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The effects of exogenous oil supply shocks on the economic growth of selected Mediterranean countries

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Overview

Three continents, namely Europe, Asia and Africa, and twenty-one sovereign countries border the Mediterranean Sea. Countries with coastlines on the Mediterranean Sea are very heterogeneous and have distinct cultural and historical backgrounds. Moreover, marked economic, political and social divides exist between countries on the North shore and countries on the South shore of the Mediterranean basin. The North and South shores of the Mediterranean Sea differ also in terms of their degree of energy dependence and energy intensity. The World Bank's World Development Indicators show that in 2011, with the exception of Algeria, Egypt, Libya and Syria, which are classified as net energy exporters, the remaining Mediterranean (MED) countries were heavily dependent on imported energy. In the light of the strategic importance of the Mediterranean region for the European Union, further research is necessary to investigate the impacts of major macroeconomic shocks on the economies of the MED countries, which are highly heterogeneous in terms of the level and the rate of growth of economic activity, energy dependence and energy intensity. In this paper we concentrate on unexpected oil price changes due to supply shortages, one of the most important and widely investigated types of macroeconomic shocks (see e.g. Berument, Ceylan, and Dogan, 2010 and references therein).

Our study widens the extant literature on oil price shocks, at least in three directions. First, it analyzes countries which are generally under-investigated, since, to the best of our knowledge, no studies have been published so far on the macroeconomic effects of oil price shocks on the economies of the MED region. Second, it provides fresh empirical evidence on how different economies react to exogenous oil supply shocks at both aggregate and micro (i.e. industry) levels. Third, it addresses several research questions which are relevant for policy makers and global investors, namely: What is the relation between the effects of exogenous oil supply shocks, energy efficiency and energy dependence? Are the effects of these shocks long-lasting? Are the impacts of exogenous oil supply shocks country-specific? Do these shocks impact differently on different industries in different countries? Which industries are more exposed to oil supply shocks? Which countries are more affected by such shocks?

We answer those questions by modelling and estimating the responses to exogenous oil supply shocks during the period 1973-2013 of eight MED countries, Egypt, France, Greece, Israel, Italy, Morocco, Spain and Turkey, which are representative of different dimensions of heterogeneity (e.g. income levels and growth rates, degrees of energy dependence and energy intensity, levels of oil imports and exports) characterizing the MED basin. For each country, we focus on the effects of exogenous oil shocks on the economic activity of the whole economy, as well as of selected industries. Our results confirm the need of a common, multi-dimensional, integrated economic policy for the whole MED region, which can contrast the contractionary effects of oil price shocks taking into account the existing between-country and within-country differences and similarities in terms of economic development, energy intensity and energy dependence.

Methods

We measure exogenous shocks to the supply of crude oil in OPEC member countries following the approach of Kilian (2008a). A proxy of supply shocks is constructed, based on the difference between the observed crude oil production level and a counterfactual level of crude oil production in countries where specific geo-political events have led to an oil production shortfall. The counterfactual series is defined as the level of production that would have been observed in the absence of the exogenous events which are responsible for the crude oil production shortfall. It is obtained by extrapolating the pre-events production level, based on the average growth rate of production in countries which are not hit by those geo-political events. Exogenous crude oil production shortfalls are then aggregated over countries, expressed as a percent of world crude oil production and transformed in first differences. Since the original series of exogenous oil supply shocks due to Kilian (2008a) ends in September 2004, we rely on its revised version updated by Bastianin and Manera (2016), which spans from January 1973 to December 2013 and includes the crude oil production shortfall due to the Libyan Civil War of 2011.¹

¹ As of August 2015, OPEC members were: Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela. This list is different from that in Kilian (2008a,b). Specifically, Angola joined OPEC in 2007, while Ecuador suspended its membership from December 1992 until October 2007. Notwithstanding small numerical discrepancies, Alquist and Coibion (2014) show that the correlation between the original shock measured by Kilian (2008a) and the updated series of Bastianin and Manera (2016) is very close to one.

To study the effects of exogenous oil supply shocks on economic growth (as measured by the Gross Value Added, or by the sectoral Value Added) we use a Distributed Lag (DL) model estimated with Ordinary Least Squares (OLS). Inference is based upon standard errors computed with block-bootstrap methods, so as to deal with the possibility of serial correlation in the error terms. In the DL model the OLS estimates of the coefficients corresponds to the impulse response at horizon h . Our empirical model rests on the assumption that oil supply shocks are pre-determined with respect to macroeconomic conditions in a given country. Pre-determinedness implies that there is no instantaneous feedback from the level of economic activity in the selected MED countries to crude oil production in OPEC countries.

Results

Results in the literature (see, among others, Kilian 2008 a,b ; Bastianin, Manera 2016; Bastianin, Manera and Conti, 2016) suggest that, for the U.S. and most of the G7 economies, exogenous oil supply shocks cause a temporary reduction in real Gross Domestic Product. Our findings on the selected MED countries do not contradict this evidence. Most of the MED net energy importers experience a temporary decrease of the rate of growth of Gross Value Added (GVA). Some common patterns emerge, which characterize the response of each MED country to an unexpected reduction in global oil production and are coherent with the degrees of energy intensity and energy dependence of the country, as well as with the composition of the GVA. Exogenous oil supply shocks do not affect GVA when a high degree of energy intensity is compensated by a low degree of energy dependence. The impacts of oil supply shocks on GVA are long-lasting (i.e. five years on average) when a high level of energy intensity is strengthened by a high level of energy dependence. The impacts of oil shocks on the GVA of the MED countries which belong to the European Union are temporary (i.e. less than two years on average). The Manufacturing and Commerce industries exhibit different response dynamics to oil shocks in the MED countries which are located in the North of Africa. The value added growth rate of the Manufacturing industries in the MED countries which belong to the European Union (with the exception of Greece) reacts, on average, two years after the oil shock. Across the selected MED countries, the oil shocks have more impact on the value added rate of growth of Manufacturing, Commerce and Transportation, while the effects on Agriculture and Construction are less evident.

Conclusions

The relationships between the European Union (EU) and countries in the North African and Middle East region of the Mediterranean Sea are strategically important for energy firms operating in the area, as well as for the energy security of net energy importers. We have shown that the degree of energy intensity and energy dependence influence how the selected MED economies react to an unexpected reduction in global crude oil production. The response of real GVA growth is negative and often statistically significant for net energy importers, while for net energy exporters (i.e. Egypt) it is not distinguishable from zero. This result holds for the aggregate economies, as well as for the selected industries. In the case of the MED countries belonging to the EU, several similarities emerge. Above all, the effects of an oil supply shock increase with the degree of energy dependence and countries experience shocks with the same timing. These results suggest that initiatives aimed at strengthening the collaboration between the EU and other MED countries, net energy exporters in particular, might be crucial for improving the energy security of the region. Beyond the energy security target, integration efforts such as the development of the “EU-South Mediterranean Energy Community” might help countries in the area to reach other goals, such as the design common environmental policy. These differences explain why energy integration is high on the policy agenda of MED countries. In particular, the relationships between the EU and countries in the Mediterranean-North African region are strategically important for providing a secure supply of energy to EU member states, whose economies are highly dependent on imported crude oil and natural gas (see e.g. the European Commission, 2011 and Tholens, 2014).

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