4. SPECIAL ISSUES

4.1. COMMODITY-DRIVEN INFLATION: MACRO EFFECTS AND RISKS

Developments in energy markets are key drivers of the projected slowdown in economic activity and high inflation. Commodity-driven inflation, associated with Russia's war of aggression against Ukraine, and supply disruptions of natural gas, particularly, are key drivers of the projected worsening of the economic outlook with major risks remaining.

This section assesses the potential impact of the realisation of key risks in energy markets on the baseline forecast. The analysis proceeds in two steps. First, the Commission's estimated macro model identifies the driving forces shaping past and projected output and price dynamics in the baseline forecast. This identification helps assess the economic cost of alternative paths for the evolution of energy supplies and prices.

The analysis builds on the Commission's Global Multi-Country Model (GM), featuring the euro area and the rest of the world (RoW).[43] The model features a prominent role for energy commodities in production and consumption. It also captures salient economic features of the COVID-19 shock[44] such as fluctuations in households' savings behaviour, firms' liquidity constraints and labour hoarding (short-time work). The model estimates rest on a rich dataset of over 30 time series, including, among others, historical and forecast data from national accounts and trade data, as well as market-based expectations of gas and oil prices based on futures markets, in line with the assumptions included in the baseline forecast (see Box I.5.1).

In the model, energy commodities act on the economy through multiple transmission channels, namely:

- Energy commodities enter the model as an imported intermediate input with limited substitutability.
- Energy commodity prices also directly feed into consumer prices (e.g. fuel and gas for heating).
- Second-round effects driven by higher production costs and wages propagate the above direct effects to other goods and services included in the consumption basket.
- In addition, higher energy prices adversely impact business investment by deteriorating the liquidity position of firms.
- The model does not include energy-related (tax) policies beyond excise duties.[45]

The modelling approach and scenario design incorporate key stylised facts of natural gas markets. While the ongoing diversification has helped to increase imports from other sources, Europe's import capacity remains limited as it depends on specific infrastructure (pipelines and LNG terminals). In the model, very low substitution elasticities between gas and other production inputs

(43) The Global Multi-Country (GM) model, a macroeconomic model in the New Keynesian tradition, has been developed by DG ECFIN and the Joint Research Centre of the European Commission. The analysis considers a two-region configuration with the euro area and the rest of the world. For a detailed description of the core GM model, see 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." European Commission (DG ECFIN) Discussion Paper No. 102.

(44) For recent extensions of the GM model to fit the main particularities in COVID-period data, see R. Cardani, O. Croitorov, M. Giovannini, P. Pfeiffer, M. Ratto, and L. Vogel (2022). "The euro area's pandemic recession: A DSGE-based interpretation." *Journal of Economic Dynamics and Control.*

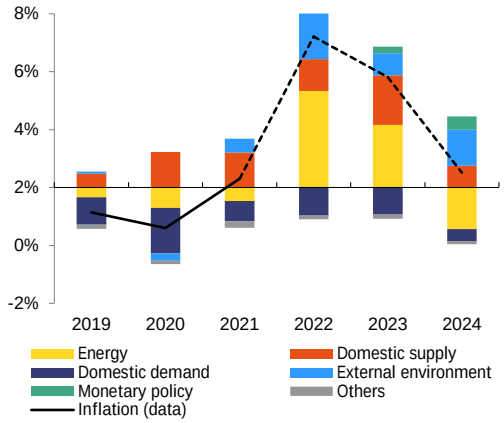
(45) For an analysis on support policies, see, for instance, G. Bethuyne, A. Cima, B. Döhring, Å, Johannesson Lindén, R. Kasdorp, and J. Varga (2022) "Targeted income support is the most social and climate-friendly measure for mitigating the impact of high energy prices." VOXEU, June 6.

capture these limited substitution possibilities and costly adjustments.[46]

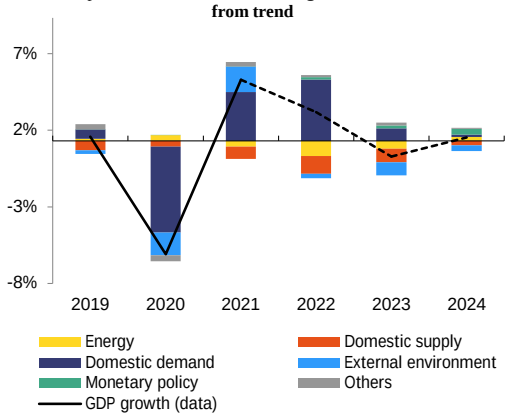
4.1.1. A model-based breakdown of projected inflation and growth

Energy prices continue to dominate euro area price and, to a lesser extent, output dynamics. Based on the forecast's external assumptions and the model estimates, Graph I.4.1 displays the decomposition of past and projected inflation.[47] In 2022 and 2023, prices of energy commodities, most notably natural gas, drive a substantial share of consumer inflation in the euro area. Namely, in 2023, they add around 2¼ pps. to the projected inflation rate, measured by the private consumption deflator, of 5.8% in 2023, partly via second-round effects. The negative terms of trade effect of energy prices and its impact on private demand also reduce next year's expected GDP growth (by -½ pps.) after a large negative impact in 2022 (-1 ppt.), as shown in Graph I.4.2. The gradual stabilisation and subsequent partial reversal of commodity prices contribute markedly to the forecast decline in inflation and to an increase in real growth to its trend growth in 2024.

Graph I.4.1: **Euro area consumption deflator growth, deviations from trend**



Graph I.4.2: **Euro area real GDP growth, deviations from trend**



Import prices drive up inflation and slow growth. Prices of imported non-energy goods and services are projected to keep inflation high in all three forecast years, but most notably in 2024 (+1¼ pps.). Inflation in the outer year would otherwise fall below 2%, according to the model estimation. At the same time, elevated imported non-energy inflation also weighs negatively on euro area GDP growth in 2023 and 2024.

While domestic demand shocks support growth, supply conditions are expected to worsen. Shocks to domestic demand remain among the few positive growth factors, even if their contribution eases markedly over the forecast horizon. After a strong positive impact in 2022 (+4 pps.), following the reopening of the economy, these shocks add around ¾ ppt. to growth in 2023 before fading in 2024. Relative to 2020, the negative contribution of

(46) The model distinguishes household and business demand for natural gas. The scenario calibrates the constant elasticity of substitution parameters between gas and other inputs to 0.04 (households) and 0.06 (firms). Due to adjustment costs and monopolistic competition in the model, the very short-run substitution is even more limited. Technically, a price shock triggers a reduction in gas volume, coupled with prolonged difficulties in accessing alternatives.

(47) In Graphs I.4.1 and I.4.2, the solid black line shows the historical data, and the dashed line represents the European Commission's forecast for inflation and growth, respectively. The coloured bars show the contribution of the drivers of the (historical and projected) deviations in inflation and GDP from the target inflation rate and long-run trend growth. Bars above (below) the horizontal axis indicate positive (negative) contributions in a given year. Positive and negative contributions sum up to the values of the black line. Drivers of deviations are the following shocks: (1) prices of energy commodities (2) domestic supply conditions, mainly productivity fluctuations and labour and goods market adjustment as captured by wage and price mark-up shocks; (3) domestic demand shocks, including pandemic-specific shocks (i.e. lockdowns) and discretionary fiscal policy; (4) shocks to world demand, international trade and exchange rates; (5) monetary policy as deviations from an estimated interest rule (stabilising inflation and the output gap in the model).

these shocks to inflation diminishes.[48] Adverse supply (productivity) factors emerging in 2021 are expected to continue to dampen GDP growth, shaving off around 1 ppt. of GDP growth in 2023. The estimated positive contribution of these shocks to inflation remains high throughout the forecast horizon, albeit it falls significantly in 2024.

Monetary policy continues to be supportive of growth. The modelling framework includes an estimated interest-rate response to deviations of inflation from the central bank's target and the output gap. According to this simple rule, the assumed path for interest rates contributes slightly positively to inflation and growth over the forecast horizon.

Overall, the model estimates point to an important role of terms of trade in shaping the baseline forecast. Unfavourable terms of trade - mainly persistently elevated prices of natural gas and rest of the world export prices – are important drivers of the baseline forecast for both inflation and growth. In addition, unfavourable domestic supply conditions continue to weigh on economic prospects, while the growth-supporting impact of domestic demand shocks, mainly associated with the reopening of the economy, quickly fades over the forecast period.

4.1.2. Risk scenarios

Considerable uncertainty in energy markets still surrounds the economic outlook. Despite the realisation of major downside risks since the Spring Forecast, important risk factors remain. [49] Further supply cuts from Russia and insufficient reductions in gas consumption are important downside risks. The analysis below estimates the economic costs associated with the realisation of these risks.

The analysis considers two main risk factors: (i) a full stop of remaining pipeline gas imports from Russia (from around 7% of total EU gas imports in October compared to 40% before 2022) in mid-December and (ii) cold winters in the next two years, which ceteris paribus raise gas demand by around 12% between December and March, compared to the implicit baseline assumption, roughly in line with the maximum consumption observed in 2014-2021. It is important to note that the modelling of these hypothetical events does not necessarily imply that the probability of such events happening is high. The choice of scenarios rather aims to illustrate the potential economic consequences of important downside risks. Finally, the scenarios do not include economic policy responses to the shocks beyond the workings of automatic fiscal stabilisers and the estimated monetary policy response.

Should these risks materialise, the EU would face severe gas shortages. The shortfall in gas imports and higher-than-anticipated demand would accelerate storage depletion during winter 2022/2023. Still, high gas storage levels of more than 90% in October and reduced gas consumption should provide sufficient buffers until early 2023.[50] However, gas storage would not be sufficiently refilled ahead of winter 2023/2024. This missing buffer stock would lead to a major gas shortage in that winter unless the shortfall in imports from Russia is substituted with other sources and the increase in gas consumption is restrained.

The scenarios underline the importance of anticipation and management of demand, particularly regarding 2024. The two scenarios differ in their assumptions about expected demand management and the ability to refill storage in 2023. The *first scenario* ('*preparedness*') assumes that the shortfall in imports from Russia is partly satisfied by

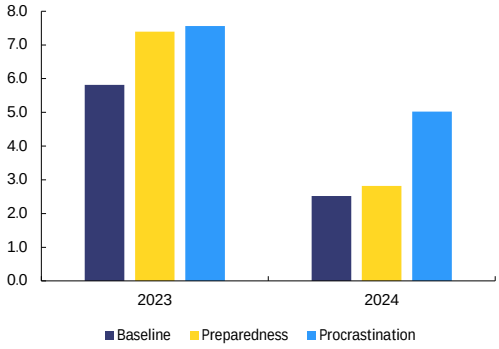
[48] For about a decade prior to the pandemic, these shocks kept inflation below its target. Pre-COVID forecasts at the European Commission have analysed the `secular stagnation' hypothesis. For analysis through the lens of the GM model. See, for example, European Commission (2018), "Drivers of the euro area recovery - evidence from an estimated model" in *European Economic Forecast: Spring 2018*, Institutional Paper 77, Box 1.3, pp. 64-67.

[49] The gas cuts from Russia are, to a large extent, in line with the Spring Forecast's severe scenario (although timing and magnitude differ). See European Commission (EC–DG ECFIN) (2022). "Alternative scenarios on the economic outlook", in EC *European Economic Forecast: Spring 2022*, Institutional Paper 173, Special Topic, pp. 51-55.

[50] See also ENTSO-G (2022), "Winter Supply Outlook 2022/2023" for a more detailed discussion of risk scenarios for the next winter.

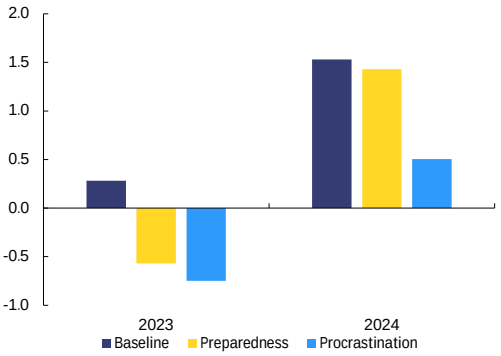
increased imports from other sources, albeit at a higher cost, starting in early 2023. Higher prices also help bring down demand. The combination of increased imports from other sources and lower gas consumption allows building up sufficient storage by the end of 2023 to get by in winter 2023/2024. By contrast, the *second scenario* (`*procrastination*') assumes that the refilling of storage is delayed. Ahead of the heating season 2023/2024, gas storage volumes would fall to around 30% below the levels needed to meet demand in the cold winter. Very large gas price increases are then necessary to induce sufficient demand reduction while avoiding the economic costs of a full-scale curtailment. In this second scenario, procrastination implies an outsized cost for short-run adjustment.

Graph I.4.3: Inflation rates across scenarios (in pps.), euro area (consumer price deflator)



Model simulations show high macroeconomic costs in case these risks materialise. In both scenarios, inflation increases and euro area GDP growth contracts significantly in 2023. High gas prices propel inflation by more than 1½ pps. above the baseline and would thus reach around 7.5% in 2023. At the same time, higher prices reduce domestic consumption and investment, and deteriorate competitiveness. As a result, real GDP grows by around up to 1 ppt. less than expected in the forecast baseline (see Graphs I.4.3 and I.4.4). Higher prices for natural gas also further reduce the euro trade balance-to-GDP ratio (-2 pps. compared to the forecast baseline).

Graph I.4.4: Real GDP growth rates across scenarios (in pps.), euro area



However, anticipation and preparedness can avoid even higher costs in 2024. In the '*procrastination*' scenario, in 2024, GDP growth is significantly lower, around 1ppt. below the forecast baseline, and inflation remains around 2½ pps. above the baseline projection, implying inflation rates above 5% until 2024. By contrast, in the preparedness scenario, growth and inflation differ only slightly from the forecast baseline in 2024.

These stylised simulations cover only selected channels. The model simulations cannot cover all the risks emanating from energy markets. For example, disruptions to infrastructure pose severe risks to gas supply in the EU. Additional channels include import markets, world demand and financial markets, as discussed, for example, in the Special Issue of the Spring Forecast.[51] Finally, as with any model-based assessment, the simulations are subject to high uncertainty at this juncture. Still, they highlight the merit of coordinated and decisive forward-looking action to avert the major economic fallout of the realisation of some risks.

[51] See "Alternative scenarios on the economic outlook" (2022), ibid.