OIL DEPENDENCE AND OIL SHOCKS IMPACTS: EUROPE VS. UNITED STATES

Verónica Acurio Vásconez, Université de Lorraine, Bureau d'économie théorique et appliquée (BETA), +33 3 72 74 20 83,
veronica.acurio-vasconez@univ-lorraine.fr

Overview

The importance of oil in the economy has regained attention after some surprising events of the last years: the latest upward and downward movements of oil prices, the increasing production of shell gas in U.S, and the increasing debate about climate change held at the COP21 in Paris in 2016. One should notice however that while the consequences of oil shocks in the U.S. economy is a largely studied subject since the 1970s, very little has been made for other industrialized economies and almost no study analyzes the impact of downward oil prices. One should note as well that very few macroeconomic studies has try to estimate the importance of oil in the economy.

When talking about the consequences of a positive oil increase in oil prices, we felt into a strong debate regarding the reasons why the sharp increase in oil prices observed between 2002 and 2007, which was comparable in size to those observed in the 1970s, did not provoke the same consequences as the previous ones[1]. This debate has been addressed by different authors as Blanchard & Galí (2009), Blanchard & Riggi (2013), Acurio Vásconez et al. (2015) and Acurio Vásconez (2016), among others. While BG (2009) and BR (2013) suggest that the different reaction of the real economy towards oil shocks comes from a structural change of the U.S economy between 1970 and 2000, Acurio Vásconez (2016) shows that some of the conclusions claimed by BG (2009) and BR (2013) are no longer verified when capital accumulation is added to the model and suggest that the difference comes from the fact that during the oil shock of the early 2000 the U.S. economy could import as much oil as needed, something that it has not been able to do in the 1970s when the oil shock was mostly a supply shock. Moreover, Acurio Vásconez et al. (2015) and Acurio Vásconez (2016) estimates the importance of oil in the industry and its level of substitutability compared with other factors of production. However, all those studies have been solely concentrate in the U.S. economy. The aim of this paper is then to enlarge the study of Acurio Vásconez (2016) to the European case.

Using the Acurio Vásconez (2016) model in which I modelise an exchange rate, I estimate the parameters of the model, among them the output elasticity of oil and the elasticity of substitution between oil and a composite factor of labor and capital, using series from 15 European countries (the EU-15). In a first step, the period of estimation is the same as in Acurio Vásconez (2015), 1984:Q1 – 2007:Q3. In this regard, the analysis of this paper is threefold: firstly, to perform a comparison regarding oil importance within European countries and with respect to U.S, secondly to quantify the structural differences between Europe and U.S. and thirdly, to study how the structural differences between Europe and U.S. play a role in the mitigation of positive oil shocks.

In a second step, I estimate the model using EU-15 countries data from 1984:Q1 – 2016:Q3 at a second order approximation. In Acurio Vásconez (2016) the estimation was not possible after the third quarter of 2007 because after this date, the U.S. became a net oil exporter country[2], but this hypothesis still holds for European countries. Moreover, using a second order approximation allow us to study the impact of decreasing oil prices in the real economy observed since 2014.

The paper is still a work in progress, however some estimation results are expected: (1) Europe and U.S. are not the same neither in terms of wage and price rigidity, nor in terms Central Bank reaction with respect to inflation and output gap. These results as simple they may seem, will give some validation to the modelisation. Other results however, will need more attention: (2) which region has the higher output elasticity of oil? Or what is the same, which country and region is more efficient in terms of oil utilization? (3) Is a country with better oil substitutability less affected after an increasing oil shock? (4) How a decrease in real oil prices affect an oil importer economy?

---

[1] Oil prices rose 150% between 1973-1974, 100% between 1978 and 1980 and 147% between 2002 and 2008.

[2] One important hypothesis used in this model stablish that all the oil used in production and in consumption comes from a foreign economy at an exogenous price. This hypothesis is no longer true after for U.S., who became a net oil exporter at the end of 2007.

Methods

The model is based on the dynamic stochastic general equilibrium (DSGE) model developed in Acurio Vásconez (2015). It consists in a small open economy in which oil is imported from a foreign country at an exogenous price. The model consists of three sectors: Households, Firms and Government. The model supposes that a typical household, consumes both oil and domestic goods, tied together by a CES function. Each household also supplies a differentiated service to the production sector, invests in government bonds and capital, pays taxes, and receives profits from the firms in the economy. I assume as well that there is a representative perfect competitive final good firm that uses intermediate goods, produced by the intermediate firms, in order to create the final good that will be sold to the consumers. While the production factors of the final good firm are just intermediate goods, I suppose that the monopolistic intermediate firms use oil, capital and labor in order to produce the intermediate good. The constant elasticity of substitution (CES) production function includes oil and a composite factor of labor and capital, linked in a Cobb-Douglas function. The model includes a Government sector with exogenous spending and a Central Bank that sets the nominal short-term interest rate using a Taylor rule monetary policy. I also explicitly modelise an exchange rate in order to take into account the fact that oil imports are paid in U.S. dollars. Then using Bayesian techniques, I estimate the model using macro series from 15 European countries (UE-15). The estimation is done in two different periods: 1984:Q1 – 2007:Q3 and 1984:Q1 – 2016:Q3. Finally, using a Taylor expansion at the second order, this paper studies the reaction of the UE-15 economies, to a positive and negative oil shock.

Results

As stablish before, the paper is still a work in progress, and need some more analysis. Some results are expected whereas others will need a deeper analysis.

Conclusions

This paper will help us to quantitative determine: (1) the structural economic differences between Europe and U.S. (2) which EU country and which region is the more efficient in terms of oil utilization, (2) what is the role of oil substitutability in the attenuation of positives oil shocks, and (3) how a decrease in real oil prices affect an oil importer economy.

References

Acurio Vásconez, V., G. Giraud, F. McIsaac, and N. Pham (2015). "The Effects of Oil Price Shocks in a New-Keynesian Framework with Capital Accumulation". Energy Policy 86, 844 – 854.

Acurio Vásconez, V. (2015). "What if Oil was Less Substitutable? A New-Keynesian Model with Oil, Price and Wage Stickiness including Capital Accumulation". Working Paper Centre d'économie de la Sorbonne 2015.41

Olivier J. Blanchard and Jordi Galí, The Macroeconomic Effects of Oil Shocks: Why are the 2000s so different from the 1970s?, CEPR Discussion Papers 6631, C.E.P.R. Discussion Papers, January 2008.

Blanchard, O. and M. 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 11(5), 1032–1052.