

4.2. ENERGY PRICES

Recent months have seen rapid increases in wholesale prices, most notably of natural gas and electricity, but also of oil and more recently coal. While the increases are expected to be relatively short-lived, they are set to have a material impact on households and companies. Rising energy prices are already translating into substantial increases in retail energy prices for producers and consumers, though at a varying degree and pace across Member States.

This feature analyses recent developments in European energy prices, their drivers and their potential impact on the economic and inflation outlook through the lens of the European Commission's Global Multi-country model.

European energy markets: recent developments and outlook

The pandemic-induced collapse in economic activity led energy prices to fall sharply in spring of 2020. By the cut-off date of this forecast, the forceful economic rebound that followed the shutdowns had progressively pushed oil prices by around a third above their pre-pandemic levels. Global natural gas prices have also progressively recovered after the downward pressures in spring 2020, but over the past few months, they have recorded unprecedented increases.

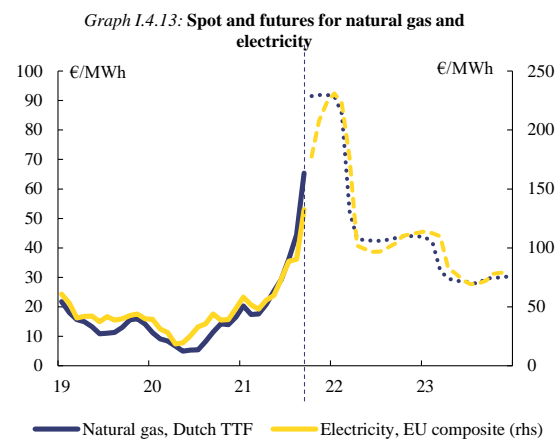
Because natural gas is difficult to transport, its price is generally set in regional hubs. Hub prices tend to reflect not only global movements in energy commodities, but also region-specific structural factors and idiosyncratic shocks. In Europe, the wholesale price of gas has increased more than in other regional hubs (for example the US), due to reduced stocks after a cold winter, limited supply from Russia and exceptionally weak wind- and hydropower production. Supplies of shippable Liquefied Natural Gas (LNG) have also been tight, amidst rising demand from Asia. Finally, the impact of rising carbon emission prices also played a role.

The price of natural gas went from just above 7 euro/MWh in April 2020 to around 90 euro/MWh by the cut-off date. The futures market as of the cut-off date suggests that European gas wholesale prices are set to remain elevated by the end of the

year, and will return to around 50 euro/MWh by early spring.

Higher gas prices are spilling over to wholesale electricity prices. Wholesale electricity prices went from just below 20 euro/MWh in April 2020 to around 150 by the cut-off date, and are expected to come down to around half of that by early spring 2022. The link between gas and electricity prices is a consequence of the interplay of available technologies and current market structure. The EU electricity market is based on a marginal pricing and pay-as-clear model, where the market wholesale price normally reflects the cost of the last unit of energy bought via an auction mechanism where gas is a predominant input. Though rapidly expanding across Europe, supply of energy from renewable sources is highly volatile, since it depends on climatic conditions. Furthermore, it cannot be easily stored and nuclear energy (and to a certain extent coal) cannot accommodate short-term fluctuations in demand. The more flexible but also more expensive gas is thus best placed to adjust production to clear the market. This implies that gas power plants have become price setters in wholesale markets.

Over the years, this market structure has generated many savings benefits to EU firms and consumers and is supporting the transition towards carbon neutrality. There is general consensus that the marginal pricing model provides the most efficient allocation of production on liberalised electricity markets and the best suited to foster effective electricity trading across Member States on the wholesale market.



A model-based assessment of the recent increases in prices of energy commodities

Futures markets expect oil prices to peak in the first quarter of 2022, and to gradually decline thereafter before stabilising in 2023. On average, oil prices are expected to increase from 71.6 USD/bbl in 2021 to 78.9 USD/bbl in 2022, and decline to 72.3 USD/bbl in 2023. Gas prices in Europe are expected to remain at high levels until spring 2022, before partially reverting towards pre-pandemic levels. As expected, electricity wholesale prices are projected to follow the same dynamics (see Graph I.4.13).

Whereas the increase in energy commodity prices is expected to be temporary, it is set to have a material impact on output and prices. The impact on the euro area is assessed using the European Commission's Global Multi-country model.⁽⁵¹⁾

The analysis proceeds in two steps. First, a composite energy price index is constructed for current and expected prices, based on information from spot and futures markets for a broad range of energy commodities (oil, coal, gas and electricity). To provide a baseline against which the impact is compared, the same index is constructed for the market prices in 2021-22 expected at the time of the Spring 2021 forecast. The difference between both indices corresponds to the simulated price shock. Overall, in the model, the shock's magnitude implies an increase in import prices of energy commodities of 33% in 2021 and 18% in 2022, compared to the Spring forecast.

In the second step, the new price path is fed into the model as an exogenous adverse supply shock. In explaining the model's transmission mechanism, it is important to keep in mind the following features. Because of adjustment frictions

and the limited substitutability of energy commodities as intermediate inputs, the model predicts demand for energy commodities to adjust sluggishly. Rising energy costs would thus lead to rising production costs, which are directly and indirectly passed on to final consumers via increased retail prices, though only partly. Lower expected profits reduce business investment, while higher inflation weighs on the disposable income of households, dampening consumption demand.

Importantly, the modelling approach assumes that monetary policy will keep nominal interest rates constant in response to the shock.⁽⁵²⁾ This assumption differs from the 'standard' approaches in which (sustained) higher inflation triggers an endogenous monetary tightening.⁽⁵³⁾ In particular, higher inflation weighs on the real disposable income of households, which dampens consumption demand, while lower expected profits reduce business investment.

Table I.4.1 shows that rising commodity prices are likely to drag GDP growth and increase consumer prices significantly compared to what was expected in Spring 2021.⁽⁵⁴⁾ Rising energy prices alone imply that 2021 consumer price inflation in the euro area could be around 0.9 pps. higher than expected in Spring. The impact in 2022 is slightly larger (1ppt.) in light of the persistent energy price inflation and the adjustment frictions described above. Furthermore, the simulated energy price shock reduces real GDP growth by around 0.3 pps and 0.5 pps. in 2021 and 2022, respectively, compared to the Spring forecast baseline. This cumulates to a real GDP loss in the euro area of 0.8 pps. over 2021-22. The trade balance of the euro area deteriorates by 0.4 pps. in 2021 and 0.5 pps. in 2022 compared to the Spring 2021 forecast in light of the higher commodity import bill.

⁽⁵¹⁾ The European Commission's Global Multi-country model (GM) is an estimated structural model jointly developed by DG ECFIN and the JRC. A detailed description of the GM model can be found in: Albonico, A., L. Calès, R. Cardani, O. Croitorov, F. Di Dio, F. Ferroni, M. Giovannini, S. Hohberger, B. Pataracchia, F. Pericoli, P. Pfeiffer, R. Raciborski, M. Ratto, W. Roeger and L. Vogel (2019). 'The Global Multi-Country Model (GM): an Estimated DSGE Model for the Euro Area Countries'. ECFIN Discussion Paper No. 102. European Commission. For a GM-based analysis of commodity prices and global macroeconomic conditions, see also M. Giovannini, S. Hohberger, R. Kollmann, M. Ratto, W. Roeger and L. Vogel (2019). 'U.S. and Euro Area External Adjustment: The Role of Commodity Prices and Emerging Market Shocks.' *Journal of International Money and Finance*, vol.94, pp.183-205.

⁽⁵²⁾ Put differently, the negative supply shock and the associated inflation pressure are not big enough to move target interest rates away from the effective lower bound.

⁽⁵³⁾ On the macroeconomic transmission of commodity price shocks at the effective lower bound, see also Bodenstein, M., Guerrieri, L. and Gust, C., 2013. 'Oil shocks and the zero bound on nominal interest rates,' *Journal of International Money and Finance*, vol. 32(C), 941-967.

⁽⁵⁴⁾ All variables are expressed in deviation from the Spring forecast 2021.

Table I.4.1:

Results from model simulation: deviations from Spring forecast 2021, euro area

	2021	2022
Commodity price inflation (annual)	32.5	18.3
Commodity imports (volume)	-5.8	-10.9
Trade-balance-to-GDP ratio	-0.4	-0.5
Real investment growth	-1.9	-3.4
Real consumption growth	-0.3	-0.4
HICP inflation (annual)	0.9	1.0
Real GDP growth	-0.3	-0.5

Notes: Results are expressed as percentage points; except commodity imports, which are expressed in percentage deviation from the Spring 2021 forecast.

As explained above, an important caveat in these simulations is that the increase in the prices of energy commodities is assumed to be fully exogenous. If energy prices had instead been modelled as a consequence of stronger global demand, this would have partially offset the reduction in euro area output growth through higher export demand.⁽⁵⁵⁾

Furthermore, the model does not take into account government measures intervened to shelter households and producers from the unexpected surge in energy prices.

⁽⁵⁵⁾ See also Kilian, L. 2009. 'Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market.' *American Economic Review*, 99 (3): 1053-69.