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Jakub Rybacki
Zakład Ekonomicznych Analiz Empirycznych, Akademia Leona Koźmińskiego, Zespół Makroekonomii, Polski Instytut Ekonomiczny, https://orcid.org/0000-0001-7248-9536, jakub.rybacki@gmail.com

Marcin Klucznik
Zespół Makroekonomii, Polski Instytut Ekonomiczny, https://orcid.org/0000-0003-3665-7138, marcin.klucznik@pie.net.pl

Dawid Sułkowski
Zespół Makroekonomii, Polski Instytut Ekonomiczny, https://orcid.org/0009-0007-7013-0205, dawid.sulkowski@pie.net.pl

The false start of disinflation – evidence from the major European economies

Falstart dezinflacji – doświadczenia głównych gospodarek europejskich

Abstract

This paper examines medium-term inflationary risks in the wake of the energy crisis. Firstly, the inflation spillovers between five major EU economies, viz. Germany, France, Italy, Spain, and Poland are analyzed using the Diebold and Yilmaz VAR framework. This analysis reveals that the interconnection between increases in inflation was stronger after the outbreak of the energy crisis. Poland and Spain have been transmitting inflation to the other countries under consideration. This impact is strongest when prices are "sticky", i.e. when they are changed least frequently. Secondly, the impact of wage pressures in the Eurozone was analyzed with a special emphasis on the Netherlands on account of its historically high frequency of wage strikes. The data show that wage pressures from that country precede similar changes elsewhere in the eurozone. These two factors suggest that returning inflation to central bank targets in Europe is going to be a slow process.

Keywords: VAR, inflation, spillovers
JEL: C32, E31, E37

Streszczenie

Naszym celem jest analiza ryzyk średnioterminowych dla inflacji po kryzysie energetycznym. Analizujemy rozprzestrzenianie się inflacji (tzw. spillovers) pomiędzy pięcioma największymi gospodarkami Unii Europejskiej pod względem ludności, tj. Niemiec, Francji, Włoch, Hiszpanii i Polski. W pracy wykorzystana została metodologia Diebolda i Ylimaza bazująca na modelu VAR. Analiza wskazuje, że wzajemne połączenie między wzrostami inflacji wzmocniły się po wybuchu kryzysu energetycznego. Polska i Hiszpania są krajami, które transmitują inflację do pozostałych gospodarek. Oddziaływanie jest najsilniejsze w przypadku tzw. cen sztywnych, gdzie częstotliwość zmian cenników jest najmniejsza. Analizie poddaliśmy także presję płacową w państwach strefy euro, ze szczególnym uwzględnieniem Holandii z uwagi na historycznie wysoką częstotliwość strajków płacowych. Dane pokazują, że presja płacowa z tego kraju poprzedza podobne zmiany w pozostałych gospodarkach strefy euro. Oba czynniki sugerują, że powrót inflacji do celów banków centralnych w Europie będzie powolny.

Słowa kluczowe: VAR, inflacja, spillovers
JEL: C32, E31, E37

1. Introduction

This paper analyzes international inflation risks in the wake of the 2022 energy crisis. Natural gas prices in Europe had been climbing steadily since mid-2021. This trend intensified following the Russian invasion of Ukraine in February 2022. Consequently, the TTF benchmark saw a tenfold increase, soaring from 25 EUR per MWh to a staggering 243 EUR per MWh by August 2022. The surge in commodity prices, particularly energy, has negatively impacted the bottom line of energy-intensive industries. Sectors like chemicals, metallurgy, glass, paper, coke, and petroleum products have borne the brunt of these escalating energy costs. Predictably, this has reduced production and led to higher inflation.

Firstly, the spillover between rapidly growing prices and sticky inflation in five major European economies, viz. Germany, France, Italy, Spain, and Poland, was analyzed. The term "sticky inflation" denotes an increase in the prices of products and services, where price lists are infrequently updated. Secondly, prices pressures in the Eurozone were measured. There is a special focus on the Netherlands in view of a recent wave of wage strikes there. The value at risk (VaR) was calculated using the Diebold and Yilmaz spillover indices for each of the relevant variables. The data was estimated using a sample from 2010 to 2023.

The research questions and conclusions are summarized below:

1. *Does the inflation rate decrease in the countries in which inflation initially emerged in 2021?* Inflation persists in the countries from which price spillovers originate. Poland and Spain were inflation transmitters during the energy crisis. Unfortunately, the proportion of rapidly rising prices in these economies has remained stable. Rapid disinflation in the Eurozone therefore seems improbable.
2. *Could changes in relative prices trigger a new wave of inflation?* The inflation of sticky prices increased more slowly than that of more flexible ones immediately after the energy crisis. This distorts relative prices and probably requires another wave of adjustments in the stickiest categories. This channel is likely to have a strong impact on inflation in other countries, as the spillovers are strong.
3. *Is there a risk of wage-led inflation?* The interconnectedness between labor markets in the EU countries is rather low. One salient feature is that wage pressures in the Netherlands usually precede similar tendencies in the larger economies, as the country is highly internationalized. The spillover analysis suggests that the impact is small, but nevertheless significant.

The present research results suggest that combating the inflation caused by the recent energy shocks is likely to be a relatively long process. While most policymakers are focused on domestic developments, inflation and wage pressures have become more interconnected since the recent energy shocks. Inflation forecasts should therefore be conservative.

This paper is structured as follows: Section 2 reviews the literature on the co-movement of inflation between countries and the recent surge; Section 3 presents stylized facts on wages and inflation behavior during the energy crisis; Section 4 outlines the methodology; Section 5 presents the results; and Section 6 concludes the paper.

2. Literature review

Before the COVID-19 pandemic, the Eurozone countries had been consistently meeting their inflation targets for several years. The academic literature has frequently attempted to explain this phenomenon through globalization – changes in supply chains made it possible to lower production costs and consequently consumer prices (Altansukh et al., 2017; Ball, 2006; Forbes, 2019). It has also been repeatedly emphasized that shocks related to import prices or exchange rate fluctuations have a relatively small impact on the inflation rate (McCarthy, 2007; Ortega, 2020). Furthermore, Eurozone, wage growth remained under control, with only moderate increases in negotiated wages (Hancké & Soskice, 2003).

During this period, the literature extensively examined inflation spillovers between countries. The presence of international factors in shaping inflation expectations was emphasized (Ciccarelli & García, 2015) and the mechanisms of transmitting inflation from the Eurozone to small open economies were described (Hałka & Szafranek, 2016; Iossifov & Podpiera, 2014). However, relatively little attention was devoted to cross-country linkages.

The Covid-19 pandemic, coupled with the energy crisis, significantly contributed to an unexpected rise in inflation that caught forecasters off guard. Analysts at the International Monetary Fund (IMF) attribute this to a poor ex-ante understanding of the impact of fiscal stimuli on the economy, as well as an underestimation of the disruptions caused by supply chain challenges (Koch & Noureldin, 2023). The European Central Bank has shifted its focus towards profit-led inflation (Arce et al., 2023). However, this approach has proven problematic, as inflation has remained persistently high, even as the Eurozone economy has started to show signs of deceleration.

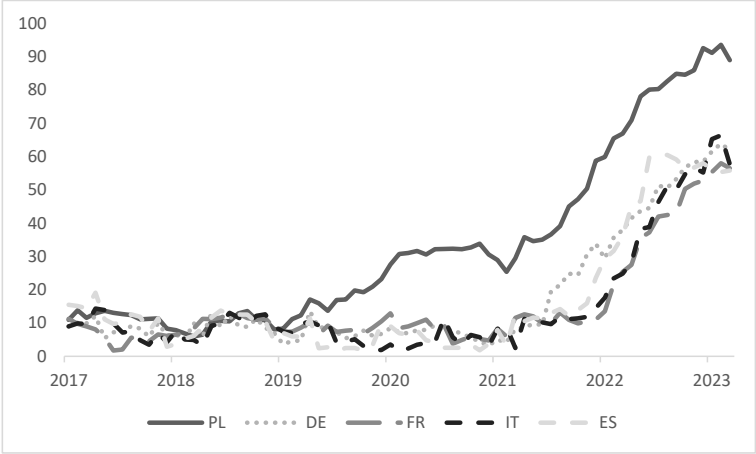
This paper focuses on spillovers, which are less frequently discussed. The magnitude of inflation co-movement varies over time (Tiwari et al., 2015, 2019). In particular, the simultaneous increase in costs across Europe is expected to be more persistent. The framework developed by Diebold and Yilmaz is therefore used to identify the countries that warrant closer examination when analyzing the process of disinflation.

3. The increase in inflation after Russia's invasion of Ukraine

This section examines stylized facts about the unexpected surge in inflation during the post-Covid-19 years, with a focus on HICP inflation and the risk of a wage-price spiral.
Russia's invasion of Ukraine triggered widespread price increases. By the beginning of 2023, prices accounting for 50% of consumer expenditures had risen by over 5% p.a., even in Southern Europe. However, the most significant impact was felt in Central and Eastern Europe (CEE), where inflation skyrocketed to unprecedented levels. In countries like Poland and Hungary, over 90% of prices had risen by 5% per year, the highest figure in history.

Figure 1.

Share of expenditures, where prices increased by more than 5 percent annually

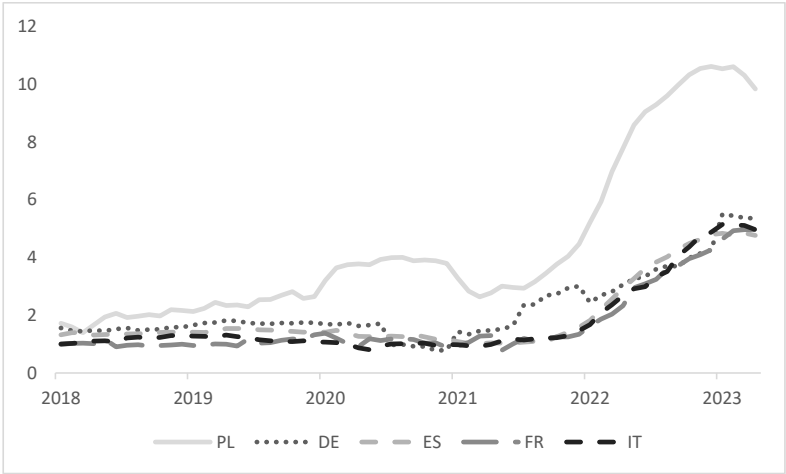


Source: Own computation based on Eurostat data.

Prices increases also became more frequent. After analyzing the frequency of pricing changes in HICP inflation, three indicators for sticky, flexible and standard prices were identified. These increases in prices were accompanied by supply shocks, which particularly affected energy and food prices, triggering second-round effects. Overall, the pace of annual growth in sticky prices in 2022 was three times higher than the European Central Bank's target.

Figure 2.

Sticky prices – implied with HICP indices (%YoY)



Source: Own computation based on Eurostat data.

Sticky prices did not catch up with the standard, let alone the most flexible ones. There were cumulative price increases of 9-11% in Germany, France, Italy and Spain, and 30% in Poland (Table 1). The increase in prices that changed more frequently was greater, varying from 12.3% in France to 19.2% in Germany and 31.5% in Poland. An increasing correlation between the sticky component of inflation and the headline figures was observed in Poland, indicating that the greater magnitude of the price increases had the effect of reducing the difference. A similar phenomenon in the Eurozone cannot be ruled out.

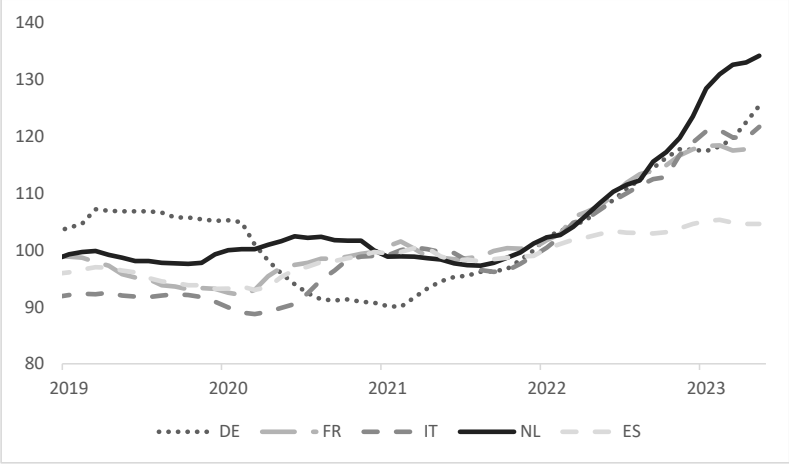
Table 1.
Cumulated prices' increase from 2020 by the frequency of changes

Frequency	DE	ES	FR	IT	PL
Sticky	10.2	10.0	10.8	9.2	30.2
Standard	19.2	15.4	12.3	13.1	31.6
Flexible	48.0	30.4	27.9	46.9	46.0

Note: the detailed derivation of sticky prices index is described in the section 4.
Source: Own calculations.

Rapid price increases triggered wage pressures in the Eurozone. The results of a Google Trends search on wage increases in Eurozone countries are illustrated in Fig. 3. Interest among Internet users is twice as high as it was in the years preceding the pandemic.

Figure 3.
Internet queries related to wage increase – Google Trend Indices. (2018.1 = 100)



Note: Indices were queried using the following words: "Gehaltserhöhung" (Germany), "Augmenter" (France), "Aumento" (Italy, Spain), "Loonsverhoging" (Netherlands). 12-month moving averages were applied.
Source: Google.

4. Methodology

The framework proposed by Diebold & Yilmaz (2012) was used to measure spillovers between the EU's five largest economies in terms of population, viz. Germany, France, Italy, Spain and Poland. The first four countries account for more than 76% of the inflation in the euro zone, serving as a robust proxy for the overarching trends within the currency union. Eurozone comparisons are based on data from these economies. The present analysis focuses on two indicators related to inflation: the share of prices prone to inflation above 5%; and sticky prices. These indices were computed using disaggregated HICP data.

Secondly, the spillovers in wage pressures among Eurozone countries was analyzed using high-frequency information from Google searches. First, the computation method for these indicators is discussed and then Diebold and Yilmaz's method is introduced.

Share of rapidly increasing prices and sticky prices – derivation of indices.

The composition of the inflation indices is first presented and then the share of expenditure for which prices are increasing by at least 5% p.a. is calculated. COICOP information at the highest level available was used, i.e. public disaggregation at the 6-digit level was used if available; if not then 5-digit categories were compiled. The share is derived as the sum of consumer basket weights for the categories in which the annual rate of increase is greater than 5%, in line with Formula 1:

$$share_t = \sum_i a_t * w_{i,t}, where\ a_t = \begin{cases} 1 & \pi_{i,t} \geq 5 \\ 0 & \pi_{i,t} < 5 \end{cases} \quad (1)$$

where i is the variable iterating between COICOP categories, $\pi_{i,t}$ denotes the annual inflation rate and $w_{i,t}$ denotes the weight of the COICOP categories in the HICP basket.

In the case of sticky prices, categories at the 5-digit COICOP level were selected if available and at the 4-digit level if not. The monthly rate of increase was then filtered. The standard deviation of the monthly inflation rate for each category was computed and the resulting list was sorted in ascending order by variability. Each category was then classified as follows:

$$\begin{aligned} Sticky \quad & \sigma \in 1st\ Quartile \\ Standard \quad & \sigma \in 2nd\ and\ 3rd\ Quartile \\ Flexible \quad & \sigma \in 4th\ Quartile \end{aligned} \quad (2)$$

The classification was made separately for each country. The aggregates therefore contain different products and services between countries. Similarly, the contribution of each component — i.e. sticky, standard and flexible prices — to the final inflation is based on the country-specific weighting scheme.

Diebold and Yilmaz indices

Next, the spillover indices proposed by Diebold and Yilmaz are presented. These rely on the generalized vector autoregression (VAR) framework, which removes any dependence of results on variable ordering. The standard VAR model can be represented by the following formula:

$$y_t = \sum_{i=1}^{p} \varnothing_i y_{t-i} + e_t, e \sim N\left(0, \Sigma\right) \tag{3}$$

where y_t is N-variable vector and e_t is a vector of independently and identically distributed disturbances. Each covariance-stationary autoregressive process can be expressed as an infinite MA process:

$$y_t = \sum_{i=0}^{\infty} A_i e_{t-i} \tag{4}$$

where A_0 is an N x N identity matrix and other coefficient matrices A_i obey the recursion.

$$A_i = \sum_{i=1}^{p} \varnothing_i A_{i-p} \tag{5}$$

The use of moving average coefficients enables the derivation of transformations such as impulse response functions and variance decompositions. The latter are especially useful in determining the proportion of inflation or wage growth that results from spillovers from other variables. However, to calculate variance decomposition, orthogonal innovation is required. This can be achieved through a Cholesky decomposition. It should be noted that such results are dependent on the ordering of variables.

Diebold and Yilmaz proposed a generalized variance decomposition based on the work of Pesaran and Shin (1998). This approach focuses on shocks that only impact one equation at a time. The Generalized Impulse Response Function (GIRF) of vector *yt* to the shock on *j – th* equation ($\delta_{j,t}$) in the horizon *l* is defined as follows:

$$GIRF\left(l, \delta_{j,t}, \omega_{t-1}\right) = E(y_{t+l} | e_{j,t} = \delta_{j,t}, \omega_{t-1}) - E(y_{t+l} | \omega_{t-1}) \tag{6}$$

where is the matrix of initial, historical values required to compute conditional expectations and is the vector of the corresponding shocks. The linear VAR model with no identification restriction is independent of history (). The GIRF Function reduces to:

$$GIRF\left(l, \delta, \omega_{t-1}\right) = A_l \delta \tag{7}$$

where δ is the vector of shocks (δ_1, δ_2,…,δ_k) The situation in which the shock is limited to the *j – th* equation is of primary interest here. Assuming the normality of error term and setting a shock to the *j – th* element of the error vector, the unscaled GIRF of the shock is provided by the following equation:

$$GIRF\left(l,\delta_j,\omega_{t-1}\right)=A_l\ \Sigma \mathrm{s}_j\sigma_{j,j}^{-1}\delta_j \tag{8}$$

The selector s_j vector takes the value of 1 for the j – *th* variable and 0 otherwise. The term $\sigma_{j,j}$ represents an element of variance-covariance matrix Σ of random disturbances introduced in Formula 1 and δ_j is the magnitude of the shock.

Generalized impulse response functions can be used in the derivation of the forecast error variance decompositions. In this case, the output describes the share of the variance in the variable accounted for by the innovations in the j – *th* variable in the VAR. The impulse δ_j is therefore scaled to the value of $\sqrt{\sigma_{j,j}}$. The h – *step* – *ahead* forecast variance of i – *th* equation on the j – *th* variable can be expressed by the formula:

$$\theta_{i,j}\left(h\right)=\frac{\sigma_{i,i}^{-1}\sum_{l=0}^{h}\left(\mathrm{s}_i^{'}A_l\Sigma \mathrm{s}_j\right)^2}{\sigma_i^2\left(h\right)} \tag{9}$$

A shortcoming of calculating forecast variance this way is that the contributions of the shocks do not add up to one unless the covariance matrix of the error is a diagonal matrix. This makes interpreting them problematic. This complication can be resolved by e.g. computing the forecast variance in a different way (such as Lanne & Nyberg, 2016). However, the approach proposed by Diebold and Yilmaz is far simpler: it assumes the normalization of the selected variance decomposition through all the available decompositions, i.e.:

$$\theta_{i,j}^{norm}\left(h\right)=\frac{\theta_{i,j}\left(h\right)}{\sum_{k=1}^{N}\theta_{i,k}\left(h\right)} \tag{10}$$

Diebold and Yilmaz proposed several indices to quantify the spillovers in a VAR model. The first index is the total spillover index. This measures the contribution of the shock spillovers – across all the variables – to the total forecast error variance.

$$Total\,Spillover\,Index\left(h\right)=\frac{\sum_{i,j=1,i\neq j}^{N}\theta_{i,j}^{norm}\left(h\right)}{N}*100 \tag{11}$$

The spillovers transmitted and received from *ith* the variable is described by an index pair. The spillover to or from a particular source is calculated as a share of the total spillover. The formulas are:

$$\begin{aligned} Received\,Spillovers\,Index_i\left(h\right)&=\frac{\sum_{j=1,i\neq j}^{N}\theta_{i,j}^{norm}\left(h\right)}{N}*100\\ Transmitted\,Spillovers\,Index_i\left(h\right)&=\frac{\sum_{j=1,i\neq j}^{N}\theta_{j,i}^{norm}\left(h\right)}{N}*100 \end{aligned} \tag{12}$$

The net spillover is simply the difference between the transmitted and received spillovers. The formula is therefore:

$$\begin{aligned} &\textit{Net Spillovers Index}_i\ (h) \\ &\quad = \textit{Transmitted Spillovers Index}_i\ (h) \\ &\quad - \textit{Received Spillovers Index}_i\ (h) \end{aligned} \tag{13}$$

Application of Diebold and Yilmaz's indices

These three spillover indices are applied to three variables. The first variable is the share of expenditures for which prices are increasing at over 5% per year. The indices contain values from zero to one. Depending on the index, higher values indicate that the countries under consideration exhibit a stronger transmission of inflation to other countries or are more susceptible to receiving inflation from abroad.

The second variable is the monthly change in the sticky-prices inflation index. This illustrates the underlying inflationary trend.

The third variable is the change in the Google-trends indices concerning pay rises. The search words *Gehaltserhöhung* (for Germany), *Augmenter* (for France), *Aumento* (for Italy and Spain), and *Loonsverhoging* (for the Netherlands) were used. This index contains values from zero to 100. This range of values is calibrated so that 100 represents the highest number of searches during the week. The other values are represented as percentages of the maximum (value/maxim value * 100). For example, 50 indicates that the number of searches was half the maximum.

This information was used instead of official statistics, as it is published very frequently (weekly and monthly), and contrary to negotiated wage indices, it is forward-looking rather than backward-looking. By contrast, the most comprehensive ECB index only shows pay rises resulting from concluded agreements. Pay rises currently being negotiated are not considered. Admittedly, this methodology does not measure price increases with precision, but it does provide a relatively reliable indicator of general sentiment.

5. Results

First, the spillovers of rapidly increasing prices (as measured by the HICP) between countries were analyzed. Next, sticky prices were analyzed. Finally, the spillovers between wage searches were estimated.

Spillovers during the energy crisis.

Spillovers played a moderate role in price rises when inflation increased rapidly. The variance decomposition suggests that after 12 months, approximately 50-65% of the variance was related to domestic inflation innovations. These may have been either idiosyncratic price shocks or shocks that hit all the economies under analysis

simultaneously. Three specifications with 2–4 lags were tested. The total spillover index remained stable and ranged from 38% to 44%. The total variance decomposition for the VAR specification with 3 lags is presented in Table 2.

Table 2.
Forecast Variance Decomposition – share of rapidly increasing prices (%)

Country	Source of innovation in the decomposition of forecast variance				
	DE	FR	IT	ES	PL
DE	59	8	5	11	17
FR	8	50	14	18	11
IT	6	14	48	18	13
ES	9	12	1	63	15
PL	16	4	5	17	58

Note: The table displays the percentage contribution of innovations in the proportion of rapidly increasing prices from the countries listed in row 2 to the total inflation forecast variance of the country in column 1 after one year. The sample used in the estimation contains data from 2017 to April 2023.
Source: Own calculations.

Spain and the CEE countries were net inflation transmitters. The directional spillover indices revealed two significant relationships: one between Poland and Germany, and another between Spain and Italy and France. However, it should be noted that the methodology used does not determine the economic justifications for these spillovers. The literature suggests that Spain transmits energy price shocks relatively quickly, while in Poland, interest rate fluctuations are significant (Leiva et al., 2022). Also significant are productivity shocks (Elfsbacka Schmöller & Spitzer, 2021). The leading relationships observed in these countries may be attributed to more labor-intensive production. Increased costs are more swiftly passed on to the end consumer than they are in more capital-intensive economies such as Germany or France. Finally, inflation expectations may be relevant. Hofmann & Remsperger (2005) point out that countries in which inflation has traditionally been low are more resistant to potential shocks.

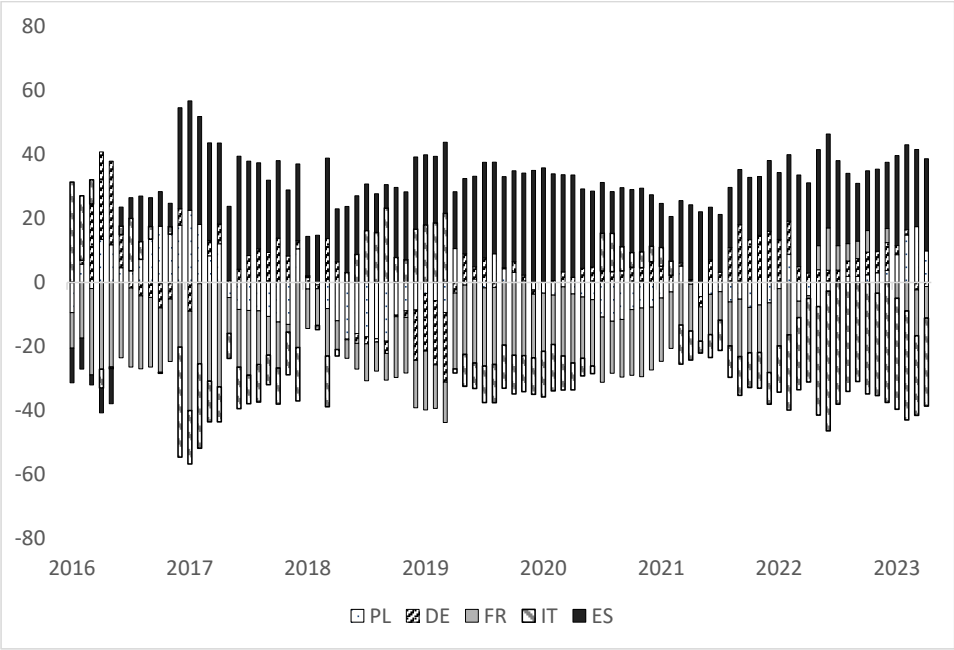
Table 3.
Diebold and Yilmaz indices – share of rapidly increasing prices

Country	Transmitted	Received	Net
DE	36.4	37.7	-1.3
FR	42.9	48.8	-5.9
IT	24.8	50.2	-25.4
ES	63.8	34.0	29.8
PL	44.5	41.7	2.8

Source: Own calculations.

The magnitude of the spillovers from Spain has been stable over time, whereas those from Poland increased in 2022. The dynamic DY indices were calculated using rolling six-year time windows. Inflation in Spain has persistently preceded inflation in other Eurozone countries. In the case of Poland, the leading relationship emerged with the energy shock. Similarly, countries that usually have the lowest inflation, e.g. Italy or France, currently have higher imported inflation. The structure of the net spillovers is presented in Figure 4. Given the persistence of inflation in both Poland and Spain, a rapid deceleration in core inflation seems implausible at this stage.

Figure 4.
Diebold and Yilmaz dynamic net spillover indices



Note: A positive value indicates that the country is an inflation transmitter. The figures in the columns always sum to zero. The calculations use a 6-year rolling time window.
Source: Own calculations.

The moderate spillovers between countries are consistent with the literature. Tiwari et al. (2019) analyzed the spillovers by applying the Barunik–Krehlik method and the wavelet approach to the four biggest EU economies. They report spillovers of similar magnitude with a slightly stronger transmission of prices from Germany. However, their research highlights Spain as a transmitter (Istiak et al., 2021). They extended their analysis to the G7 countries. This confirmed that Italy was the biggest receiver of inflation among the developed economies. Finally, the role of Italy and France as receivers of inflation has been confirmed by Aharon & Qadan (2022).

Sticky prices – a new inflation risk.

Sticky prices pose another risk related to spillovers. In the second step of the present analysis, the VAR model was estimated using monthly price changes to the sticky price index. This model shows that only 23–44% of sticky-price inflation was generated domestically. Moreover, imported inflation increased after the energy shock.

Table 4.
Forecast Variance Decomposition – monthly changes of sticky prices (%)

Country	Source of innovation in the decomposition of forecast variance				
	DE	FR	IT	ES	PL
DE	40	8	21	17	14
FR	9	23	21	22	25
IT	10	2	33	22	33
ES	8	3	27	31	31
PL	12	3	21	20	44

Note: The table displays the percentage contribution of innovations in sticky inflation from the countries listed in row 2 to the total forecast variance of the country in column 1 after one year. The sample used in the estimation contains data from 2017 to April 2023.
Source: Own calculations.

Again, the major net transmitters of the sticky price increase are Poland and Spain. The inflation was mainly transmitted from CEE, as it was much higher there than in the Eurozone. The major EU economies, viz. France and Germany, are inflation receivers; it took longer to impact inflation there than it did in less developed EU countries. For a summary of the spillover indices, see Table 5.

Table 5.
Diebold and Yilmaz indices – monthly changes of sticky prices

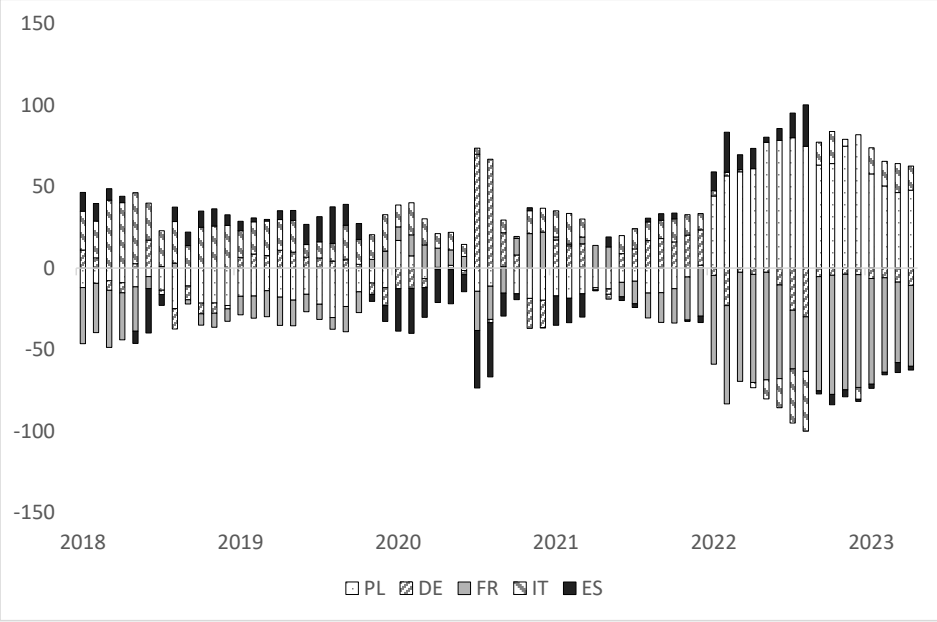
Country	Transmitted	Received	Net
DE	38.36	60.2	-21.8
FR	16.17	77.1	-61.0
IT	89.27	66.7	22.5
ES	81.56	68.6	13.0
PL	102.89	55.6	47.3

Source: Own calculations.

The magnitude of the spillovers is not stable over time; it increases with inflation. The six-year rolling window total spillover index increased from 40% in 2018 to

65% immediately after the invasion of Ukraine. The contribution increased during the ensuing period of higher inflation. This phenomenon is likely to continue in the coming quarters as most EU countries have experienced a lower increase in sticky prices compared to overall inflation. The transmitters and receivers are presented on Figure 5.

Figure 5.
Diebold and Yilmaz dynamic net spillover indices – sticky prices



Note: A positive value indicates that the country is an inflation transmitter. The columns always sum to zero. The calculations use a 6-year rolling window.
Source: Own calculations.

Wage price spiral risk – evidence from Google searches

Wage spillovers from the Netherlands increase the risk of persistent inflation. The estimate of the Diebold Yilmaz indices suggests a lower interconnection between wage pressures. Wage pressures in neighboring economies account for approximately 27–35% of the variance. However, the structure is unfavorable – a decomposition of the forecast variance shows that the Netherlands is the biggest transmitter, while Spain and Germany are among the biggest receivers.

Table 6.
Forecast Variance Decomposition – wage indices (%)

Country	Source of innovation in the decomposition of forecast variance				
	DE	FR	IT	NL	ES
DE	76	3	7	11	3
FR	1	75	3	9	12
IT	3	4	75	17	1
NL	8	5	9	75	3
ES	7	11	8	14	60

Note: The table displays the percentage contribution of innovations in inflation from the countries listed in row 2 to the total inflation forecast variance of the country in column 1 after one year.
Source: Own calculations.

Italy and the Netherlands are subject to greater spillover effects from wage pressures. The net indices are presented in Table 7. The case of Italy is likely to reflect the situation in the southern EU countries; the labor market slack there is the lowest and wage growth is slow. Wage rises there, however, are likely to lead to adjustments elsewhere. The Netherlands, as the most internationalized EU economy, it is the first EU country to reflect global trends.

Table 7.
Diebold and Yilmaz indices for the European Union biggest countries

Country	Transmitted	Received	Net
DE	22.5	32.5	-10.0
FR	18.8	29.2	-10.4
IT	43.9	30.4	13.5
NL	50.4	35.5	14.9
ES	30.8	38.9	-8.1

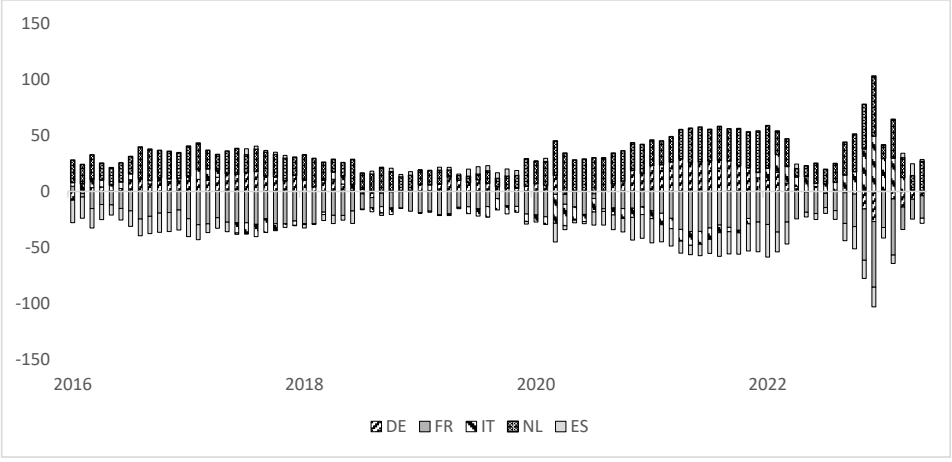
Source: Own calculations.

The literature usually attributes positive spillovers to Germany and the Netherlands. (Devereux et al., 2023) constructed a multi-country international spillover model using WIOD data. The results suggest that countries within production networks tend to propagate wage shocks. The findings of the present study support the observation that such tendencies were evident before the energy crisis. However, the collapse of production in the manufacturing sector has likely reduced spillovers from Germany. Afonso (2019) suggests that Southern European countries have been attempting to curb wage growth in a bid to restore competitiveness. This trend is evident in the data: both Spain and Italy were receivers rather than transmitters before the Covid-19 pandemics.

The overall magnitude of the spillovers is moderate. The total spillover index oscillates around 35–40%, similarly to the share of rapidly increasing prices,

although it can increase rapidly during periods of stress. A similar phenomenon was observed at the beginning of 2023, following a wave of wage strikes in the Netherlands. A synchronous rise in wage pressure therefore remains a risk that should not be overlooked.

Figure 6.
Diebold and Yilmaz dynamic net spillover indices – wage pressure



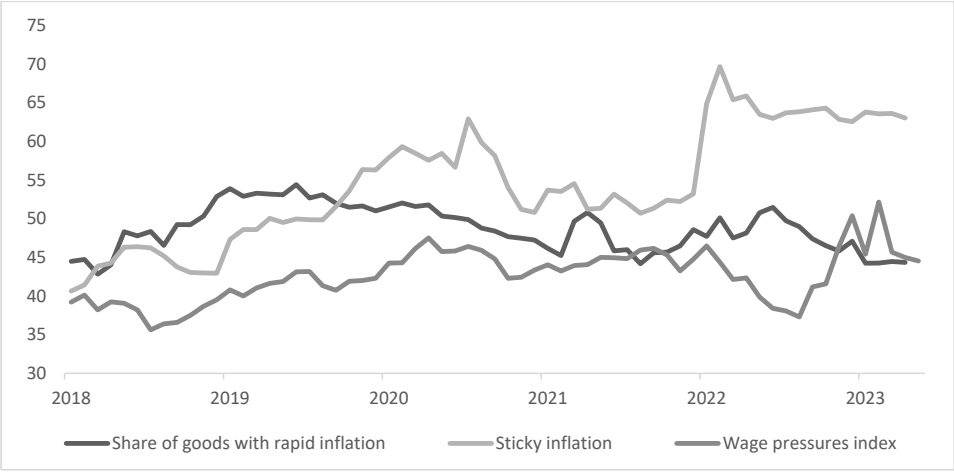
Note: A positive value indicates that the country is an inflation transmitter. The columns always sum to zero. The calculations use a 6-year rolling time window.
Source: Own calculations.

6. Conclusion

This paper examines the potential channels of inflation spillovers between the largest economies in the EU. Although the cross-country transmission of rapidly increasing prices is rather moderate, the transmitter countries (viz. Poland and Spain) continue to experience more widespread inflation, which suggests that the entire Eurozone is at risk of more persistent inflation. Sticky-price spillovers are observed to increase with the magnitude of price increases. This remains an important channel that could prolong periods of high inflation. The present research shows that Poland is likely to become a significant transmitter, while France remains a receiver.

Overall, the magnitude of inflation spillovers between countries increased after the energy crisis (Figure 7). Again, the Diebold and Yilmaz framework suggests that sticky prices were most affected. This helps explain why predictions obtained using standard modeling frameworks, e.g. the Philips curve, which were based on data from a period of low inflation, undershot the actual increase in prices.

Figure 7.
Diebold and Yilmaz – Total spillover indices



Note: The calculations are based on a 6-year rolling time window.
Source: Own calculations.

Wage increases pose additional risks. While the framework used in the present study shows little interconnectedness between the situation on the labor market in the Eurozone countries, there is greater spillover during periods of disturbances. The Netherlands emerges as a transmitter; one that systematically exhibits tendencies later observed in other countries. The heightened wave of wage strikes in that country makes wage-induced inflation an important factor that could prolong periods of high inflation. Contrary to other research (e.g. Devereux et al., 2023), Germany does not appear to be a transmitter, as the collapse of production in the manufacturing sector has likely reduced wage spillovers.

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