117.5	81.4	86.9	226.2	366.1	-1.3	-4.1	9.1	-11.4	-1.9	2.8	24.9	-23.6
		-16.2	-40.2	-8.2	-28.1	-3.9	23.9	-13.7	29.9								
LV	2000=100	409.0	260.8	68.9	96.6	95.3	148.2	376.2	214.8	-0.1	-64.2	-43.9	-32.3	12.0	64.1	175.0	-174.9
	2005=100	388.1	266.0	64.2	104.1	97.6	122.1	333.6	278.4	-21.0	-59.0	-48.6	-24.8	14.3	38.0	132.3	-111.4
		-20.9	5.2	-4.7	7.5	2.3	-26.1	-42.6	63.5								
LT	2000=100		265.7	47.1	117.1	91.5		439.9	135.6	-409.0	-69.3	-65.7	-11.8	8.3	-84.1	238.6	-254.1
	2005=100	401.7	271.0	64.7	113.1	93.3	130.7	366.7	241.6	-7.3	-54.0	-48.1	-15.9	10.0	46.6	155.5	-148.2
		401.7	15.3	17.6	-4.0	1.7	130.7	-83.1	106.0								
HU	2001=100	412.6	284.3	83.2	107.3	93.8	128.3	289.2	298.3	3.5	-40.7	-29.6	-21.6	10.6	44.2	87.9	-91.4
	2005=100	426.4	295.2	95.5	99.1	100.6	131.2	281.6	292.0	17.4	-29.8	-17.3	-29.8	17.3	47.1	80.3	-97.7
		13.8	10.9	12.3	-8.2	6.8	2.9	-7.6	-6.3								
MT	2000=100	377.7	326.1	131.2	111.3	83.6	51.6	232.4	389.9	-31.4	1.1	18.4	-17.6	0.3	-32.5	31.2	0.2
	2005=100	377.5	328.9	129.7	108.5	90.7	48.6	222.6	400.0	-31.6	3.9	16.9	-20.4	7.4	-35.5	21.3	10.3
		-0.2	2.8	-1.5	-2.7	7.1	-3.0	-9.9	10.1								
PL	2000=100	414.1	270.3	45.0	99.7	125.7	143.9	370.4	215.5	5.1	-54.7	-67.8	-29.2	42.4	59.8	169.1	-174.2
	2005=100	441.6	280.5	64.3	81.0	135.2	161.1	280.2	278.2	32.5	-44.5	-48.5	-47.9	51.9	77.0	79.0	-111.5
		27.4	10.2	19.3	-18.7	9.6	17.2	-90.1	62.7								
SI	2000=100	461.0	343.6	120.1	135.6	87.9	117.4	271.5	267.5	52.0	18.6	7.3	6.7	4.6	33.3	70.3	-122.2
	2005=100	433.7	310.9	111.7	111.1	88.1	122.8	236.8	329.5	24.7	-14.1	-1.1	-17.8	4.8	38.7	35.6	-60.2
		-27.3	-32.7	-8.4	-24.5	0.2	5.4	-34.7	62.0								
SK	2000=100	463.7	316.3	64.7	149.0	102.6	147.4	312.6	223.7	54.7	-8.6	-48.1	20.1	19.3	63.3	111.4	-166.0
	2005=100	415.4	240.1	64.6	77.3	98.2	175.3	253.1	331.6	6.3	-84.9	-48.1	-51.6	14.9	91.2	51.8	-58.2
		-48.3	-76.3	0.0	-71.8	-4.5	27.9	-59.5	107.9								

Source: Eurostat.

## 2.2 Contributions to inflation rates and to the real appreciation

Table 2 shows the inflation rates and the contributions of the four categories to the inflation rate. In small open economies, inflation in the different product classes might be driven by different factors. Industrial goods prices may be determined by the international price level and the exchange rate, whereas services may be more influenced by domestic factors. Energy prices will be determined by the oil prices and the exchange rate. The table also contains an “inflation rate in euro”, which is calculated as the sum of the inflation rate and the rate of change of the nominal exchange rate to the euro. Related to the corresponding rates of the euro area, this reflects the real exchange rate. Of course, in such calculations it is suggested that the pass-through of the nominal exchange rates to prices is very strong. Therefore, the indicated inflation rates need not fully correspond with inflation rates under a fixed exchange rate regime. Table 2 contains the average values during 2001 and 2005 (Lithuania and Hungary 2002-2005).

In two countries (Czech Republic and Lithuania), the average inflation rate was lower than in the euro area, but only in Lithuania this holds also for the inflation rate adjusted for exchange rate movements. In both countries, the low inflation rates are connected with declining prices of industrial goods in national currency. For all new member states it holds that energy prices recorded the highest inflation rates, which is similar to the euro area. However, the contributions to overall inflation are higher in the new member states due to higher growth rates of energy prices, but also the higher weights in the consumer baskets. In addition, all new member states experienced a trend increase in the relative price of services to industrial goods. This is also found in the euro area, but the magnitude of the change in

relative prices was higher in the new member states (with the exception of Latvia and Poland). Food prices have risen less than prices of services, but more than those of industrial goods.

Table 2: Contributions to inflation rate

		hicp	igoodsxe	energy	food	services	ner
<b>EU12</b>	inflation rate	2.2	0.9	3.9	2.9	2.6	
	contribution to inflation	2.2	0.3	0.3	0.6	1.1	
	inflation rate in euro	5.4	2.3	7.7	4.7	7.6	
<b>Czech R</b>	inflation rate	2.0	-1.1	4.3	1.3	4.2	-3.4
	contribution to inflation	2.0	-0.3	0.6	0.4	1.3	
	inflation rate in euro	5.4	2.3	7.7	4.7	7.6	
<b>Estonia</b>	inflation rate	3.6	1.1	7.9	3.3	4.3	0.0
	contribution to inflation	3.6	0.3	1.0	1.0	1.2	
	inflation rate in euro	3.6	1.1	6.3	3.3	4.3	
<b>Hungary</b>	inflation rate	5.0	2.5	6.8	4.6	7.1	-0.8
	contribution to inflation	5.0	0.7	0.9	1.3	2.1	
	inflation rate in euro	5.8	3.3	7.6	5.4	7.9	
<b>Poland</b>	inflation rate	2.8	1.7	5.5	2.1	3.3	0.5
	contribution to inflation	2.8	0.5	0.8	0.7	0.8	
	inflation rate in euro	2.3	1.2	5.0	1.6	2.8	
<b>Slovenia</b>	inflation rate	5.6	3.2	8.2	5.0	7.4	3.0
	contribution to inflation	5.6	1.0	1.0	1.3	2.3	
	inflation rate in euro	2.6	0.2	5.2	2.0	4.3	
<b>Slovakia</b>	inflation rate	5.9	1.7	11.2	3.8	9.0	-1.9
	contribution to inflation	5.9	0.5	1.8	1.1	2.6	
	inflation rate in euro	7.8	3.6	13.1	5.7	10.9	
<b>Latvia</b>	inflation rate	4.1	2.7	5.5	5.2	3.5	4.5
	contribution to inflation	4.1	0.7	0.7	1.8	0.9	
	inflation rate in euro	-0.4	-1.8	1.0	0.6	-1.0	
<b>Lithuania</b>	inflation rate	0.8	-1.0	3.2	0.7	1.6	-0.9
	contribution to inflation	0.8	-0.3	0.4	0.3	0.4	
	inflation rate in euro	1.7	-0.1	4.1	1.7	2.5	

Source: Eurostat, own calculations

igoodsxe denotes industrial goods excluding energy, food = food and alcoholic beverages/tobacco, ner= nominal exchange to the euro, the figure in the table denoted the annual average rate of change, a negative number denotes appreciation.

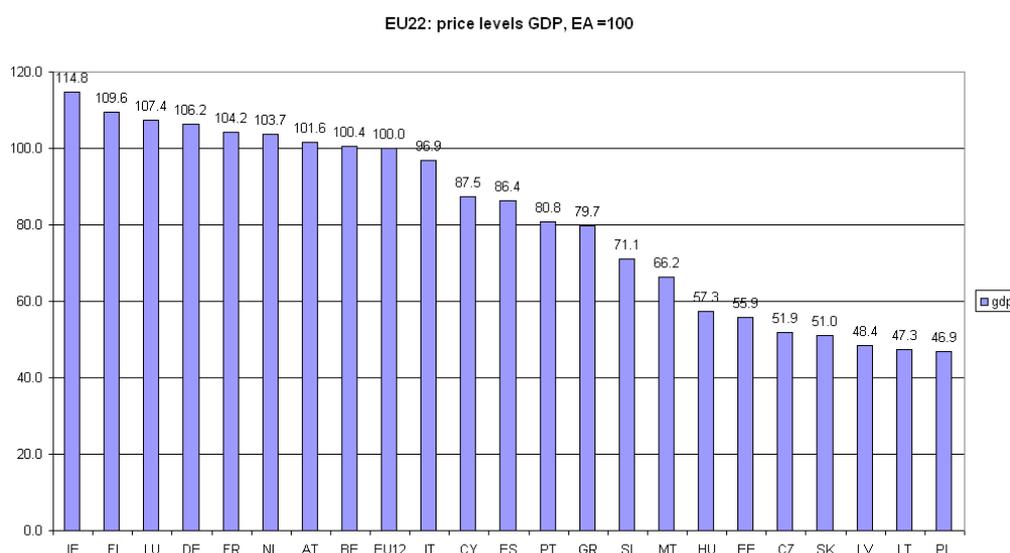
Inflation rate in euro is the sum of inflation rate and change in nominal exchange rate

The data in the table are the average values for 2001-2005 for all countries except Hungary and Lithuania (2002-2005).

### 3. Price levels in the new member states

In December 2005, Eurostat published preliminary data for the price levels in the European Union for 2004. As is shown in Graph 2, the price levels in the NMS are lower than in the euro area and, with the exception of Cyprus, lower than in any member state of the euro area. Slovenia and Malta have price levels of approximately 70% of the euro area; and the other countries have price levels of less than 60% and in some cases even less than 50% of the euro area.

Graph 2: Price levels in the euro area and the new member states in 2004



Source: Eurostat; euro area average = 100, the data refer to the price level of GDP

Within the PPP project of Eurostat, price levels are determined also for subcategories of the expenditure side of GDP. Data are calculated for household consumption expenditures including actual consumption expenditures (all that households consume independently on whether the households or the government pay, i.e. including expenditure on health care and education) and individual (paid by the private households) consumption expenditures. In addition, data are available for the price level of government expenditures, of which “collective consumption” refers to general public services, public order, defence and the like. Investment into fixed capital is divided into investment into machinery and equipment, and construction. Table 1 summarises the comparative price levels in the new member states in 2004 of these categories.

Table 3: price levels in the new member states, subcategories of the expenditure side of GDP

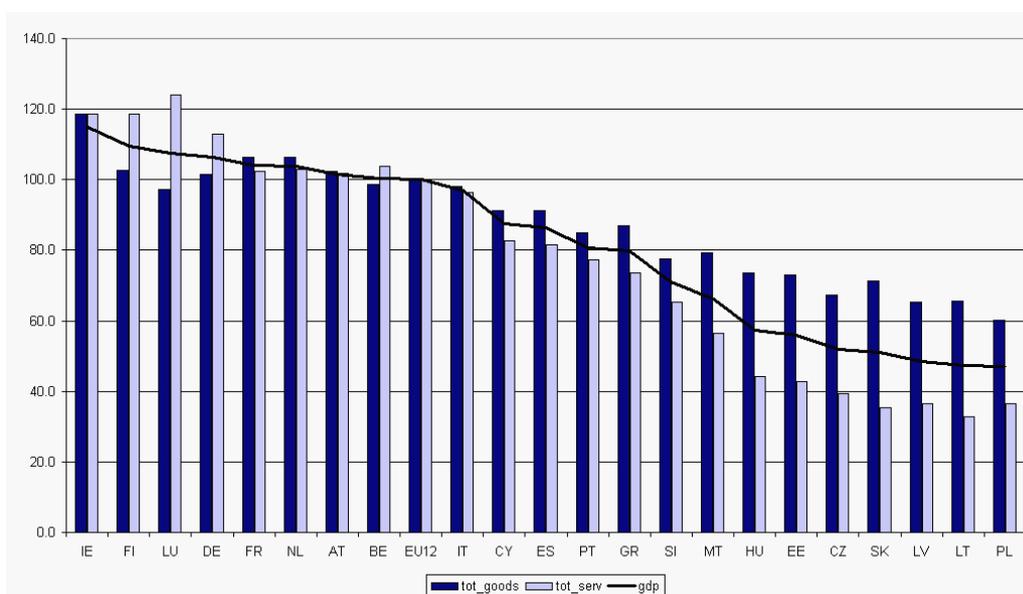
	Gross Domestic Product	Household final consumption expenditure	Government final consumption expenditure	Actual individual consumption	Actual collective consumption	Gross fixed capital formation	Machinery and equipment	Construction
cy	87	91	87	90	83	79	107	64
si	71	74	65	71	69	70	91	56
mt	66	73	53	68	52	67	99	51
hu	57	60	41	55	46	73	90	62
ee	56	61	34	53	37	77	93	66
cz	52	54	38	49	42	64	88	48
sk	51	53	32	48	36	73	95	55
lv	48	55	29	48	32	66	85	53
lt	47	53	27	45	31	67	87	55
pl	47	51	31	46	34	57	85	43

Source: Eurostat; in all individual categories the respective euro area average marks 100.

Table 1 shows that similar differences as in the GDP price level can be found in the price level of the households' consumption and in investment into construction. Even larger differences occur in the government collective consumption (which are inferred from compensation of employees as no market prices are available for these services) and also in the final government consumption (i.e. including publicly provided services that are priced). The price levels closest to the euro area are recorded in the fixed investment in machinery and equipment, which might be due to the large share of tradables therein. Note that unlike the GDP, all expenditure categories may contain imported goods that affect the price level. At the same time, the price level of GDP is influenced also by the export price level. To our knowledge, both the import and the export goods' price level are not published by Eurostat.

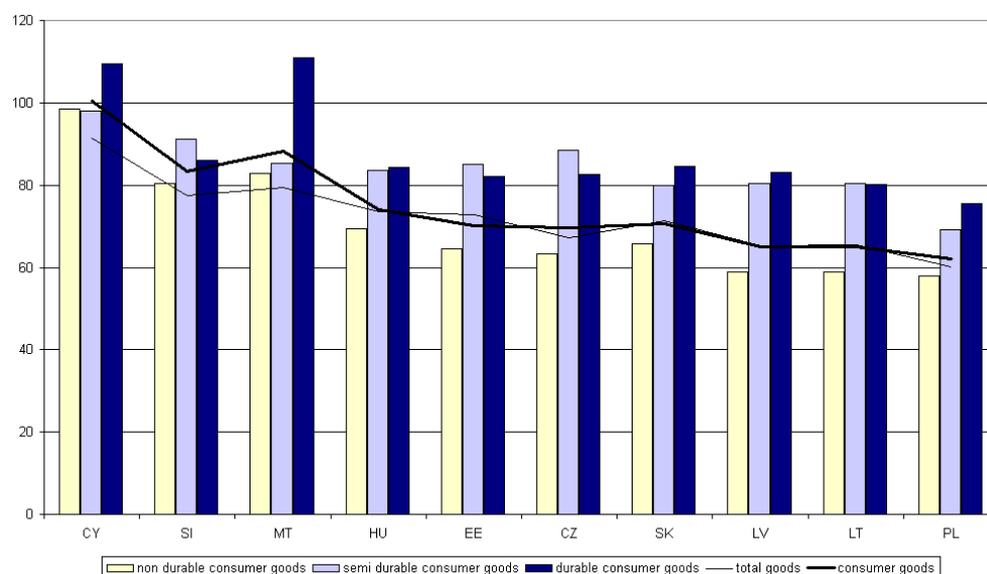
A different decomposition of GDP can be made into goods and services. Goods include consumer goods of different durability and capital goods; services are further divided into consumer services and government services. The price levels of total goods in the new member states are much closer to the euro area's price level than those of services (cf. Graph 3).

Graph 3: relative price level of GDP, total goods and total services, 2004



At the same time, durable and semi-durable consumer goods have a more aligned price level with the euro area than non-durable goods (Graph 4).

Graph 4: Comparative price levels of goods and their subcategories, 2004



Source of Graph 3 and 4: Eurostat; for all categories the respective euro area average marks 100.

Further evidence on price level disparities can be obtained from the twelve COICOP categories of households' final consumption expenditures summarised in Table 2. These data broadly support the assessment that the price levels in the new member states are lower for nearly all goods and services and that the difference in the price level of services is even larger than for goods. However, communication appears to be an exception. Prices in the new member states can in some cases exceed the level of the euro area.

Table 4: Relative price levels of COICOP 12 categories, 2004

	CY	SI	MT	HU	EE	CZ	SK	LV	LT	PL
Actual individual consumption	90	71	68	55	53	49	48	48	45	46
Food and non-alcoholic beverages	102	84	79	64	66	59	60	61	55	53
Alcoholic beverages, tobacco and narcotics	136	68	117	70	63	64	66	56	60	58
Clothing and footwear	100	91	86	86	90	97	82	80	85	70
Housing, water, electricity, gas and other fuels	75	68	43	43	51	37	38	40	32	33
Household furnishings, equipment and maintenance	96	74	89	65	70	67	63	64	62	61
Health	91	62	57	41	40	39	36	32	31	35
Transport	89	82	81	82	69	69	69	62	68	67
Personal transport equipment	115	91	124	97	91	92	89	88	88	84
Communication	54	58	142	87	79	94	103	103	130	110
Recreation and culture	93	77	76	59	61	52	50	53	52	53
Education	91	65	55	37	27	33	24	24	21	28
Restaurants and hotels	102	67	71	60	62	45	48	58	56	59
Miscellaneous goods and services	83	70	65	52	51	48	45	48	43	46

Source: Eurostat

#### 4. Sources of price level differences and price level convergence

##### 4.1 Balassa-Samuelson effect

The main theory modelling shifts in the price level during the process of catching-up growth is the Balassa-Samuelson model (Balassa 1964, Samuelson 1964). According to this model, price levels of poorer countries tend to be lower than price levels of countries with higher income because of the lower wage level and therefore lower prices of labour intensive services. It assumes that the economies are divided into a sector producing internationally traded goods and a sector with non-traded goods, which produces labour intensive services that are immediately consumed. The traded goods sector charges prices in accordance with PPP, and pays wages in accordance with its productivity. Hence countries with high productivity in the traded goods sector have higher wages, and countries with low productivity have lower wages. If these wages have to be paid in the entire economy because of wage equalisation, and wage costs are the main determinant of prices, services will be cheaper in the less productive country. Dynamically, catching up in productivity levels in the traded goods sector implies catching up in the prices of services and hence price level convergence. In this model, differences in price levels and the price convergence are based on differences in service prices only.

The importance of the Balassa-Samuelson (BS) effect for the price level convergence of the (former) transition economies has been investigated in numerous studies (cf. e.g. Égert 2002 or Blaszkiwicz et al. 2004. Égert et al. 2005 give an overview of the research.). The BS model suggests that the elasticity of relative price growth (growth of the ratio of nontradable to tradable prices) to changes in the relative productivity growth (growth of the ratio of nontradable to tradable productivities) is equal to one. This could not be verified in empirical research, which has determined a broad range of coefficients. Graph 5 presents the average annual growth of both relative productivity and relative price ratios for the euro area and EU-8 during 2000-2004<sup>2</sup>. Due to the unavailability of more disaggregated data, tradables were defined rather broadly as comprising all three industrial sectors (NACE c d e: mining and quarrying; manufacturing; electricity, gas and water supply) while non-tradables as market services (NACE f - k: construction, trade, catering, transport, storage, communication, financial intermediation, real estate, renting and business activities). Admittedly, this division is far from ideal and implies some degree of ‘contamination’ of tradables with nontradables and vice versa, it is the best possible given the data availability and corresponds fairly well to the HICP concept of goods and services. For comparison, graph 8 presents also relative price ratios calculated HICP aggregates for analogous periods.

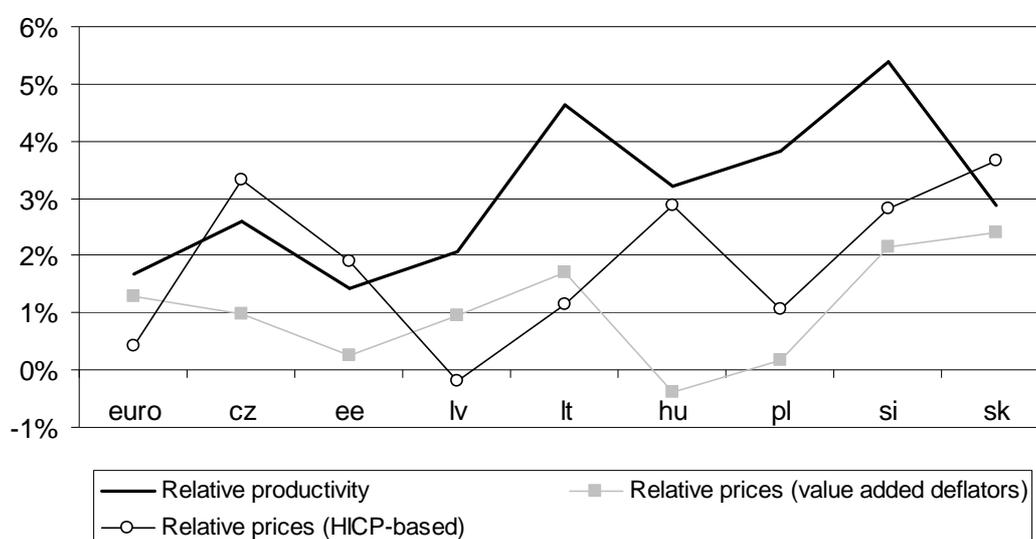
While productivity and both relative price ratios exhibited positive average growth in all countries (with the exception of selected price indicators in Latvia and Hungary), it seems that there is considerable difference between the two relative price changes and that, in general, relative price ratios grow slower than relative productivity ratios. The former can certainly be ascribed to different coverage of goods and services and different methodological approaches implied by HICP and value

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<sup>2</sup> Productivities are labour productivities and were calculated as real value added in local currencies per one employee while price indices were obtained by dividing the current-price deflators with constant-price deflators of respective sectoral value added likewise expressed in local currencies.

added deflators. The fact that the growth of relative prices on average falls short of the growth of relative productivities points to BS elasticities of less than one – i.e. less than the magnitude implied by theory. However, if we assume the theoretical elasticity of one, the BS effect would have caused a rise in the relative price of non-tradables in the EU-8 ranging between 1.4% in Estonia to 5.4% in Slovenia on average during 2000-2004. Weighted by the shares of tradables and nontradables in the HICP, the average growth rate is about 3.4%. It is also easily discernible that Estonia is the only country that does not surpass the Euro zone relative productivity growth. Nevertheless, it has to be stressed that these calculations of the BS effect rest critically on numerous assumptions, which are not necessarily fulfilled.

Graph 5: Average annual growth rates of relative productivities and relative prices during 2000-2004.



Source: Own calculations based on data from Eurostat

As was shown in Section 3, the price level of services is low in services provided by both the market and the government. By definition, the price level of government services will also rise with the wage level. In the absence of market prices for the calculation of the national accounts, value added for government services is inferred from the costs and hence the level of compensation of employees.

#### 4.2 Other sources of price level differences in services

In addition to the Balassa-Samuelson effect of a trend increase in the relative price of (market) nontradables, other factors play a role in the price level convergence process. Firstly, the variety and quality of services increases during the process of catching up, most pronouncedly in the financial market, the real estate market and in business services. Due to the calculation of price levels from the GDP expenditure side, these may affect the average price level of consumer services only to a limited extent. Nevertheless, they may affect the price of other goods and services based on their role as intermediate goods. Secondly, a number of public services requiring networks and capital were of

rather poor quality during the planned period. Telecommunications, transport (railways, roads) and the transport equipment, energy and water supply all require upgrading of the capital stock and the networks. This will raise the quality of the services, and may also impact its price, both within the economy and its relative price to the euro area. It may also affect the price level in the rest of the economy indirectly, if they constitute intermediate products or allow the economy to increase the range and quality of other supplied products. Moreover, communication may be an example of services with potential for declining prices. Its price levels are currently higher in the new member states than in the euro area, most probably because of the investment needs into the networks and hence limited capacity. Thirdly, some prices of public utilities are regulated in the new member states (as in the euro area member states). Due to the particularly low price level at the outset of the transition process, their level may still be substantially lower than in the euro area despite a rather pronounced adjustment in some countries.

#### 4.3 Price level convergence in industrial goods

A main finding from price level comparisons is that the price levels of industrial goods and also foodstuffs are significantly lower in the new member states of the EU than in the euro area (Graph 3). A first reason for these differences might be that in the price comparisons, not always identical goods exist for comparison. For price comparisons, ideally the goods produced and consumed in the economies should be the same. However, this is not the case in reality. The price comparison programmes strive at comparing the prices of goods that are at the same time comparable and representative, but this cannot be always secured. For a number of goods the comparison is made for branded products, but for other goods the prices are compared for “generic products” (i.e. with defined parameters). The latter case allows differences in the quality and hence the price of the product. If the real convergence process is connected with a trend to higher quality goods, the price level will rise.

A second cause of differences in the prices of industrial goods might be that not all industrial goods are traded in the strict sense that their prices are determined by the price level in the international market. The largest differences in the price levels are in the category of non-durable goods. Domestic brands of domestic producers might dominate here, either because foreign suppliers cannot profitably compete, or because of natural market barriers such as different languages (e.g. in the market for books and newspapers). The same may apply to foodstuffs, as long as these are industrially processed goods. Therefore, domestically produced industrial goods (mainly non-durables) and foodstuffs produced for the domestic market may have characteristics of both traded and non-traded goods. They are traded, because the industrial nature of their production makes higher productivity growth and quality improvements likely and because to some extent these goods can be substituted by imported goods. They are non-traded in the sense that the wage growth (set or determined by the most productive sectors, i.e. the export-oriented industries such as car production and electronic engineering) may still outpace the productivity growth and hence affect the price level (cf. Égert/Lommatzsch 2006).

A third factor could be that goods of domestic producers might have suffered from lower reputation and have had to underprice their goods in the domestic and foreign market. This may vanish with the quality improvements, leading to price growth also in industrial goods (cf. Cihak/Holub 2003, Égert

/Lommatzsch 2004). At the same time, as long as the goods of foreign brands and suppliers were sold with a (risk and/or reputation) price premium, this may decline during the process of real convergence. A fourth factor might stem from intermediate products and other inputs for production. Business services have expanded heavily during the process of catching-up and this may also affect the costs and prices of the industrial goods. Cost-push can be expected also from services that are intermediate goods and the price of which increases due to the factors mentioned in the previous section (quality of network and capital, Balassa-Samuelson effect). The distribution sector, which relies heavily on the local wage level, may also influence the price level of the store price of goods (a model showing this link is in Corsetti/Dedola 2005). Another example is rents and costs of renting premises for firms. In many places in the new member states, rents and construction costs are lower so far. However, with the upgrading of the stock of houses and buildings and higher costs of construction works (higher standards, higher wage costs), the rents of houses and buildings for enterprising purposes will rise.

Estimations of the equilibrium real appreciation of tradables are made e.g. by Cihak/Holub (2003), Égert/Lommatzsch (2004) and Lommatzsch/Tober (2004). Cihak/Holub find that the price level of the new member states (transition economies) shifts both with the trend increase in the relative price of non-tradables, and with the trend growth of exports in machinery and equipment. They interpret the latter as a factor reflecting improving quality and reputation of the goods produces in the transition economies. Égert/Lommatzsch (2004) regress the PPI based real exchange rate on productivity growth in industry, and find that for some new member states, higher quality and reputation might be the source of the trend appreciation.

#### 4.3 Price level convergence and inflation

In sum, the price level convergence process will come through

- 1) a shift in the production and consumption patterns towards higher quality and variety of both goods and services
- 2) higher reputation of the goods produced in the domestic economy within the country and abroad
- 3) a wage induced increase in the relative price of non-tradables (BS effect)
- 4) a cost push from non-tradable intermediates (distribution sector, business service sector, rents)
- 5) adjustments in the prices of goods provided by public enterprises.

These factors are relevant for price level convergence defined as the average price level of the goods and services actually produced and consumed in an economy. Only a part of the process of price level convergence will be reflected in higher inflation and real appreciation of the currency. It need neither be fully mirrored in the price levels determined in the International Price Comparison Programmes. In both cases this is due to the definition of the respective price measure.

The relative price levels as determined in the International Price Comparison Programmes are based on data for goods and services that should be (ideally) identical and representative at the same time (cf. *Eurostat PPP methodological manual*). To ensure comparability and representativity, a careful choice of the goods compared is made. Nevertheless this aim is difficult to achieve as the prices of some products are compared based on the same brand and model, but others on relevant parameters of the products (generic products). In doubt, comparability is preferred to representativity (cf. Manual p.6 “A lack of representativity can lead to biased results that may compromise the comparison, but a loss of comparability negates comparison”). Therefore, biases in the determined price levels cannot be ruled out, in particular when compared with the price level of representative goods only. As a result, the fact that the process of real convergence in the new member states is connected with structural change in production and consumption patterns cannot be (by definition) fully mirrored in the relative price levels determined by the Comparison Programmes. The changes in the relative price levels due to the shift to goods of higher quality may or may not be visible in the relative price level, depending on the choice of goods considered in the comparison. Also the inclusion of new goods will affect the relative price level only to the extent that these are included in the comparisons. On the other hand, any change in the nominal exchange rate will immediately and fully be reflected in the relative price levels irrespective of whether or not this has changed the price in domestic currency.

Inflation rates based on the consumer price index indicate changes in the purchasing power of a currency for a representative basket of goods and services; deflators from the national accounts show the change in purchasing power related to the entire GDP. Both measures therefore automatically reflect basic characteristics of the economy. However, a shift in the composition of the production and consumption patterns may be visible in these measures only partly, if at all. Changes in the quality and variety should not show up directly if the indexes are properly chained and adjusted for quality upgrading. Both raise the real income and should therefore not be measured as a loss of purchasing power. Yet, to the extent that the share of subcomponents in the CPI and GDP changes, and the components are characterised by different dynamics, the change in the production and consumption patterns may affect the overall inflation rate. In addition, price level convergence will be reflected in inflation rates in the case of the BS effect, insufficient adjustment for quality improvements in both goods and services, and an adjustment in the regulated prices (if these exceed the adjustments in the reference countries). On the other hand, short-term factors such as fluctuations in the exchange rate or in food prices and the business cycle may affect the inflation rates and need not necessarily reflect the (equilibrium) price level convergence based on the catching up process.

The mentioned peculiarities in the calculation of comparable price levels and inflation imply that the definition of convergence (both in price levels and in real income) is not straightforward. Only if the structures of economies and the goods and services produced and consumed were the same, and the countries differed only in their productivity and hence lower wages and prices of non-tradables, then the differences between GDP at current prices (in same currency) and GDP in PPP would stem only from differences in the prices of non-tradables. Convergence would then mean that productivity levels rise in the country catching up (i.e. GDP per capita converge in PPP) and at the same time the price levels through higher inflation (GDP in current prices converges to GDP in PPP). However, because production and consumption structures differ, the convergence process both in real quantities and in price levels can be less easily deduced from the data on comparative price levels and GDP in PPP. At

the same time, it is also difficult to infer from these data to what extent price level convergence will proceed through inflation.

Tatiana Fic, Ray Barrell and Dawn Holland (2006) estimate the equilibrium exchange rate based on the FEER model. Table 6 shows the estimated equilibrium appreciation of the real exchange rate in 2005. The speed of equilibrium appreciation has substantially declined since the early years of the transition; and has been on average more pronounced in the Baltic States than in the Central European countries.

**Table 6: Estimated equilibrium appreciation of the real exchange rate in 2005**

	Czech R	Estonia	Hungary	Lithuania	Latvia	Poland	Slovenia	Slovakia
2005	1.8	2.0	1.6	3.6	1.8	1.6	1.2	4.1

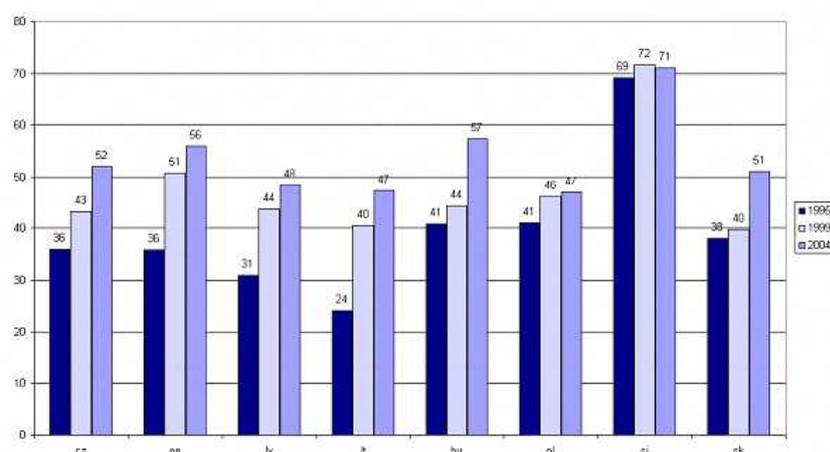
Source: Fic/Barrell/Holland, p.6

In the next few years, the central European countries could expect a further real appreciation of 1-2% p.a., and the Baltic states of 2-3% p.a.

#### 4.4 Changes in the relative price levels over time

A comparison over time is possible for the price level of GDP since 1995 and for the subcategories since 1999. Convergence of price levels occurred in all countries, perhaps least so in Slovenia and Poland. In Slovenia the relative price level remained nearly unchanged. In the other six former transition countries, price levels increased by 5 to 10 percentage points of the euro area average price level. Convergence was recorded in a similar magnitude also in the price level of households' final consumption expenditures.

**Graph 7: Relative price levels in 1995, 1999 and 2004**

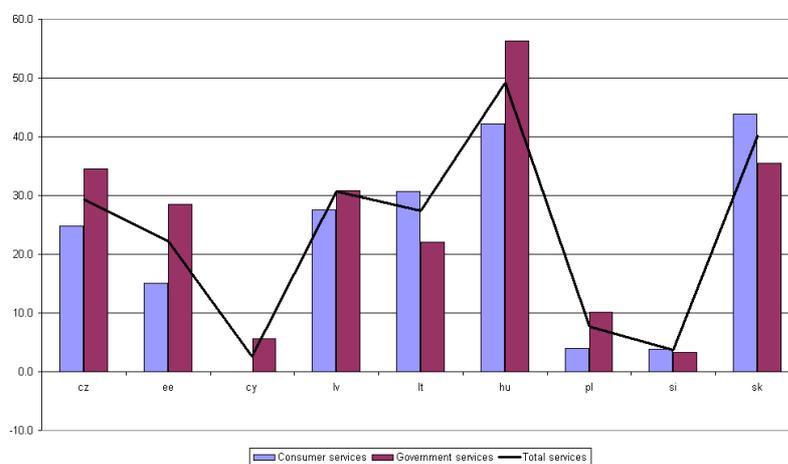
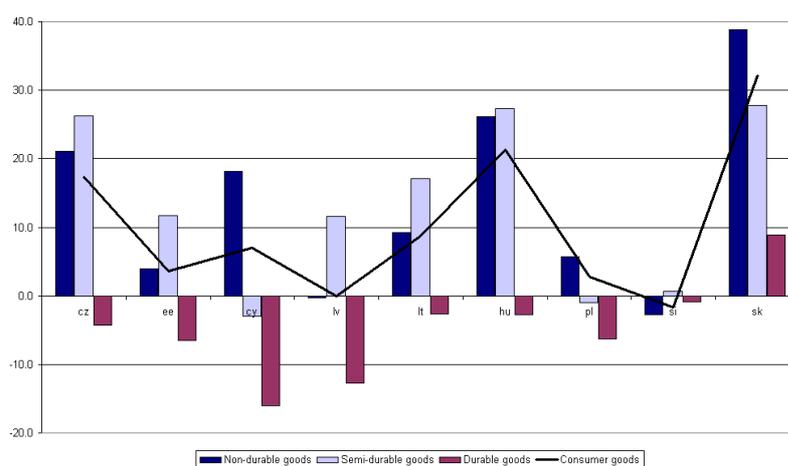


Source: Eurostat

However, at a disaggregated level, the price levels have in some cases developed rather differently. Specifically, the price level of consumer goods declined slightly in Slovenia, stayed unchanged in Latvia and rose only slightly in Estonia and Poland; whereas rather substantial increases were recorded in the other four former transition economies (Czech Republic, Slovakia, Hungary and Lithuania). Among the consumer goods, the most striking development can be found in the consumer durables, where in all countries except Slovakia the relative price level towards the euro area declined. In principle, this could be explained by sticky prices combined with currency depreciation, but such event occurred only in Latvia and Poland (when comparing the average of 2004 with the average of 1999). In the Czech Republic, Estonia, Hungary and Lithuania declining price levels in consumer durables have been recorded despite a stable or appreciating exchange rate. This points to structural factors of changes in the price levels. The rising price levels in non-durables and semi-durables might be related to the quality and reputation of the domestically produced goods, whereas the reduction in the durables goods' prices might be a decline in the price premium on imported products. In services, increasing price levels are found in all countries.

### Graphs 8 and 9:

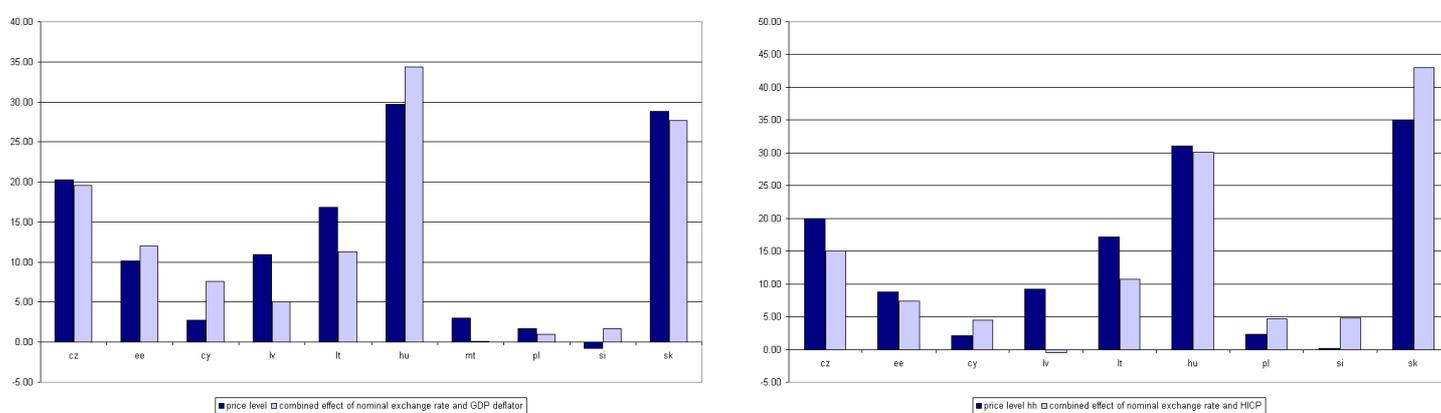
#### Changes in the price levels of NMS between 1999 and 2004; in percentage points of the euro area



Source: Eurostat; in all cases the respective values of the euro area mark 100.

If price levels were lower only because of differences in the costs (i.e. if the goods and services were identical and their prices differed only because of the lower wage level in countries with lower income), then the price levels will change either by the measured price increase (deflators of GDP and subcomponents) or the nominal exchange rate (with sticky prices, i.e. insufficient pass-through). If changes in the price level occur that differ from the combined effect of the deflator and the nominal exchange rate, this will have structural causes including the consequences of the different definition of comparative price levels and price indexes.

Graphs 10 and 11: Changes in the relative price levels between 1999 and 2004, in percentage points of the euro area



Source: Eurostat. In all cases the respective euro area values mark 100. The combined effect of the GDP deflator and the nominal exchange rate is calculated as the sum of the respective growth rates between 1999 and 2004.

The graphs 10 and 11 compare the price level increase between 1999 and 2004 with the combined effect from the nominal exchange rate and deflators. In the left graph, the link is shown for the price level of GDP and the GDP deflator; in the graph on the right, the HICP is related to the price level of household consumption. The data suggest that the inflation rates and the movements in the nominal exchange rates may not fully explain the changes in the price levels.

## 5. Factors of the inflation process other than price level convergence

In addition to price level convergence, inflation rates in the new member states are also affected by factors such as nominal exchange rate movements and foreign prices, oil price in world market; adjustment of regulated prices and taxes; the business cycle (output gap or marginal cost fluctuations during the cycle, credit growth).

Graphs B in the Appendix show the development of the effective exchange rate and the inflation rate based on the HICP and industrial goods excluding energy. Because in nearly all cases (perhaps except Poland) the new member states are small very open economies, the link between the nominal exchange rate and the HICP and in particular the industrial goods component is very strong.

Particularly striking is the divergent development in Latvia and Lithuania. The latter country witnessed a period of sustained nominal effective appreciation, as it experienced the euro depreciation towards the dollar when being pegged to the dollar, whereas a strong depreciation of the dollar to the euro after the shift in the peg to the euro in 2002. This might explain the very low inflation rates after 2002. By contrast, Latvia pegged its exchange rate to the euro only in 2005 and has hence recorded a nominal effective depreciation during the past years. This may have also contributed to the pick-up in inflation in 2004. A strong link between the nominal exchange rate and the inflation rate can be found also for Slovenia, where the fixing of the exchange rate in the ERM-II in July 2004 helped stabilise the inflation rate on a level close to the euro area. Similarly, the trend nominal appreciation of the Czech koruna will have supported the very low inflation rates in the Czech Republic.

Another factor of the inflation process in the new member states are adjustments in regulated prices. This is not a particular feature of the new member states, as regulated prices are included in the price indexes in many countries. Their adjustments may prove more pronounced in the new member states, because the prices of some public utilities or rents were particularly low during the planned era and the adjustment is steady but stretched over time. As was already indicated in the section on price level convergence, the adjustment in regulated prices can be viewed as part of the longer term price convergence process, however, in the case of publicly regulated prices the end point of the convergence process is even worse defined as in the case of the other prices.

For some countries, explicit series of regulated prices are available. These can be produced by the national statistical offices, central banks or other government institutions, and are related to the national CPI<sup>3</sup>. However, the decompositions of the indexes can therefore differ between the countries. As an example, the Hungarian central bank decomposes the index into food, energy, industrial goods and regulated prices; the Czech national bank divides the CPI into tradables (further decomposed into food and other tradables) and non-tradables (further divided into regulated and other non-tradables). For some countries, the regulated prices are produced without a breakdown of the rest of the CPI. Table 7 shows that the weights of regulated prices in the consumer baskets are quite high, however, the weight of the regulated prices does not significantly deviate from the figure e.g. in Germany with 18% (according to the German Central Statistical Office). Because regulated prices include mainly energy and services (e.g. public utilities such as water supply, housing, transport, postal services; but the exact regulated items differ between the countries), the weight of (unregulated) energy and services becomes correspondingly lower.

Table 7: weights of regulated prices in the consumer price index, 2005

	CZ	HU	SK	EE	LT	LV
weight	18	20,3	22	25	14	14,4
source	CNB	MNB	NBS	CSO	CSO	CSO

<sup>3</sup> The HICP differ from the CPI only slightly.

Table 8 shows that the inflation rates of regulated prices are generally higher than those of the other components and of the overall price index, which however, is also found in the current euro area member states.

Table 8: Annual growth rates of CPI, growth rates of regulated prices and their contribution of headline inflation

	CR			HU			LV			DE		
	rate CPI	rate reg prices	contribution of reg prices	rate CPI	rate reg prices	contribution of reg prices	rate CPI	rate reg prices	contribution of reg prices	rate CPI	rate reg prices	contribution of reg prices
2000	3.9	7.3	1.3	9.8	8.8	1.6	2.7	6.1	1.6	1.5	-0.3	-0.1
2001	4.8	11.2	2.0	9.2	8.6	1.6	2.5	1.9	0.4	2.0	3.3	0.6
2002	2.0	5.6	1.0	5.3	5.5	1.0	1.9	0.9	0.2	1.4	2.0	0.4
2003	0.0	0.7	0.1	4.9	5.4	1.0	2.9	3.0	0.5	1.0	1.8	0.3
2004	2.8	2.3	0.4	6.8	9.3	1.9	6.2	5.8	0.9	1.7	4.6	0.9
2005	1.9	5.2	0.9	3.8	6.1	1.2	6.6	4.6	0.7	1.9	3.4	0.6

Sources: as for Table 7.

For Latvia the data for 2005 refer to January- August; for Germany to January – November 2005, in the classification of CSO for the national CPI.

Short-term fluctuations of the inflation rate are a characteristic of the business cycle. For the new member states this link is still rather difficult to establish because of the problems related to the determination of the trend and cycle in short time series. Graphs showing the inflation rate and the GDP growth rate and the output gap (determined with an HP filter on quarterly seasonally adjusted real GDP series) are included in Appendix C. Unit labour costs are also found a determinant of the inflation rates in the new member states (e.g. IMF Latvia 2004, Lendvai 2005). However, a problem may arise in the interpretation as disequilibrium factor because if the Balassa-Samuelson effect is present, this implies that unit labour costs and prices in the new member states are related.

## 5. Implications for the preparation process and inflation rate in the enlarged euro area

The real and price level convergence process may have implications for the preparation process and the inflation rate of the enlarged euro area. Our research indicates that the determined size of the equilibrium appreciation may indeed require nominal appreciation in some countries to meet the inflation rate criterion. At the same time, the (trend) inflation rate of the enlarged euro area will increase in accordance with the weight of the new member states and their higher inflation rate.

Table 9 contains calculations of the inflation rate of enlarged euro area based on the observed performance in 2005. The table shows the weight of the current member states of the euro area, and the suggested weights in the enlarged euro area based on the weights in private consumption expenditure in current prices. The weight of the new member states amounts to 10%. The columns next to the weights of the countries in the euro area show the weights of the four main subgroups in the HICP for 2004. The inflation rates inserted for the individual subgroups correspond to the observed rates in 2005. The effect of the new member states on the inflation rate in the enlarged euro area is rather limited with 0.03 percentage points.

**Table 9: Inflation rate of an enlarged euro area based on the observed data for 2005**

	country weight in the HICP of the Euro Area 2004	country weight in the HICP of the enlarged Euro Area 2004	weight industrial goods in the national HICP 2004	weight energy	weight food	weight services in the national HICP 2004	assumed rate in industrial goods	assumed rate in energy	assumed rate in food	hypothetical inflation rate in services	hypothetical inflation rate in respective country
Belgium	33	30	328	94	202	376	0.3	12.7	1.9	2.1	2.5
Germany	292	261	299	97	163	441	-0.4	10.3	2.8	1.3	1.9
Spain	111	99	296	91	253	361	1.0	9.6	3.4	3.8	3.4
France	207	185	298	79	207	416	-0.2	9.8	0.2	2.8	1.9
Italy	193	172	343	58	198	401	1.4	8.7	1.0	2.4	2.1
Netherlands	53	47	331	83	163	422	-1.0	11.8	-0.3	2.0	1.4
Austria	31	28	303	70	166	461	-0.4	9.8	2.1	2.4	2.0
Finland	16	14	302	70	223	405	-0.5	6.5	-0.2	1.2	0.7
Luxembourg	3	2	347	88	247	319	0.7	14.9	4.4	2.5	3.5
Greece	27	24	312	65	234	389	2.9	13.6	1.2	3.6	3.5
Ireland	13	12	233	73	238	456	-1.0	12.6	-0.2	3.2	2.1
Portugal	21	19	322	79	216	383	1.0	9.9	0.1	2.5	2.1
<b>OLD EA</b>											<b>2.15</b>
Czech Republic		16.1	257	130	295	318	-2.2	6.4	0.5	3.5	1.5
Estonia		1.6	277	135	302	285	0.2	13.6	3.8	3.7	4.1
Cyprus		2.6	329	87	232	352	-1.1	12.8	2.1	2.1	2.0
Latvia		2.5	269	121	342	268	2.6	12.2	8.4	6.9	6.9
Lithuania		4.0	257	139	373	231	-0.7	7.2	3.1	3.3	2.8
Hungary		15.2	283	129	286	302	1.1	7.6	2.0	5.5	3.5
Malta		1.1	329	45	227	399	1.7	15.7	1.8	2.3	2.6
Poland		51.2	288	161	276	276	-0.1	6.2	2.3	2.2	2.2
Slovenia		3.8	303	124	245	328	-0.3	11.8	0.2	3.3	2.5
Slovakia		7.5	247	171	283	299	-0.5	8.2	-0.7	5.4	2.7
<b>enlarged EA</b>											<b>2.18</b>

Source: Eurostat, own calculations

In a second step, this calculation is repeated with hypothetical inflation rates. The euro area records inflation rates as on average between 2002 and 2005. The inflation rates in the new member states exceed these numbers in all categories, and the final inflation rates are in line with the estimated equilibrium appreciation (Table 6). As is shown in Table 10, the increase in the euro area's inflation rate would still remain small and amount to 0.15 percentage points.

**Table 10: Hypothetical impact of the new member states on euro area inflation**

	country weight in the HICP of the enlarged Euro Area 2004	weight industrial goods in the national HICP 2004	weight energy	weight food	weight services in the national HICP 2004	assumed rate in industrial goods	assumed rate in energy	assumed rate in food	hypothetical inflation rate in services	hypothetical inflation rate in respective country
Euro area of 12						0.8	4.3	2.5	2.6	2.17
Czech Republ	16.1	257	130	295	318	1.5	5.0	3.3	5.0	3.6
Estonia	1.6	277	135	302	285	1.5	5.0	4.5	8.0	4.7
Cyprus	2.6	329	87	232	352	1.5	5.0	3.3	5.0	3.5
Latvia	2.5	269	121	342	268	1.5	5.0	4.5	8.0	4.7
Lithuania	4.0	257	139	373	231	1.5	5.0	4.5	8.0	4.6
Hungary	15.2	283	129	286	302	1.5	5.0	3.3	5.0	3.5
Malta	1.1	329	45	227	399	1.5	5.0	3.3	5.0	3.5
Poland	51.2	288	161	276	276	1.5	5.0	3.3	5.0	3.5
Slovenia	3.8	303	124	245	328	1.5	5.0	3.3	5.0	3.5
Slovakia	7.5	247	171	283	299	1.5	5.0	3.3	5.0	3.7
<b>enlarged EA</b>										<b>2.33</b>

Source: Eurostat, own calculations.

## 6. Summary

The process of real and price level convergence in the new member states implies a trend real appreciation of their currencies. In the absence of nominal exchange rate movements, this will imply inflation rates exceeding the average of the euro area.

This article has identified numerous channels through which price level convergence, defined as the average price of the goods produced and consumed in the economies, will occur. The most often cited cause is the Balassa-Samuelson effect of a trend increase in the price of non-tradables. However, this is not the only factor. Rising prices of non-tradable inputs such as wages and rents may affect also tradable goods. In addition, price level convergence will also come through a shift in the production and consumption structures. Goods and services of higher quality and variety will become more representative with growing income. Only the first two causes will be measured as inflation, the third cause will not be reflected in inflation rates if these are properly chained and adjusted for quality improvements.

The equilibrium appreciation and hence trend higher inflation rate may therefore amount to 1-2% in the case of the Central European countries and 2-3% in the Baltic states. This will allow the countries to manage the preparation phase, i.e. meeting the Maastricht criteria, although perhaps only with a slightly appreciating nominal exchange rate and some delay in the adjustment of regulated prices. The inflation rate in the enlarged euro area will increase only slightly. According to our calculations, the effect of the new member states should not exceed 0.2 percentage points.

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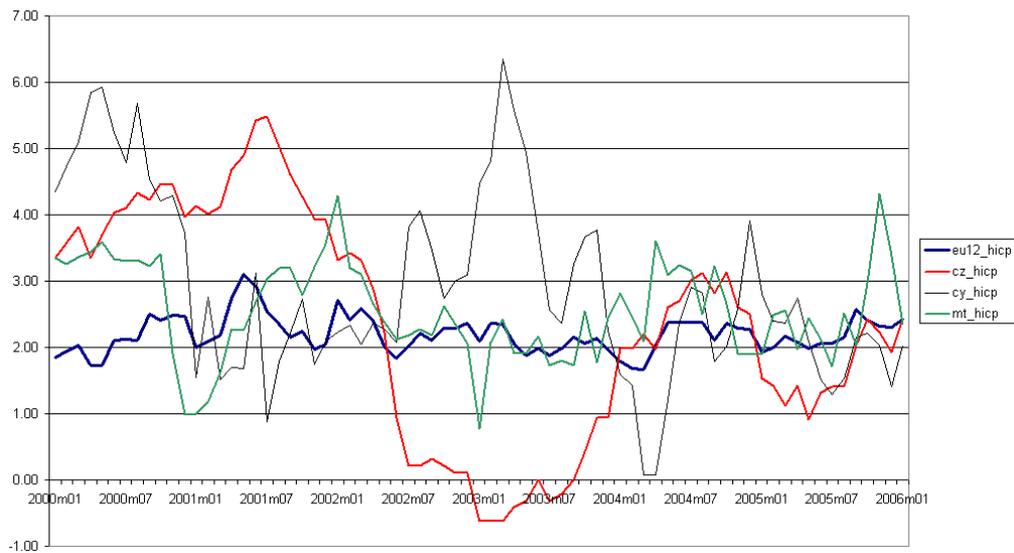
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**Appendix**

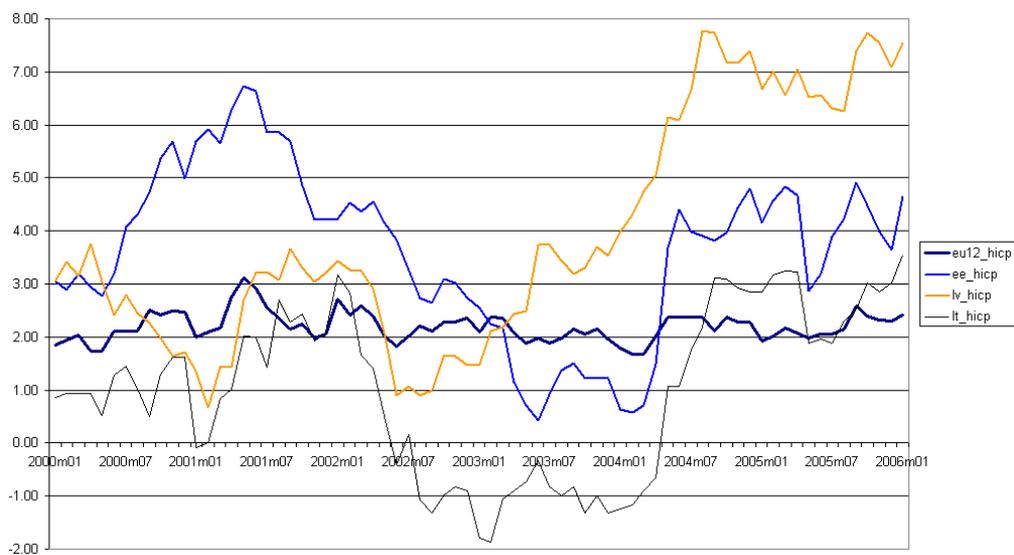
**Graphs A**

**Inflation rates (HICP) in the NMS compared with the euro area**

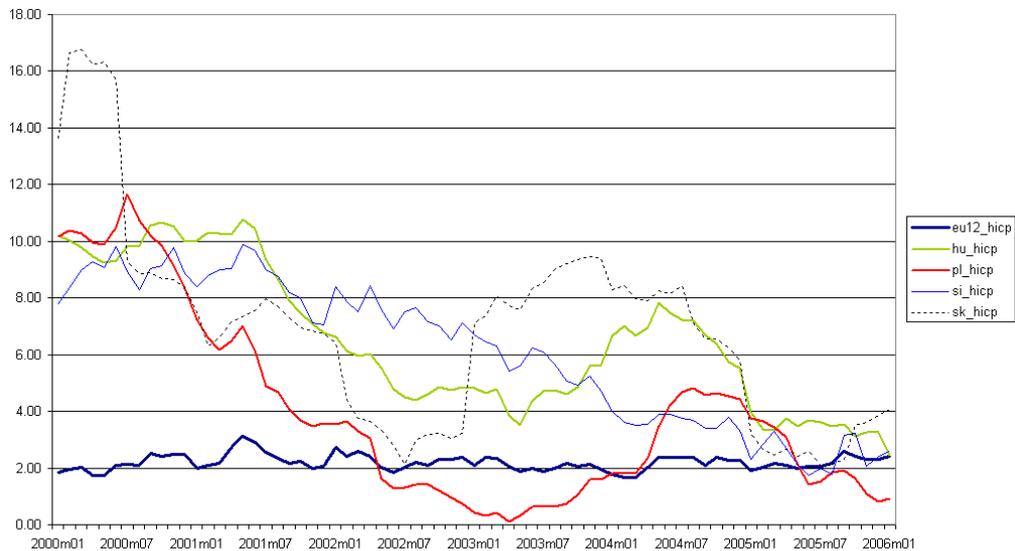
**Czech Republic, Cyprus and Malta**



**Estonia, Latvia and Lithuania**

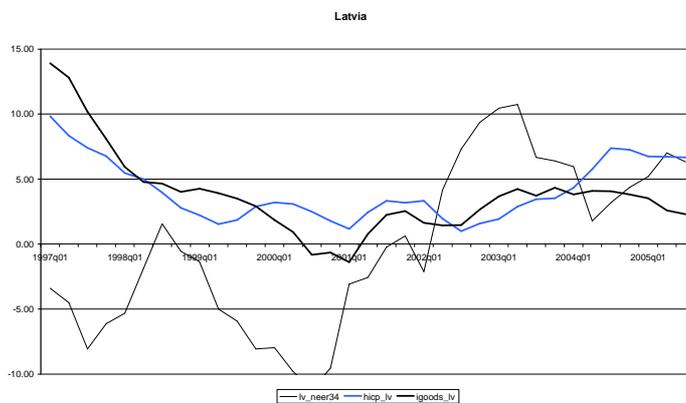
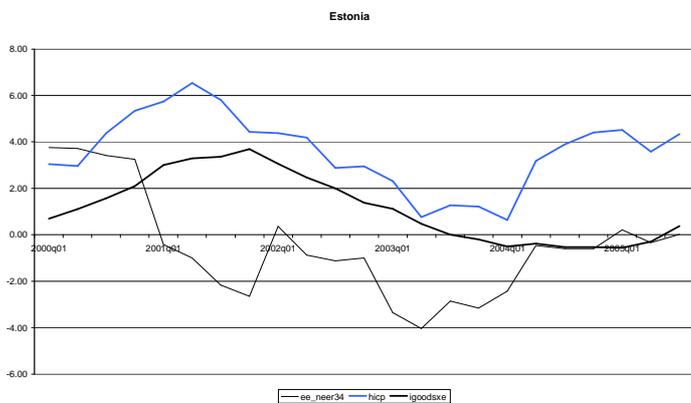


Hungary, Poland, Slovakia and Slovenia

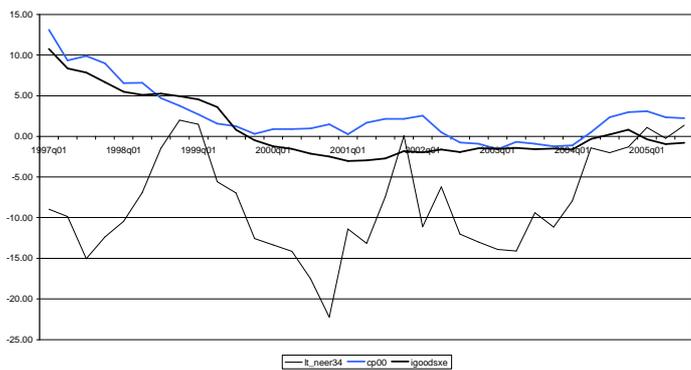


**Graphs B**

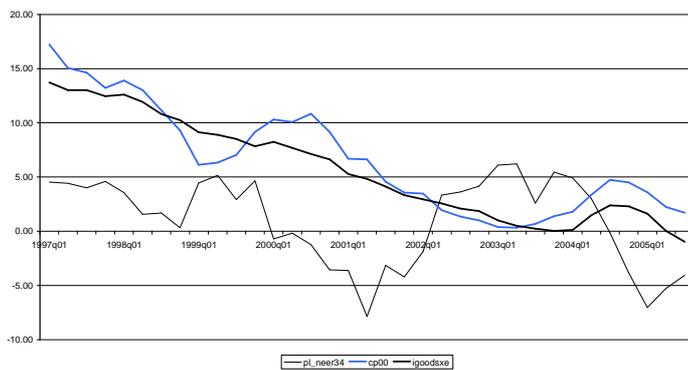
Nominal effective exchange rate and inflation rate of overall index and industrial goods



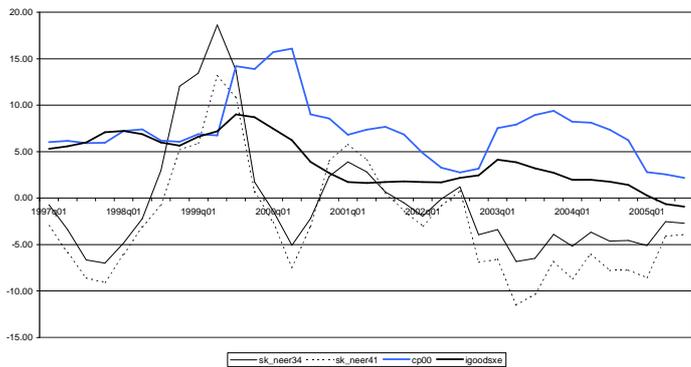
Lithuania



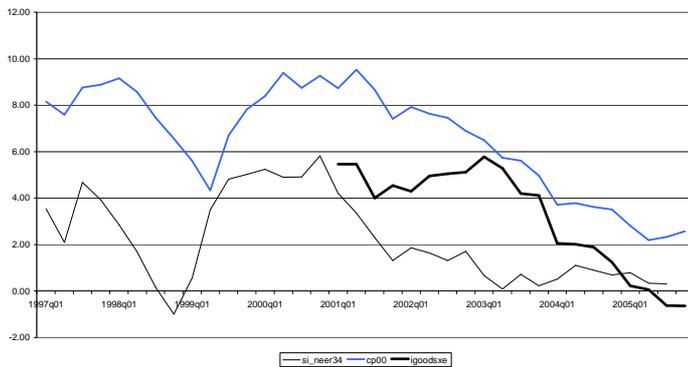
Poland



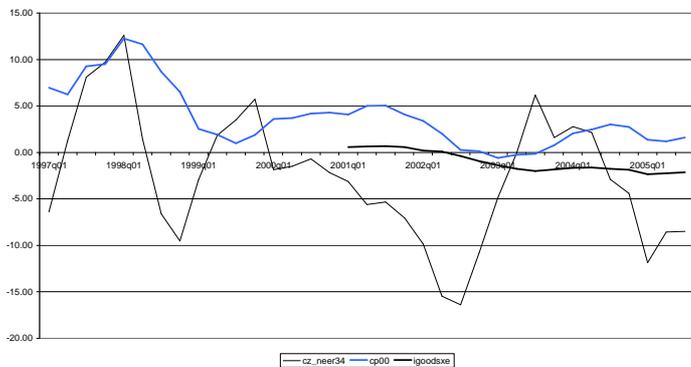
Slovakia



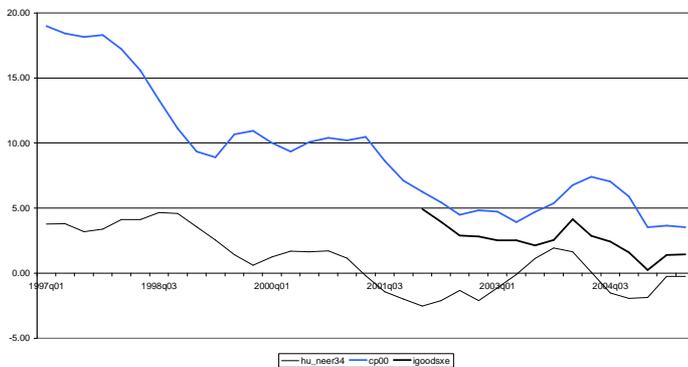
Slovenia



Czech R



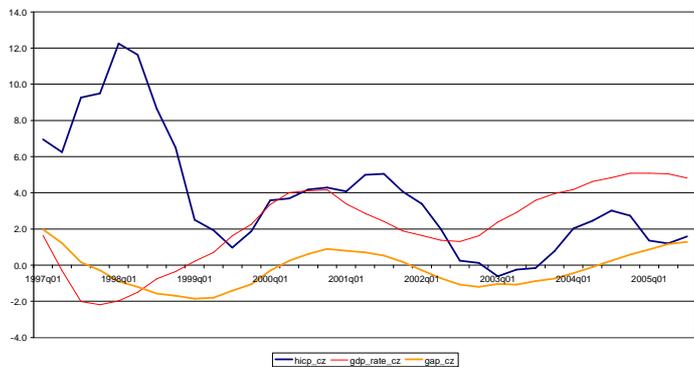
Hungary



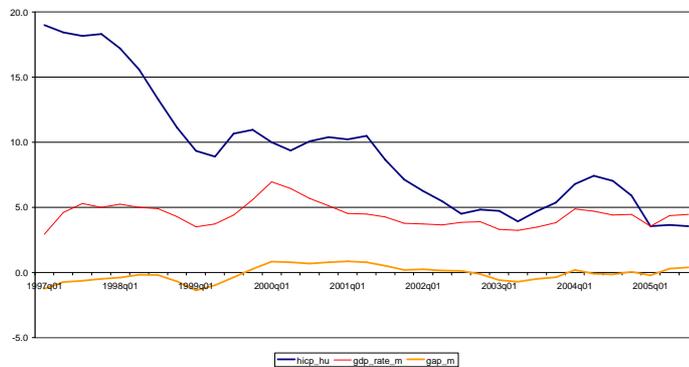
## Graphs C

### Inflation rates, GDP growth rate and the output gap

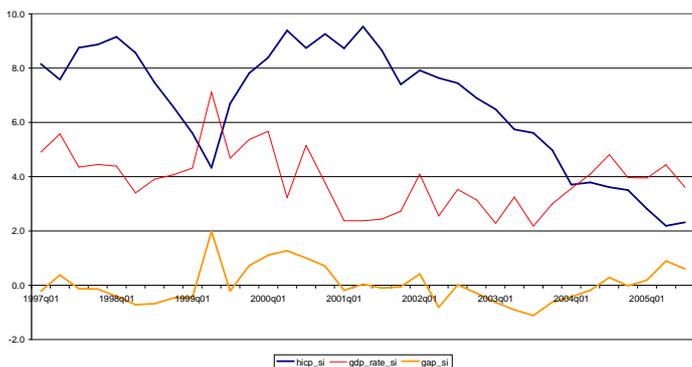
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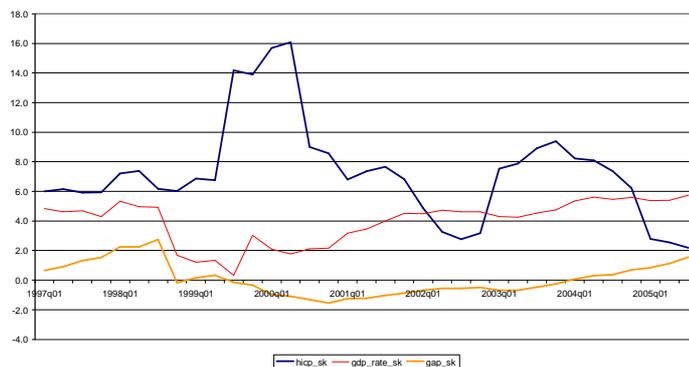
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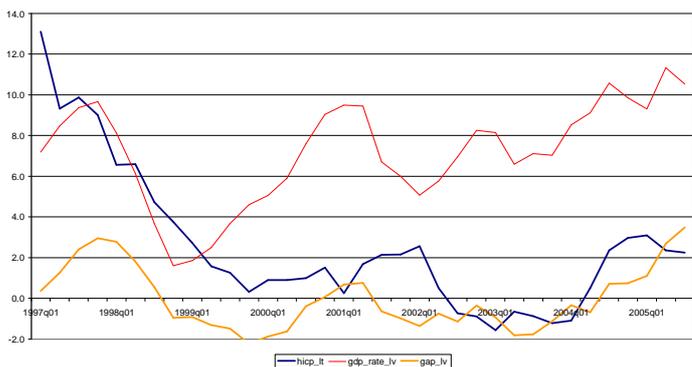
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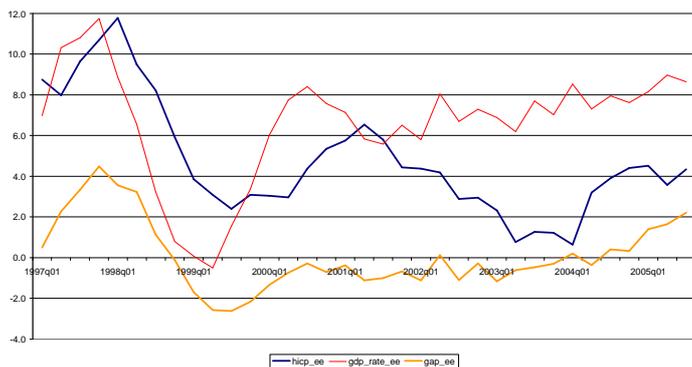
Slovakia



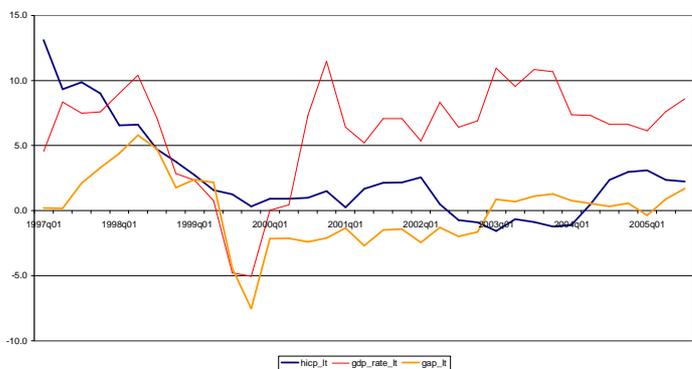
Latvia



Estonia



Lithuania



Poland

