



Banc Ceannais na hÉireann
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Box B:

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The Impact of Gas Prices on the Forecast

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One of the key assumptions underpinning the forecasts contained in this *Bulletin* is the future wholesale price of natural gas. The Bank's forecasts derive technical assumptions for all commodity prices used in the forecasts. We use a ten-day average of the futures price up to the forecast cut-off, typically five days before the publication of the forecast. One of the most significant commodity movers in recent months has been natural gas².

Since the Russian invasion of Ukraine, concerns about supplies to Europe have seen wholesale gas prices increase by as much as 296 per cent (on 26 August), and are now around 137 per cent higher since close on 23 February. The peak in prices reached on 26 August came ahead of a three day halting of natural gas supplies from Gazprom to Europe via the Nord Stream 1 pipeline due to maintenance amid concerns the pipeline would not be switched back on. Gas prices have remained elevated since due to uncertainty over the supply and inventories of natural gas, and as leaks were discovered in both the Nord Stream 1 and 2 pipelines.

In Ireland, natural gas is a primary input in electricity generation, as well as a method for home heating. As such, increases in the wholesale price of gas pass directly to energy products in the HICP. There are also strong indirect effects, as non-energy firms facing significant energy price increases pass these costs on to consumers. High levels of uncertainty in this key assumption therefore imply high levels of uncertainty about the inflation forecast overall.

One way to quantify the range of uncertainty in the gas price assumption is derive information about investor's beliefs from financial market information. One way to do this is to use option prices. Options are financial instruments that give the buyer the right, but not the obligation, to purchase an asset at

¹ Irish Economic Analysis Division and Monetary Policy Division. Thanks to Sean Furlong (Financial Markets Division) for help with data collection.

² In this box, we discuss prices from the Title Transfer Facility, more commonly known as TTF, which is a virtual trading point for natural gas in the Netherlands. It stands as benchmark for gas prices in Europe.

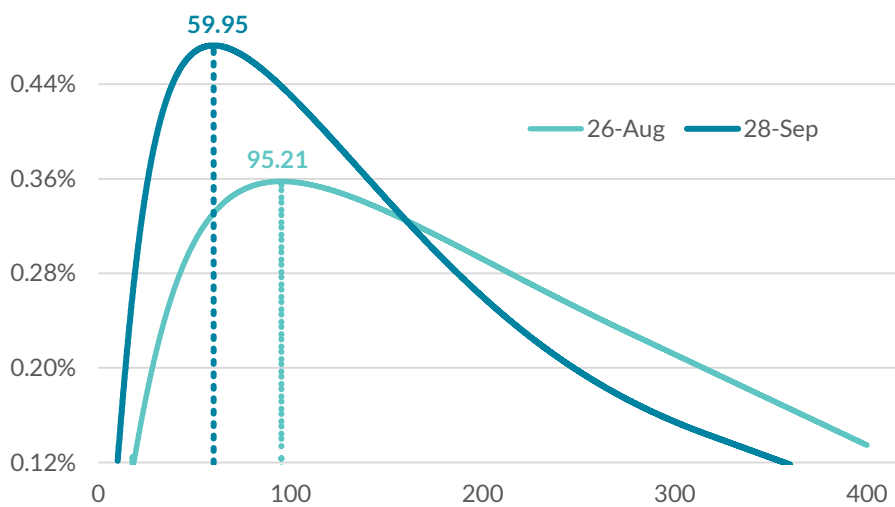


some time in the future. They are used to insure against uncertainty about the future price of financial assets and commodities. Using certain assumptions, the information in option prices can be expressed in terms of the risk neutral market-implied probability that the price of the asset will fall within a particular range on a given date in the future.³

These probabilities can be expressed in the form of a probability density function (PDF). The PDF is a visual representation of the likelihood of a given outcome, in this case the price of natural gas on a given date. Figure 1 represents a PDF constructed from options on natural gas prices (Dutch TTF) with a maturity of December 2023. The area under the curve is skewed to the right reflecting the high probability that prices will remain well above their typical range of €10-30 per MWh seen between 2010 and mid-2021.

Figure 1: Expectations for gas prices have declined since August

Chart: Risk-Neutral Distributions for options settling Dec-2023



Source: Bloomberg and Central Bank calculations

Notes: This figure shows the risk-neutral distributions for options expiring in December 2023. The distributions shown are taken on 26 August, the date at which gas prices reached their record peak and at 28 September, the most recent data available. The dotted vertical lines represent the mode for each distribution.

Figure 2 displays historical gas price futures and a range derived from option-implied market expectations of the price from now until the end of next year. The figure shows that the median market expectation is for gas prices to fall in 2023, but that the market-implied distribution suggests

³ A full outline of the methodology is available in [O'Donnell, S. and O'Keeffe, M., 2016. Option Implied Probability Density Functions: Methodology and Use in Understanding Investor Sentiment. Quarterly Bulletin Signed Articles.](#)

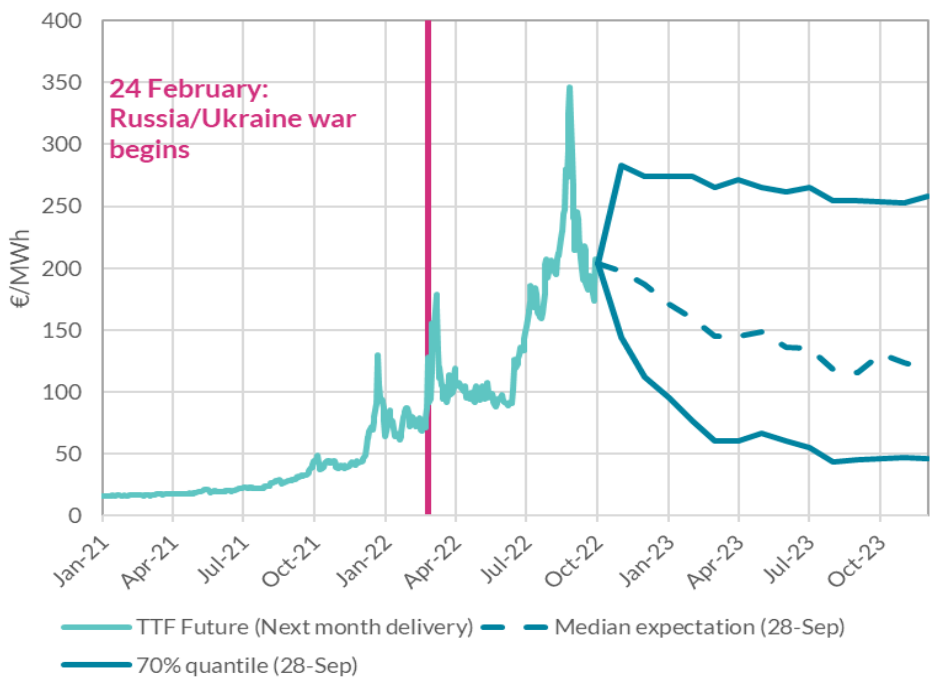


that the risk is tilted strongly to the upside, with the 70th percentile of the distribution suggesting a price in mid-2023 of €250 per MWh relative to the median price of just above €100.

These figures show the unprecedented level of uncertainty inherent in the projections for HICP energy in this Bulletin. For example, if gas prices were to reach levels consistent with the 70th percentile of the probability density function in Figure 2, this would increase the HICP energy forecast from 26.1 per cent in 2023 in this Bulletin to 31.3 per cent. Holding the other HICP components equal this would imply an overall HICP forecast in 2023 of 6.7 per cent relative to the forecast of 6.3 in this Bulletin.

Figure 2: High uncertainty remains for the path of gas prices

Chart: Historical and expected Dutch TTF gas futures price



Source: Bloomberg and Central Bank calculations

Notes: Historical prices (green) show the futures prices for next month delivery. Expected prices, derived from risk neutral probabilities (dark blue), show the path for gas futures prices for each month until end-2023. The expected path is based on options prices at close on 28 September.