Oil Price Dynamics Report

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Our model breaks down the supply and demand factors behind recent fluctuations in oil prices.

Following the approach in Groen, McNeil, and Middeldorp (2013), we identify demand and supply shocks on oil prices by using correlations between oil price changes and a large number of financial variables. The underlying assertion is that oil demand and supply shocks generate different price movements across these variables. Note that we use the Brent benchmark oil price instead of the West Texas Intermediate (WTI) oil price because the former more accurately reflects other global benchmark measures.

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Federal Reserve Bank of New York, Oil Price Dynamics Report, https://www.newyorkfed.org/research/policy/oil_price_dynamics_report.

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Disclaimer

The Oil Price Dynamics Report is not an official estimate of the Federal Reserve Bank of New York, its President, the Federal Reserve System, or the Federal Open Market Committee.

About the Oil Price Dynamics Report

How oil price fluctuations affect the U.S. economy will depend on whether supply or demand factors are driving them. Our statistical model examines correlations of oil price changes with a broad array of financial variables to determine which forces best explain price movements. We update it every other Monday at or shortly after 3 p.m. (except during blackout periods surrounding Federal Open Market Committee meetings). When federal holidays occur on a Monday, the report is delayed by twenty-four hours.

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Recent Trends

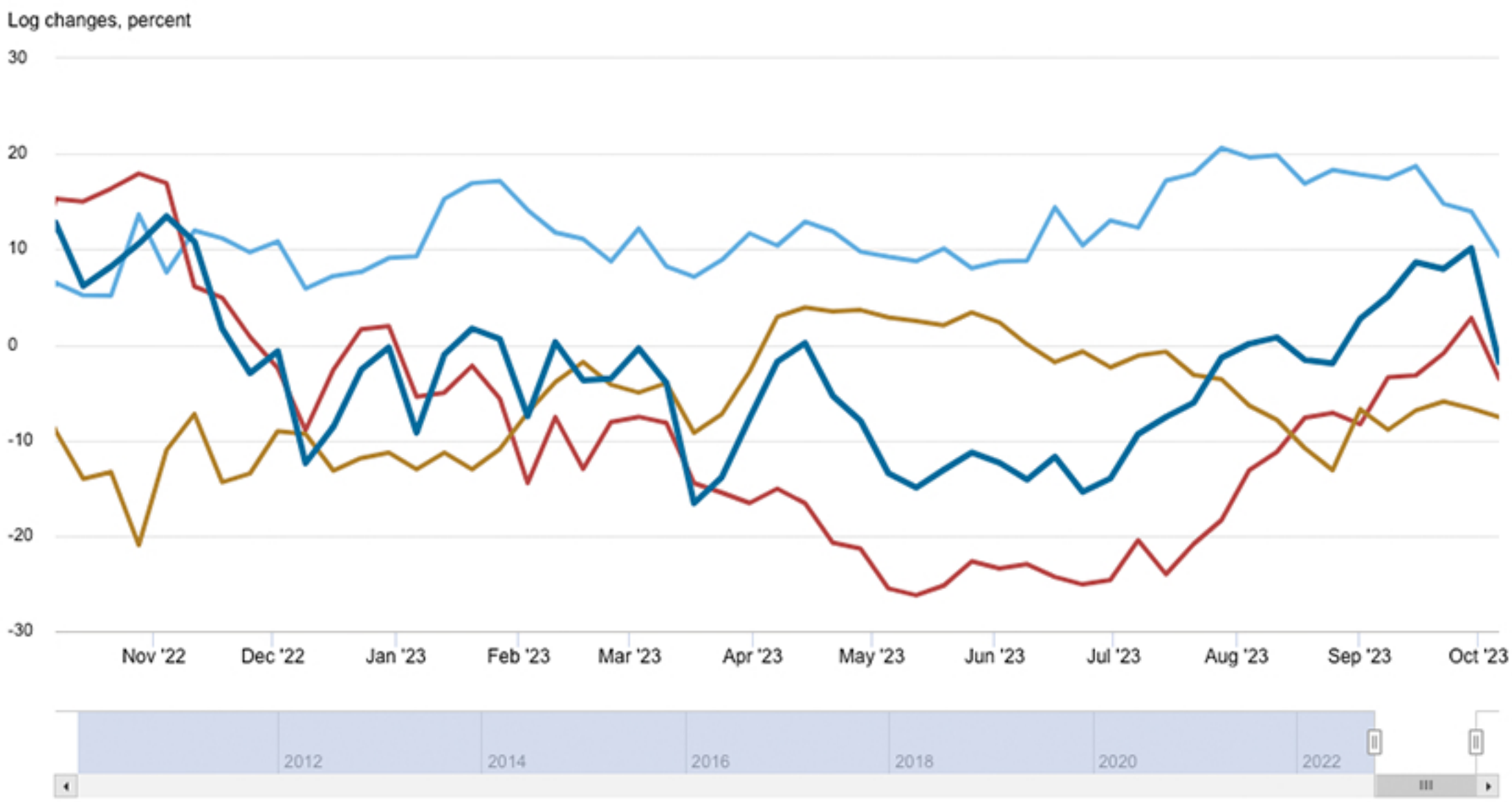
- Oil prices have declined over the last two weeks as a result of downward pressure from both supply and demand factors.

Cumulative Weekly Oil Price Decomposition

Latest Release 3:00 p.m. October 10, 2023

SELECT OPTIONS ☑ Brent crude price ☑ Demand ☑ Supply ☑ Residual

From: Oct 7, 2022 To: Oct 6, 2023



Sources: Authors' calculations; Haver Analytics; Thompson Reuters; Bloomberg L.P.
Notes: The chart above tracks cumulative weekly changes in the price of Brent crude oil and presents the estimated contributions of supply and demand factors to those price fluctuations (the "residual" series captures the effects of unexplained factors). The supply, demand, and residual series sum to the Brent crude price series. For each series, an increase (upward movement) indicates a positive contribution to price. An increase in the supply series implies a decrease in expected supply, which increases price. The demand series is intuitive; an increase in expected demand increases price.

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What is the goal of the oil price decomposition?

Our aim is to determine how much of the observed oil price change has been driven by demand and supply factors.

What is the modeling strategy?

Using a statistical model and a large number of financial variables, we decompose weekly oil price changes into demand effects, supply effects, and an unexplained residual.

Sparse partial least squares regression allows us to construct linear combinations from the variables in our financial market data set—called factors—which have maximum explanatory content for oil price changes. We first use this procedure to generate factors that best capture the patterns in the data, and then examine the estimated factors to determine how they reflect demand or supply dynamics.

The model is re-estimated every week using weekly data from January 1986 through the close of business on Friday of the most recent week. Over this sample, the model can explain about two-thirds of the weekly oil price dynamics.

How should users interpret the results?

The output of the model is used to decompose weekly changes in an accounting sense. More specifically, the weekly Brent crude price change always equals the change explained by demand factors plus the change explained by supply factors plus a residual (the weekly change unexplained by the sum of the estimated demand and supply factors). Given the noise in weekly price changes, we choose to show the results as a cumulation from a certain starting point (usually the start of the previous quarter).

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