The Impact of Oil expenses and Credit on the U.S. GDP.

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Overview

Since the late 1970s' the relationship between oil and GDP growth is of main interest, a debate emerged and a contrast was drawn in order to find a relationship between the price of oil and its true impact on the U.S. GDP growth. In 1983, Hamilton showed that a linear relationship between oil price and U.S. recession post-WWII existed. Since then, the linkage between oil price and the U.S. real GDP growth continue to evolve. At the mid-1980s', due to the decline of the oil price, the necessity to use nonlinearities in order to explain the relationship comes up. Mork in 1989 was the first to introduce nonlinearities in the relation by taking only the positive returns of the price of oil. Nevertheless, this new specification did not last for long. Hooker, in 1996, proved that this nonlinear specification did not hold with the new data (from 1989-1996). Around that time, Hamilton improved the nonlinear specification by taking the positive part of the return of oil with respect to the maximum value over the past three years. This new specification still has a high significance in the sense that the real U.S. GDP growth today is significantly reacted to the value of this nonlinear specification over one year before. However, the 2000s' run-up of oil price should have created more recessionary periods (since the 2000s' plot of the nonlinear specification shows a lot of spikes during the period post-crisis), furthermore, Blanchard and Gali (2007) and Blanchard and Riggi (2013) showed that the effect of oil price in the 2000s' did not have the same impact on fundamental macroeconomic variables (including GDP) than the 1970s'; this impact was muted. The episode of the 2000s' opens door to further refinement on the nonlinear relation between oil and the U.S. real GDP growth. One can address this issue by involving credit, known as being the main driver of the 07/08 financial crisis, in the nonlinear specification. To do so, one can propose the ratio oil expenses relative to credit, and then use the nonlinear specification of Hamilton (1996, 2003) to this ratio. The rationale behind this ratio is that private agent (households, managers, governments…) face energy expenditures strongly correlated with the price of oil, one way to avoid the impact of high costs to the economy is through credit. This ratio is representing the expenditure for oil not covered by credit. When the nonlinearities à la Hamilton on this ratio is positive, meaning that the ratio is higher today that its three-year high, a bad signal is sent to the U.S. economy.

Methods

The methodological tools are econometrics, more precisely linear regression, stability tests, structural break tests and likelihood ratio test. I also use the Monte-Carlo integration as in Kilian and Vigfusson (e.g. 2011a, 2011b, 2013, 2014…) for forecasting purposes. These tools are borrowed from the past literature made on that field.

Results

The ratio presented before plugged with the nonlinear specification of Hamilton (1996) shows a strong significant relationship with the U.S. real GDP growth, implying that the one-quarter and the one-year past values of the nonlinear formulation of the ratio has a significant relationship with the GDP today. This relation is also stable over time. Furthermore, once the methodology of Kilian and Vigfusson used, the forecasting of the real U.S. GDP growth with the nonlinear representation of the ratio gives a good out-of-sample performance relative to existing models on that field.

Conclusion

This new nonlinear relation enhances the linkage between oil market, credit market and the real U.S. GDP growth and show how increase of oil prices can be one of the causes of economic downturn. The next step is to do this analysis in other countries (which suffer from a lack of long time series) and to extend this idea to over energy sectors.

References

Olivier J. Blanchard & Marianna Riggi, 2013. "WHY ARE THE 2000s SO DIFFERENT FROM THE 1970s? A STRUCTURAL INTERPRETATION OF CHANGES IN THE MACROECONOMIC EFFECTS OF OIL PRICES," Journal of the European Economic Association, European Economic Association, vol. 11(5), pages 1032-1052, October.

Olivier J. Blanchard & Jordi Gali, 2007. "The Macroeconomic Effects of Oil Shocks: Why are the 2000s So Different from the 1970s?," NBER Working Papers 13368, National Bureau of Economic Research, Inc.

Hamilton, James D., 2011. "Nonlinearities And The Macroeconomic Effects Of Oil Prices," Macroeconomic Dynamics, Cambridge University Press, vol. 15(S3), pages 364-378, November.

Hamilton, James D, 1983. "Oil and the Macroeconomy since World War II," Journal of Political Economy, University of Chicago Press, vol. 91(2), pages 228-48, April.

Hamilton, James D., 1996. "This is what happened to the oil price-macroeconomy relationship," Journal of Monetary Economics, Elsevier, vol. 38(2), pages 215-220, October.

Kilian, Lutz. “Oil Price Shocks: Causes and Consequences.” CEPR Discussion Papers 9823, C.E.P.R. Discussion Papers, February 2014.

Kilian, Lutz and Vigfusson, Robert J. “Are the responses of the U.S. economy asymmetric in energy price increases and decreases?“ Quantitative Economics, 2(3):419-453, November 2011a.

Kilian, Lutz and Vigfusson, Robert J. “Nonlinearities In The Oil Price-Output Relationship”. Macroeconomic Dynamics , 15(S3):337-363, November 2011b.

Kilian, Lutz and Vigfusson, Robert J. “Do Oil Prices Help Forecast U.S. Real GDP? The Role of Nonlinearities and Asymmetries”. Journal of Business & Economic Statistics, 31(1):78-93, January 2013.

Kilian, Lutz and Vigfusson, Robert J. “The Role of Oil Price Shocks in Causing U.S. Recessions”. CEPR Discussion Papers 10040, C.E.P.R. Discussion Papers, June 2014.

Mork, Knut Anton, 1989."Oil and Macroeconomy When Prices Go Up and Down: An Extension of Hamilton's Results," Journal of Political Economy, University of Chicago Press, vol. 97(3), pages 740-44, June.