# The Effect of Oil Supply Shocks on U.S. Economic Activity: What Have We Learned?

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## Introduction

This paper reviews recent research and explores the question: What is the effect of oil supply disruptions on U.S. GDP? We argue that differences in methodology due to identification assumptions and estimation techniques result in important dissimilarities in the response pattern of the real oil price and U.S. real GDP. The inclusion of a proxy for above-ground crude oil inventories in the SVAR model leads to a larger impact of oil supply disruptions on real oil prices. All else equal, models that impose large values of the short-run price elasticity of oil supply result in smaller estimates of the short-run price elasticity of demand in production. They also imply a larger response of real oil prices to oil supply disruptions and a larger and longer-lived contraction in U.S. real GDP.

We explore the sensitivity of the results to changing the prior on the short-run price elasticity of supply, the number of lags in the SVAR, down-weighting earlier data and conducting inference using the impulse response of the modal posterior model instead of the pointwise posterior median responses. On the one hand, we show that if we are willing to condition on a range of supply elasticity values that is supported by microeconomic estimates, the apparent disagreements in the literature regarding the response of real oil prices to supply disruptions are not nearly as large as they initially seem. On the other hand, changes in lag length and loss function contribute to explain the differences in the response of U.S. real GDP.

## Methods

Structural Vector Autoregressive (SVAR) Method, Sign Restrictions Approach

## Conclusions

Estimates of the dynamic effect of oil supply disruptions on real oil prices differ greatly across studies. The source for these dissimilarities can be traced to differences in methodology, especially alternative identification schemes, model specification and estimation methods. This paper reviewed recent SVAR models used to study the world oil market and also evaluated the effect of the implied structural supply shocks on U.S. real GDP.

What have we learned? First, future investigations into the role of oil supply (and demand) shocks on real oil prices should heed the advice of Kilian and Murphy (2014) to include a measure of crude oil inventories into the SVAR models for the crude oil market. Doing so is key in modeling the short-run comovement between oil production and prices. Second, once inventories are accounted for and the short-run price elasticity of demand has been pinned down, the importance of oil supply shocks in generating recessions hinges heavily on the value of the short-run price elasticity of oil supply.

We found that models that impose a prior that attaches a large probability mass to large values of the short-run price elasticity of oil supply such as Baumeister and Hamilton (2017) result in larger estimates of the short-run price elasticity of oil supply and smaller estimates of the short-run price elasticity of demand in production. They also imply a larger response of real oil prices to oil supply disruptions and a larger and longer-lived contraction in U.S. real GDP. The maximum contraction in U.S. real GDP was estimated as -3.373% based on the Baumeister and Hamilton (2017) model. In contrast, the maximum decline in real GDP is -1.669%, -1.471% and -0.984% in the models of Kilian (2009), Kilian and Murphy (2012) and Kilian and Murphy (2014), respectively, which bound the price elasticity of oil supply to be consistent with economic theory and extraneous microeconomic evidence.

## References

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