Exogenous Oil Supply Shocks in OPEC and Non-OPEC Countries

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Recent geopolitical events, such as the 2019 drone strikes targeting Saudi Arabian oil-processing facilities and growing tensions between the U.S. and Iran, have refueled public concerns about oil supply disruptions. At the same time, there is an ongoing debate in the academic literature about how to identify oil supply shocks in structural vector-autoregressive (VAR) models of the global oil market, arising from different views about the short-run price elasticities of world oil supply and demand. This calls for external instruments in order to identify the dynamic causal effects of exogenous oil supply disruptions on world oil prices and macroeconomic conditions.

Kilian (2008: "Exogenous oil supply shocks: How big are they and how much do they matter for the U.S. economy?" *Review of Economics and Statistics* 90(2), 216–240) proposes a measure of oil supply shocks based on arguably exogenous production shortfalls in OPEC countries due to geopolitical events such as wars, strikes or natural disasters. Production shortfalls are constructed as the difference between the actual production levels and a country-specific counterfactual based on the evolution of oil production in a benchmark group of countries that was not subject to the same or any other exogenous event during the period under consideration but adhered to similar economic conditions – in particular the same crude oil price – and incentives.

We expand Kilian's (2008) original series of exogenous oil supply shocks along two dimensions. First, we extend the sample period to include production shortfalls in OPEC countries also during 2004:10–2019:12. Second, we consider production shortfalls in major oil-producing countries outside of OPEC, including the U.S. and Canada, for example. These two extensions yield a truly global measure of exogenous oil supply shocks at the monthly frequency for 1973:1–2019:12.

Our time series displays statistically significant contemporaneous correlation with state-of-the-art estimates of oil supply shocks based on structural VAR models. At the same time, it requires only a limited number of explicit assumptions about the counterfactual oil production in the countries under consideration and provides thus an alternative to and instrument for the estimates based on structural VAR models.

Given that the methodology in Kilian (2008) relies on the identification of arguably exogenous political events and natural disasters, the resulting time series predominantly reflects negative oil supply shocks. However, these are exactly the kind of production disruptions that are of primary interest to market participants and policymakers alike, as they are likely to cause an unpredictable increase in the price of crude oil.

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