A Macroeconomic Analysis of the U.S. Crude Export Ban

Nida C. Melek, Federal Reserve Bank of Kansas City
Michael Plante, Federal Reserve Bank of Dallas
Mine K. Yucel, Federal Reserve Bank of Dallas

May 13, 2015

1. Introduction

Rapidly expanding U.S. shale oil production has dramatically changed the nation's energy landscape in a few short years. Since 2010, the U.S. has increased its oil production by 4 million barrels per day. The ample supplies of crude oil have raised fears of price collapse of domestic oil prices. The reason for these fears is a federal ban on crude oil exports whose motivation dates back to the 1973 oil embargo.

Localized oversupply—the result of transport constraints—has already depressed regional crude oil prices relative to global rates.[1] As pipeline infrastructure reaches new production areas, more crude is flowing to the Gulf Coast, where more than 50 percent of U.S. refining capacity resides. But, refiners there potentially lack the ability to process all the newly discovered oil. Although the U.S. has one of the largest refining capacities in the world, it is mostly for heavy, sour crudes. Only a small amount of this capacity is for light sweet crude. Because crude oil from shale is predominantly "light," there is a mismatch in heavy versus light refining capacity raising the specter of an oversupply that could persistently depress U.S. oil prices.

The increased domestic supply and the differential in domestic and international oil prices have led to calls to lift the oil export ban. The lifting of the oil export ban raises a number of questions on how oil and product markets and other macroeconomic variables will be affected. In this context, there is a large body of non-academic literature discussing the impact of a U.S. crude oil free trade policy by national and international organizations.[2] These studies are typically qualitative in nature or rely on simple models in order to evaluate the impact. Overall, they argue that a free trade policy would increase the price of domestic crude oil hence could increase production, would reduce the price of gasoline therefore would benefit consumers. The estimated decline in domestic gasoline prices change from 1.5 cents to 13 cents in these studies.

We propose to explore the quantitative impacts of the lifting of the export ban on domestic and foreign oil production, oil prices, product markets, and trade flows from a macroeconomic perspective.

[1] However, this development does not appear to benefit consumers. Borenstein and Kellogg (2014) find that the discount in Midwest crude oil prices did not pass through to prices for refined products consistent with the fact that the marginal gallon of fuel in the Midwest still being imported at global prices.
[2] Brookings Institution (2014), EIA (2014), ICF International (2014), IHS (2014, 2015), etc.

2. Methodology

There has been a renewed and growing interest in the literature for developing full-fledged dynamic stochastic general equilibrium (DSGE) models that incorporate global and domestic energy markets. We plan to investigate the impact of lifting U.S. crude export ban through the lens of a DSGE model allowing us to explore some of the potential macroeconomic effects that might be associated with the export ban.

The model will include two "representative" countries: the U.S. and the rest of the world. Both countries produce oil, refined petroleum products, and non-oil goods. We will model the export ban and the short-run constraint on how much oil can be processed in the U.S.

Various modeling choices are possible for some of the issues we plan to analyze. One salient example is how to model investment in refinery capacity. Refineries typically have long lead times before they begin operating. Investment behavior could be modeled using capital adjustment costs in the capital accumulation constraint, such as in Hayashi (1982), Baxter and Crucini (1995); or by using a time to build approach, such as in Kydland and Prescott (1982), Backus, Kehoe, and Kydland, (1992, 1994). Likewise, there is the question of whether it is necessary to model the type of crude oil, i.e. heavy or light oil. Part of the research will focus on how best to model these and other issues in a parsimonious manner. The scoping workshop will be helpful in exploring some of the different ways of modeling the suggested refinements.

Once the model has been chosen, we plan to conduct several experiments including a specific policy experiment. First, the U.S. economy will be hit with a very persistent shock that increases crude oil production. Following this shock, for example, the impact on crude oil prices can be examined in order to see whether the shock drives a discount between oil prices across the two countries in the model. Second, the constraint imposed by the export ban will be removed in the model. We will then compare the time series that is generated from the model under this policy to several other alternative scenarios. We may also consider the results that come from several modeling assumptions.

3. Data Sources

Researcher Provided Data

Various macroeconomic and oil-market related data from the Haver database, Bloomberg, Wall Street Journal, and the Energy Information Administration.

The researchers do not need any funding or other research support.

4. Project Output and Disclosure Risk

The expected output will be in the form of time series generated from the model for the policy experiments we run. These time series will be used to discuss the implications of removing the export ban.

We plan to use the output to write a research paper for publication in a peer-reviewed journal and for presentation at academic conferences, including the NBER scoping workshop to be held in Cambridge, MA on July 19, 2015.

As the project is currently not expected to use any confidential data, we do not see any disclosure risk associated with our research.

5. Conflict of Interest Statement

The researchers are from the Federal Reserve Banks of Kansas City and Dallas. There are no financial or other interests of the researchers that might bear on the proposed work. The researchers have no ties to the energy industry.

6. Project Duration

The project is expected to last about a year.

References

Backus, D. K., Kehoe, P. J., and Kydland, F. E., 1992, ``International Real Business Cycles," Journal of Political Economy, Vol. 100, No. 4, 745-775

Backus, D. K., Kehoe, P. J., and Kydland, F. E., 1994, ``Dynamics of the Trade Balance and the Terms of Trade: The J-Curve?" The American Economic Review, Vol. 84, No. 1, 84-103

Baxter, M., and Crucini, M. J., 1995, ``Business cycles and the asset structure of foreign trade," International Economic Review, Vol. 36, No. 4, 821-854

Borenstein, S., and Kellogg, R., 2014, ``The Incidence of an Oil Glut: Who Benefits from Cheap Crude Oil in the Midwest?" The Energy Journal, Vol. 35, No. 1

Brookings Institutions, 2014, ``Changing Markets: Economic Opportunities from Lifting the U.S. Ban on Crude Oil Exports"

Hayashi, F., 1982, ``Tobin's Marginal q and Average q: A Neoclassical Interpretation," Econometrica, Vol. 50, No.1, 213-224

ICF International, 2014, ``The Impacts of U.S. Crude Oil Exports on Domestic Crude Production, GDP, Employment, Trade and Consumer Costs"

IHS, 2014, ``U.S. Crude Oil Export Decision: Assessing the Impact of the Export Ban and Free Trade on the Economy"

IHS, 2015, ``Unleashing the Supply Chain: Assessing the Economic Impact of a U.S. Crude Oil Free Trade Policy"

Kydland, F. E., Prescott, E. C., 1982, ``Time to Build and Aggregate Fluctuations," Econometrica, Vol. 50, No. 6, 1345-1370

U.S. Energy Information Administration, 2014, ``What Drives U.S. Gasoline Prices?"