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Inflation Rates in Europe: Legacy of the Iron Curtain

Jiří Schwarz Jr. & Tomáš Adam¹

When comparing inflation across European countries, we often overlook a simple fact – inflation is the percentage change in the price level. The rate of inflation therefore depends on base prices. This phenomenon has been particularly important during the 2022–23 inflation episode, when countries have been facing the same energy shock. The key takeaway is that the price level plays a crucial role in explaining different inflation rates in services, where the price level differences are biggest. In this article, we explain how a higher price level – due mainly to higher wages – insulates the economy from cost shocks to inflation. This means that countries with higher headline or core inflation following a major cost shock are not necessarily overheating more than those with lower inflation.

INTRODUCTION

A series of unprecedented shocks have hit the global economy over the last couple of years. At the start of 2020, the Covid pandemic broke out. Governments responded with generous fiscal expansion and central banks with accommodative monetary policy. After the anti-pandemic measures were lifted, supply chains were overwhelmed by increased demand for goods, demand which they were unable to meet. This was followed in February 2022 by Russia's invasion of Ukraine, which led to extreme growth in prices of natural gas, electricity, crude oil and food commodities. The result has been a global surge in inflation.

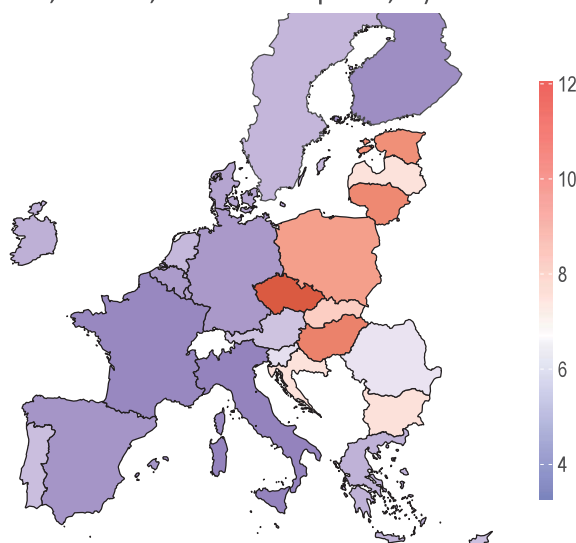
In this article, we will focus on the impact of this energy shock on inflation in European countries. Over the past two years, we have observed large cross-country differences in inflation, including in core components of the consumer basket (goods and services) indirectly related to energy prices. It is as if the history is repeating itself: From Szczecin on the Baltic Sea, a curtain descended southwards across the European continent. Unlike its iron predecessor, it has divided Europe in terms of inflation, with Eastern Europe experiencing higher inflation rates (see Figure 1).

The original curtain divided Europe both politically and economically. The countries in the East were cut off from their economic links to the West and focused mainly on energy-intensive industry. Due to the slow growth that characterized their centrally planned economies, central and eastern European countries were much poorer when the curtain fell in the early 1990s. Although their standard of living has risen remarkably over the last 30 years, they still lag behind western Europe.

As a result, the general price levels in CEE countries in 2021, before the worst energy shock in decades hit, was 30% below the European Union average. The price differences were largest in the services sector, reflecting lower wages, which were about 40% below the EU average. Lower wages mean that the share of tradable goods, which were most affected by the global supply shock, is higher in the consumer basket; the same increase in energy or food prices subsequently leads to higher headline inflation.

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Figure 1: Average core inflation in EU countries in 2022
(HICP index excluding energy, food, alcohol, and tobacco prices, %)



Source: Eurostat

More interesting is the question of what the different price levels mean for core inflation, which in 2023 averaged 9% in CEE countries, 5% in Germany and 4% in France. As economists, we often overlook a simple fact: inflation is the percentage change in the price level and its value therefore depends on initial prices.

Put simply, the same shock (expressed in euros) has a bigger impact on inflation (expressed in percent) in the country where the price level is lower. For example, if restaurants' food and energy costs go up by €1 per lunch globally, the impact on inflation is greater in countries where the cost of lunch rises from €5 to €6 (by 20%) than in those where it rises from €10 to €11 (by 10%). Another factor that is often overlooked is the higher energy intensity of CEE economies. If you need more units of electricity or gas to produce one unit of output, this must translate into higher inflation if input costs rise at the same rate. To account for these factors, we will present a simple model of the impact of a rise in energy prices on inflation taking into consideration the base price level and the energy intensity of production.

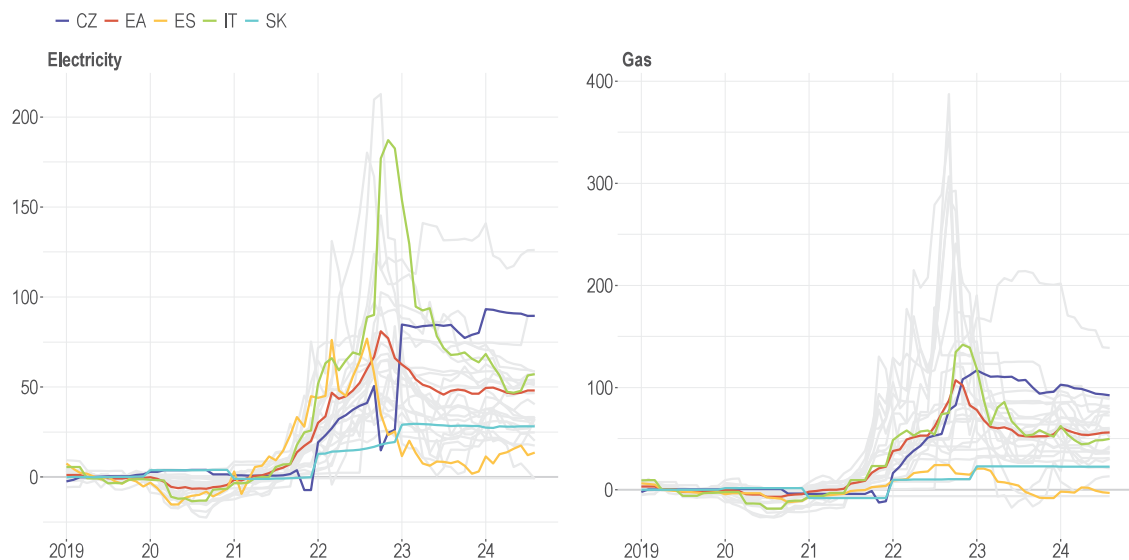
For simplicity, we focus on annual inflation in 2022, when the cost shock to natural gas and electricity prices in Europe peaked. If instead the cumulative price growth over the years 2020–2023 is used, the results remain qualitatively the same.

Energy prices gradually fed through to final consumer prices depending on how long prices were fixed for and how the national statistical office treats gas and electricity prices. Despite the large weight of energy prices in the consumer basket, the harmonization of the national statistical methods used to construct this price segment is surprisingly imperfect. For example, the "savings tariff" introduced by the Czech government in October 2022 as a form of financial support for households was treated in the Czech statistics as a temporary decrease in the price of energy. Statistical offices in some other countries that brought in similar measures used the same approach. In many other countries, however, such assistance was treated as a transfer to households rather than a decrease in prices. Some countries, for instance Italy, introduced whole packages of regulatory changes which contained measures such as reduction or cancellation of the general system charges of electricity and gas bills, lowering taxes, increasing tax allowances, or increasing transfers to households in

need.² As a result, only small differences in support measures for energy prices led to large changes in inflation rates (Figure 2).

Figure 2: One shock, different price reactions due to chosen policy measures

(HICP index, 2019 average = 0)

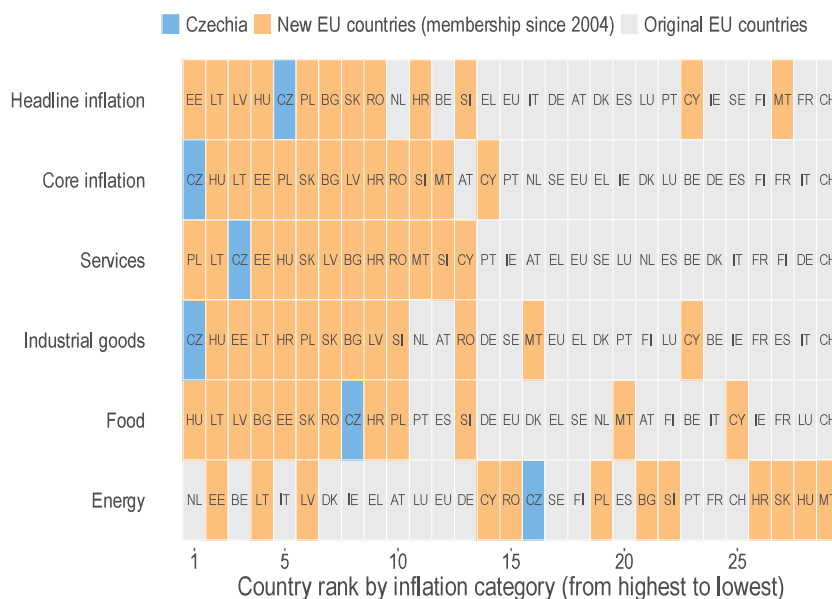


Source: Eurostat

DIFFERENT INFLATION RATES ACROSS EUROPEAN COUNTRIES IN 2022

The highest inflation rates in the EU in 2022 were recorded by the Baltic states, by the V4 countries and by Bulgaria, Romania, Croatia and Slovenia, i.e. countries that joined the EU after 2004, regardless of whether they have adopted the euro or have their own national currencies. This applies not only to headline inflation, but also to the other main categories of the consumer basket except for energy (see Figure 3).

Figure 3: Ranking of inflation in EU countries and Switzerland in 2022

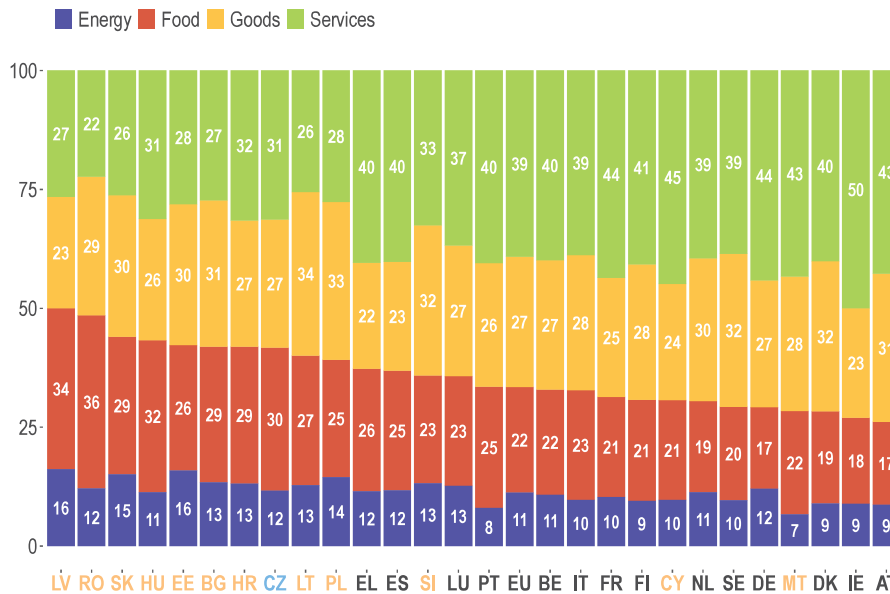


Source: Eurostat, own calculations

² Andrea Bonfatti and Elena Giarda, “Energy Price Increases and Mitigation Policies: Redistributive Effects on Italian Households,” *Journal of Policy Modeling*, July 10, 2024, <https://doi.org/10.1016/j.jpolmod.2024.06.006>.

The elevated levels of headline inflation are explained at least partially by higher weights of food and energy, the items that saw the strongest growth in 2022 (see Figure 4).

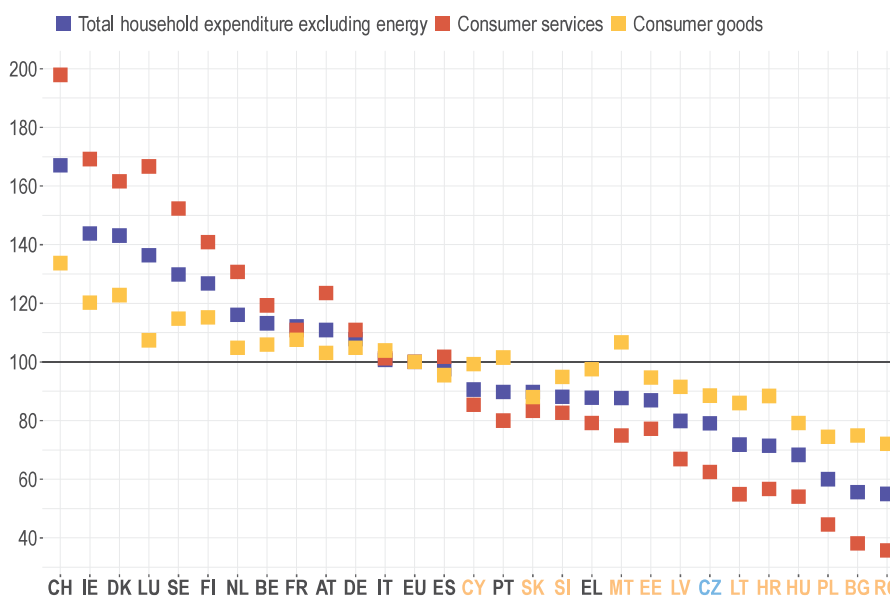
Figure 4: Weights of main items in the consumption basket
(weights in HICP index, %, year 2022, sorted by the sum of energy and food prices weights)



Source: Eurostat

But what explains the higher inflation in the core items of these countries' consumer baskets, especially services? One suspect is the price level, which is lower in the new EU member states (see Figure 5). In 2021, for example, the price level in the Czech Republic was 89% of the EU average in the case of total goods expenditure, 63% in the case of services and 79% in the case of total household expenditure. Where costs went up equally in all countries (in absolute terms, for example in euros) and producers passed them through equally to prices, the increase in percentage terms was greater in countries with lower price levels.

Figure 5: Relative price level in EU countries and Switzerland in 2021
(EU = 100)

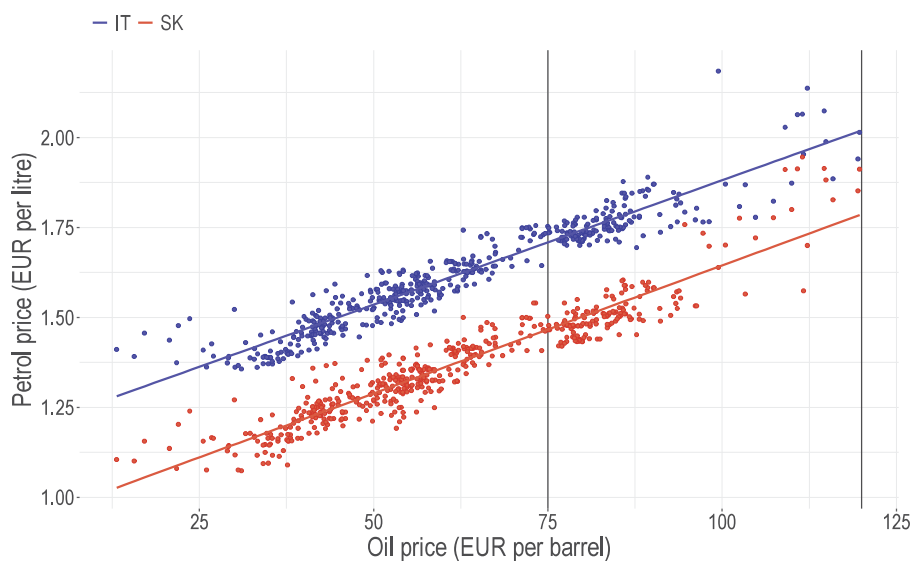


Source: Eurostat

EXAMPLE: IMPACT OF THE GROWTH IN OIL PRICES ON PETROL PRICES IN SLOVAKIA AND ITALY

The importance of the price level for the level of inflation can be illustrated using the impact of the oil shock on petrol prices in Italy and Slovakia. Figure 6 illustrates that the relationship between the prices of crude oil and petrol (both expressed in euros) is linear and that the petrol price increases with an increasing oil price similarly in Italy and Slovakia (the regression lines describing the oil-petrol price relationship have similar slopes). Generally, though, the price of petrol is higher in Italy than it is in Slovakia, due to higher taxation³ and higher labor and other costs (the blue line lies above the red one).

Figure 6: Relationship between oil price and gasoline price at fuel stations



Source: Weekly Oil Bulletin (European Commission), Fred, own calculations

Let's assume that the price of oil increases like it did in the first half of last year – from €75 to €120 per barrel, i.e. by 60% (see Table 1). The shock is the same for both Italy and Slovakia. If we plug these figures into our linear model, the price of petrol goes up by a similar amount in both Slovakia and Italy (by €0.32 and €0.31 respectively). In percentage terms, though, the difference is larger – prices rise by 21.8% in Slovakia and 18.1% in Italy. The same shock thus has a bigger impact in the country with the lower base price.

Table 1: Impact of an oil price increase on petrol prices in Slovakia and Italy

	Pre-shock price €	Post-shock price €	Change in price €	Change in price %
Oil	75	120	45	60
Petrol SK	1.47	1.79	0.32	21.8
Petrol IT	1.71	2.02	0.31	18.1

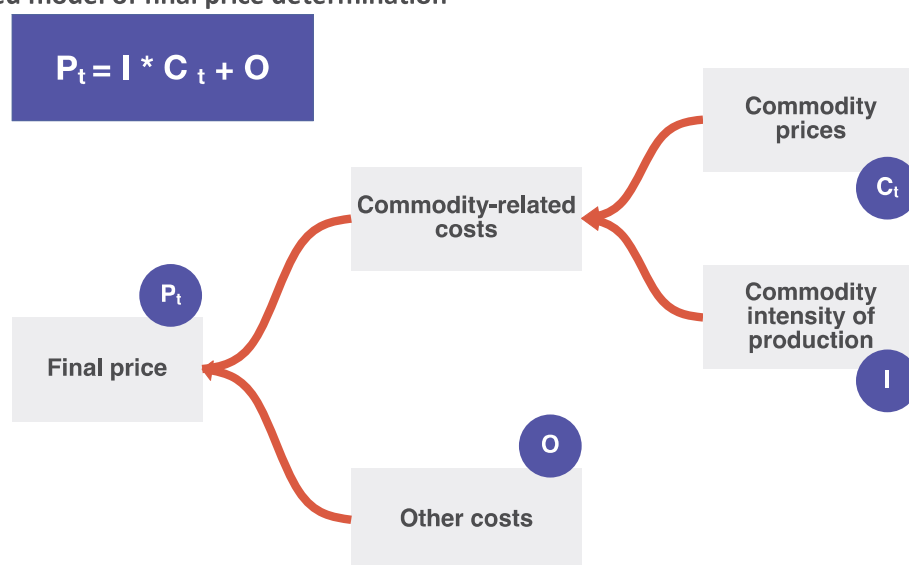
Source: own calculations

³ <https://taxfoundation.org/data/all/eu/gas-taxes-in-europe-2023/>

RELATIONSHIP BETWEEN COMMODITY PRICES AND FINAL PRICES OF GOODS AND SERVICES

The simple linear model shown in Figure 7 can be used to explain the relationship between the price level and the response of inflation to a commodity shock. Prices of goods and services are determined by costs not related to commodity prices (denoted by O for Other – labor, rent, technology, etc.) and by commodity-related costs. The latter are determined by the prices of commodities (C) and by the commodity intensity of production (I). These assumptions apply to prices of services as well as goods. For instance, restaurants have to cover the costs of energy for cooking and heating and also the costs of ingredients. The energy intensity of producing goods and services can be expected to differ from country to country depending on climatic conditions and production efficiency.

Figure 7: Stylized model of final price determination



Other things being equal, our stylized model implies the following:

1. The same shock to commodity prices (in absolute terms, as measured, say, in euros) leads to a larger percentage increase in prices of goods/services in countries where the share of other costs (O) in the final price is lower. Higher labor costs, rents, taxes and so on therefore cushion the impact of commodity shocks on inflation.
2. A higher energy (commodity) intensity of production leads to a stronger pass-through of a commodity shock to final prices (in both absolute and percentage terms).
3. A higher base price level dampens the impact of a commodity shock on the percentage change in prices.

WHAT DOES THE MODEL IMPLY FOR INFLATION? IS IT SUPPORTED BY THE DATA?

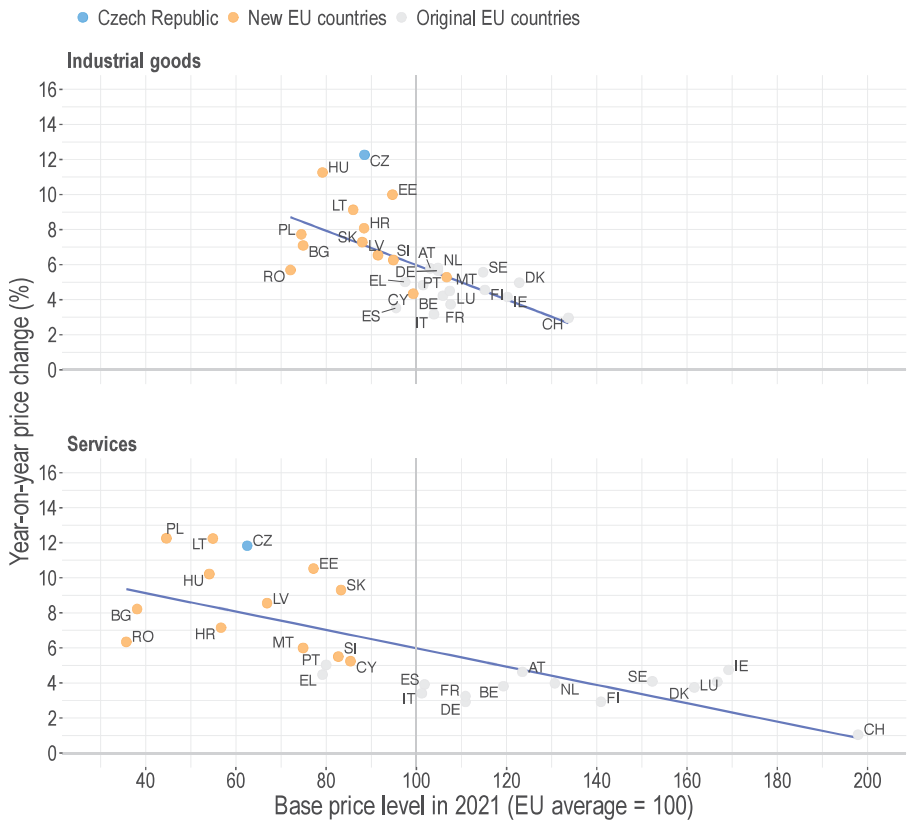
The conclusions of this model have the following implications for the dynamics of inflation in response to a commodity shock common to various countries. We use several charts to illustrate our hypotheses:

H1: The lower the base price, the larger the impact of the shock on inflation

The relationship between the base price level (Figure 8, x-axis) and inflation (y-axis) is evident across price categories, i.e. in prices of both goods and services. In times of calm (with no major cost shocks), for services the relationship stems from the Balassa-Samuelson effect – prices of non-tradables (services) in poorer

countries gradually rise and converge towards those in wealthier ones. This effect is accelerated in the event of a commodity shock, as we will demonstrate below (H3).

Figure 8: Relationship between price level and percentage price change in 2022



Source: Eurostat, own calculations

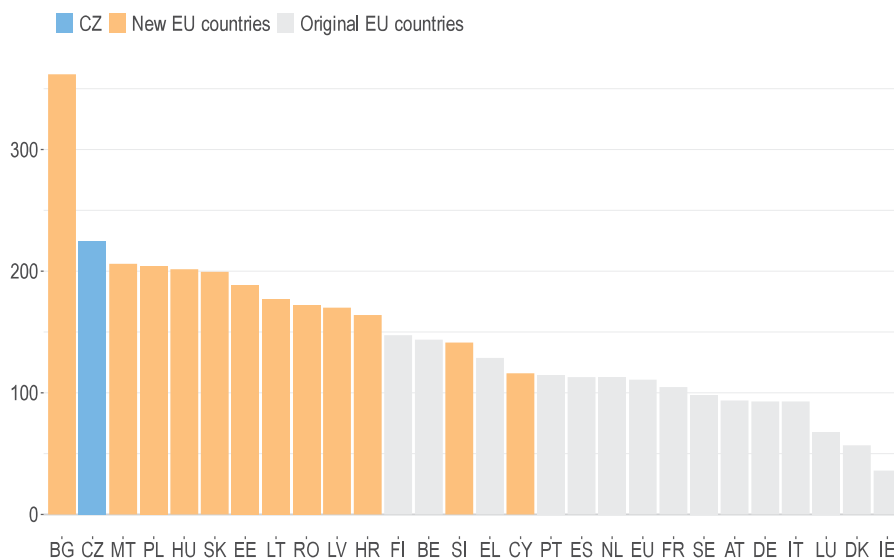
Switzerland is an interesting case. Energy commodity prices there are low relative to other costs, so Swiss inflation stayed at 2.7% in 2022. Demand also plays a role, of course. Prices in Switzerland are already so high that sellers will first try to reduce their margins and only then increase their prices.

H2: We should see higher inflation in countries with a higher commodity intensity of production (i.e. lower efficiency)

Figure 9 compares the energy intensity of the economy, which approximately reflects coefficient (I) in the model, i.e. the commodity intensity of production. Countries that joined the EU later are again the top-ranking ones.

Figure 9: Energy intensity of the economy

(kilograms of oil equivalent (KGOE) per thousand euros of GDP, year 2021)



Source: Eurostat

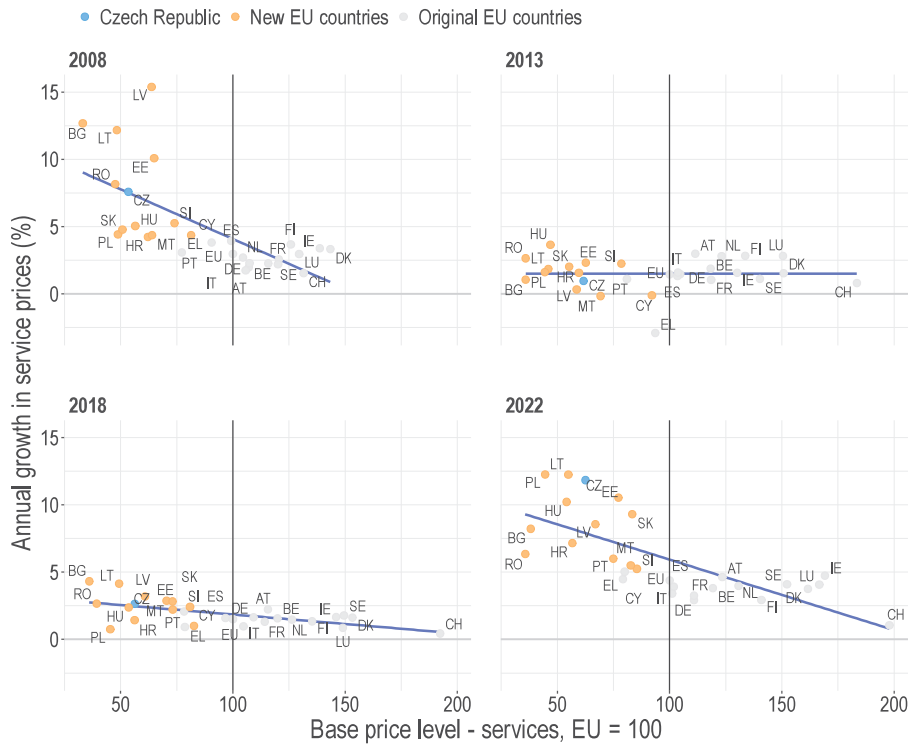
H3: Price convergence will accelerate in the event of a commodity shock

Our simple model explains the inverse relationship between the price level and inflation in the event of a commodity shock. In quiet times, there may be a similar relationship (the above-mentioned Balassa-Samuelson effect), but it may not be as strong. This is confirmed by Figure 10, which shows the percentage growth in service prices during energy shock periods (2008 and 2022) and also during a period of calm (2013), when the oil price was high (above US\$100 per barrel) but had been flat for some time, and finally in 2018, when the oil price was rising steadily. The charts show that the cross-country dispersion of services inflation increases in the event of a strong oil shock (2008 and 2022), although this is only partially explained by different base price levels. In 2013, by contrast, there is virtually no relationship between base prices and inflation.

We can extend this analysis to include goods prices as well as service prices and to cover the longer time period of 2004–2022 (see Figure 11). For each year, we estimate how much observed inflation depends on the price level in the previous year. The strength of the relationship is measured by R^2 (the coefficient of determination): in the case of stronger convergence, i.e. higher inflation at a lower price level, the model should explain the data well (R^2 will be higher and the regression will be statistically significant, as indicated by a diamond on the relevant line in the graph); where there is no convergence, the relationship between the price level and inflation should be weak (a low R^2 and a statistically insignificant relationship).

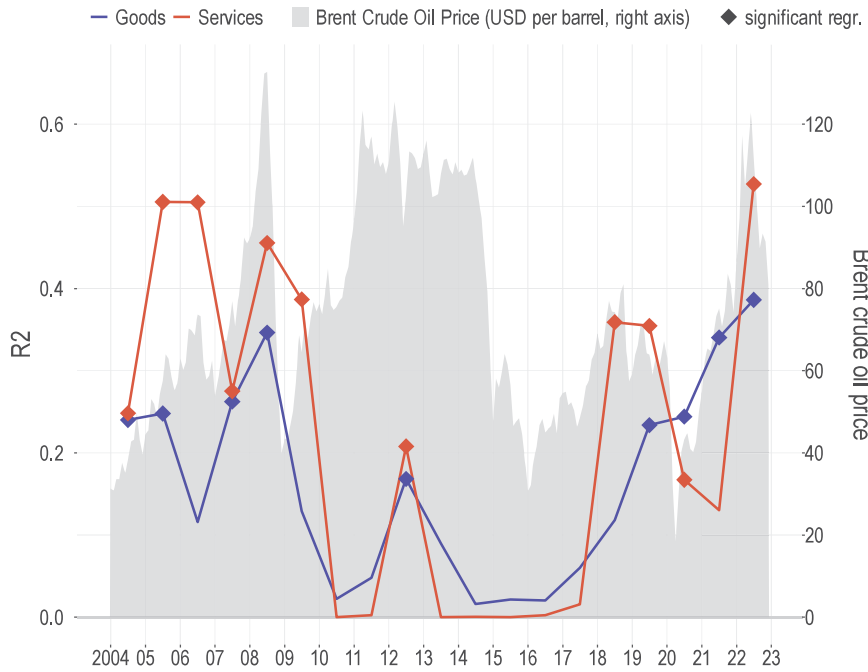
The analysis reveals that price convergence has been fast in times of strong cost shocks, which we capture using growth in the price of Brent crude oil. For services, the strongest relationship between the price level and inflation is observed in the period of 2004–2008, a time of sharp growth in the price of oil. After the financial crisis, by contrast, the rate of price level convergence slowed and, except in 2012, was statistically insignificant. This is probably linked with economies recovering from the financial crisis and with the ongoing European debt crisis; both of these factors led to low demand and low dispersion of inflation rates. The low price convergence lasted until 2017 for services and 2018 for goods. In 2022, the speed of convergence reached an all-time high due to a combination of cost shocks. Interestingly, the price level explains the differences in inflation better for services than for goods. It is therefore likely that a cost shock does indeed also affect non-tradables prices, due to differences in the price level.

Figure 10: Relationship between price level and inflation – price of services



Source: Eurostat, own calculations

Figure 11: Price level convergence strength in EU countries and Brent crude oil price
(diamonds indicate statistically significant regression in the respective year)



Source: Eurostat, Fred, own calculations

Note: Convergence strength is measured as R^2 in the regression, where the dependent variable is inflation in the respective category and the explanatory variable is the price level.

WHAT DOES THIS IMPLY FOR THE CENTRAL BANK AND MONETARY POLICY?

The model and figures presented above suggest that the base price level really does affect how the same cost shock is reflected in inflation. The question is to what extent the differences in inflation rates across EU countries are actually due to different price levels and energy intensities and to what extent other factors (such as demand pressures and the market power of firms in the economy) play a role. In future research, we will try to quantify the strength of the price level effect more precisely.

If the relationship between the price level and inflation is strong, the monetary policy implications would be as follows:

First, in the event of a positive commodity shock, countries with lower price levels and higher energy intensities, of which the Czech Republic is one, have mechanically higher inflation than countries with higher price levels (Western European nations for the most part). There is scope here to adjust the central bank's escape clauses (its exemptions from fulfilling the inflation target) to include the second-round effects of strong commodity shocks.

Second, the base price level effect means that higher inflation may not always reflect a more overheated economy. For example, we cannot automatically say (after a cost shock) that the Baltic economies are more overheated because they have higher core inflation than Germany. They may be, of course, but the above model shows that if two countries were in the same cyclical position and were subject to the same monetary and fiscal policies, the country with the lower price level would have higher inflation.

As the impact of the cost shock on the price level began to fade by the end of 2023, core inflation began to reflect the strength of the domestic economy again, as price level and energy intensity differentials no longer played such a prominent role. While in January 2023 CEE countries still occupied all the top 10 positions in the core inflation ranking, a year later Austria, Sweden and Belgium made it into the top 10. The Czech Republic, which had the second highest core inflation in 2023, dropped to 11th place in early 2024 (see Figure 12).

Third, the base price level effect may complicate analyses of how severe inflation is based on how broad-based it is. Our theoretical model demonstrates that services inflation (services being regarded as non-tradables and an indicator of the strength of domestic demand) can also increase in response to a commodity shock.

Fourth, excessively tight monetary policy could even be an obstacle to curbing inflation in the future. CEE countries need to invest in energy efficiency and state-of-the-art technologies. The tool for achieving this is not monetary policy, but investments by firms in streamlining their production and reducing their commodity intensity. Too high interest rates, aimed at suppressing the inflationary impacts of cost shocks, could slow down these investments and maintain the suboptimal state of the economy (in the same way that too low interest rates keep zombie companies undead).

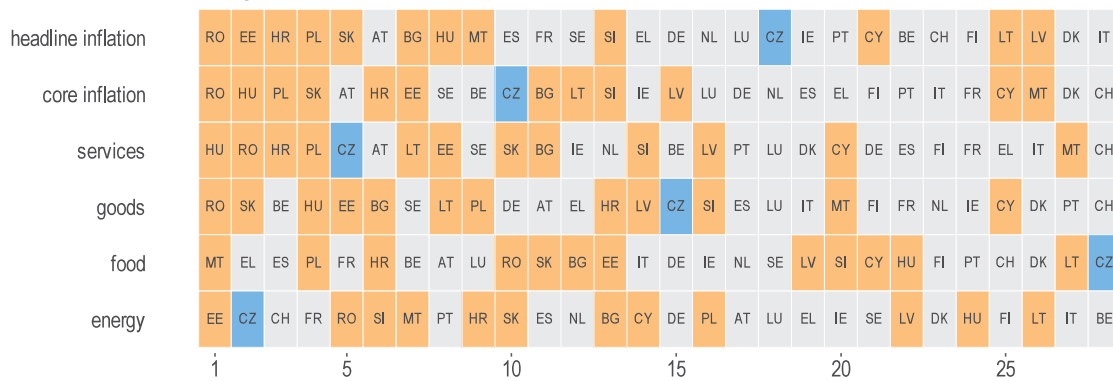
And finally, the role of different price levels will diminish over time as countries with lower price levels catch up with the West. What we were seeing in the past two years – higher inflation in lower-income countries – can be seen as a sign of convergence accelerated by supply shocks. Higher service prices may indeed mean higher wages in the service sector. To some extent, higher wages and service prices act as a buffer, shielding inflation from supply shocks – just look at the inflation rate in Switzerland.

Although it is unlikely that wages in CEE countries will fully equalize with those in Switzerland or other rich western economies, we believe that the economic legacy of the iron curtain will eventually disappear from the map of Europe.

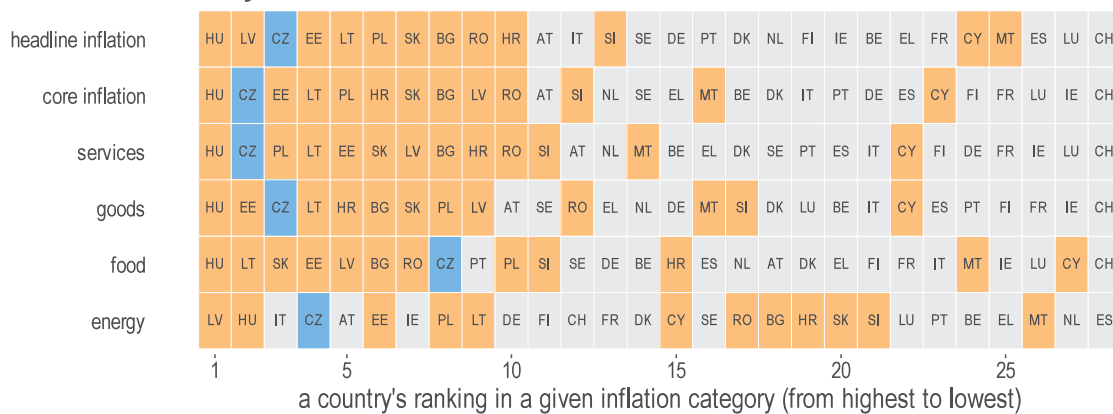
Figure 12: Ranking of countries by inflation: the EU and Switzerland

■ CZ ■ new EU countries ■ original EU countries

January 2024



January 2023



Source: Eurostat