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Oil price shocks and global imbalances: Lessons from a model with trade and financial interdependencies ☆

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ABSTRACT

The aim of this paper is to investigate oil price shocks' effects and their associated transmission channels on global imbalances. To this end, we rely on a Global VAR approach that allows us to account for trade and financial interdependencies between countries. Considering a sample of 30 oil-exporting and importing economies over the 1980–2011 period, we find that the nature of the shock—demand-driven or supply-driven—matters in understanding the effects of oil price shocks on global imbalances. In addition, we show that the main adjustment mechanism to oil shocks is based on the trade channel, the valuation channel being at play only on the short run.

1. Introduction

In a context of increasing scarcity of fossil fuels, and more particularly oil, the relationship between energy prices and current-account imbalances has become a key issue in the economic literature (IMF, 2011). Since the late 1990s, this theme has increasingly prevailed in the extensive study of global imbalances' persistence, as well as in the analysis of the recent financial crisis.[1] Changes in energy prices impact worldwide current-account imbalances and, consequently, countries' net foreign asset positions, since an increase in energy prices can be considered as a transfer of wealth from importing to exporting countries. More specifically, considering the energy price–current account imbalances relationship, two main transmission channels can be highlighted. The first one refers to the trade channel that focuses on the dynamics of energy exports and imports for exporting and importing countries. Two related elements are of particular importance here: (i) the propensity of energy-exporting countries to import due to increased revenues, and (ii) the geographical distribution of their international trade. The second channel is related to international capital flows linked to the increase in energy prices; these flows being important since many producing countries have a limited propensity to import. This channel can be apprehended by relying on intergenerational considerations: in a sustainable development perspective and with exhaustible energy resources, countries need to save part of their current earnings to shift resources toward future generations.

More generally, beyond the scope of current-account issues, oil price movements have for a long time usually been considered as a major source of business cycle fluctuations. In this context, a vast literature has focused on the mechanisms whereby oil price shocks affect the macroeconomy, as well as on the measure of the impact of these shocks on economic growth (see Jones and Leiby, 1996; Jones et al., 1997, 2002, 2004; and Brown and Yücel, 2002 among others). Various transmission channels exist through which oil prices may have an impact on economic activity: an increase in the oil price is passed on to the price of petroleum products, leading to a rise in the energy bill for consumers and an increase in unit costs for producers. Yet, an increase in the oil price causes a drop in productivity, which is passed on to (i) real wages and employment; (ii) selling prices and core inflation; (iii) profits and investment, as well as stock market capitalization. Previous literature has widely investigated the relationship between oil prices and economic growth (Elder and Serletis, 2010; Ferderer, 1996; Hamilton, 2003, 2008; Kilian, 2008a; Rahman and Serletis, 2012). This link can be understood via the classic supply-side effect according to which rising oil prices are indicative of the reduced availability of a basic input to production, leading to a reduction of potential output. Consequently, there is an increase in production cost, and the growth of output and productivity are slowed. In addition to the investigation of the explanatory power of the price of oil for economic growth, a few papers have also considered its predictive power. In this vein, a recent relevant contribution dealing with forecasting issues is Narayan et al. (2014) who have investigated the predictive content of oil prices for economic growth. The authors find that the nominal price of oil predicts economic growth for 37 of the 45 considered countries, and that for around 70% of

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[1] See, among others, International Monetary Fund (2006) International Monetary Fund (2011), and Caballero et al. (2008).

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these economies there is evidence of out-of-sample predictability. Such recent studies thus highlight that investigating the macroeconomic effects of oil prices is still of great interest.

Besides, a recent literature has been concerned with the role of oil prices on stock markets, in line with the tendency of financialization of commodity markets.[2] Regarding the pioneering studies, the impact of oil price movements on share prices has notably been investigated by Jones and Kaul (1996), Sadorsky (1999) or El-Sharif et al. (2005). The seminal work by Jones and Kaul (1996) puts forward that oil prices impact the US stock market, through their influence on expected dividends and cash-flows. More recently, Narayan and Sharma (2011) have investigated the relationship between oil price and returns of firms at a micro-level, and find strong evidence of a lagged impact of oil prices on firms' returns. Phan et al. (2015) also highlight the existence of a relationship between stock returns and oil prices. Specifically, they distinguish between stock returns of oil producers and oil importers, and show that stock returns respond positively to oil price changes for the former, the effect being heterogeneous for the latter.

Despite the substantial research on the economic and financial impacts of oil price changes, we are still far from a consensus about the transmission channels. Moreover, the way oil prices influence the economy and the magnitudes of their effects may have evolved through time (Hamilton, 2008; Kilian, 2008b). Within this context, the aim of this paper is to provide a detailed investigation of oil price shocks' effects and their associated transmission channels on global imbalances. Regarding previous literature, the IMF (2006) emphasizes that while oil price shocks have a short-lived impact on current accounts, they exert a significant effect on net foreign asset positions. In addition, oil importers suffer from slower growth and real exchange rate depreciation, while oil exporters experience higher growth and real appreciation. As equity prices fall in oil-importing countries, a significant valuation channel is identified. Kilian et al. (2009) investigate the effects of oil-supply driven and oil-demand driven shocks on external accounts of oil-importing and oil-exporting countries throughout the 1975–2006 period. By using a vector autoregressive (VAR) framework, they focus on the role of the non-oil trade balance in offsetting oil trade changes and on the effects of shocks (trade channel) on the value of gross foreign assets and liabilities (valuation channel). They show that (i) the source of the shocks matters insofar as oil-supply and oil-demand shocks have different effects on external accounts,[3] and (ii) trade and valuation channels exert a significant influence on the global adjustment process. Focusing on foreign trade as a key channel of transmission of oil shocks, Korhonen and Ledyaeva (2010) estimate a system of simultaneous equations capturing the interlinkages among the GDP growth rates of different countries through the trade matrix. Their approach is based on the following intuition: (i) for net oil importers, higher oil prices constitute a negative supply shock that weakens growth, reducing the initial positive effect for net oil exporters, but (ii) at the same time, a higher growth in oil-exporting economies may lead to larger exports from oil importers. The specificity of their approach is that responses of growth rates are allowed to vary over time as the trading pattern changes. Considering the case of Russia from 1995 to 2006, Korhonen and Ledyaeva (2010) find that the direct positive effect of higher oil prices is dampened by the negative indirect effect that rests on the slower growth in its main trading partners. Cashin et al. (2014) analyze the macroeconomic consequences of oil price fluctuations across different countries over the 1979–2011 period, through the estimation of a global VAR model with a set of sign restrictions on the generalized impulse responses. They show that supply- and demand-driven shocks have specific impacts on macroeconomic variables, and that oil importers and exporters react differently.

This paper falls into this strand of the literature by focusing on the effects of oil price shocks on global imbalances, with particular attention paid to their transmission channels. Our contribution is threefold. First, while most of previous studies consider only oil-importing countries,[4] we also include oil exporters and consider a panel of 30 countries over the 1980–2011 period. Retaining a large panel of diverse countries will allow us to better apprehend the role of oil prices at a global level, which is obviously highly relevant in the context of global imbalances.

Second, turning to methodological issues, we rely on the global VAR (GVAR) approach introduced by Pesaran et al. (2004) which allows us to account for trade and financial interdependencies between countries—which is a key condition to correctly analyze global imbalances. We acknowledge that oil price shocks may have different effects over time,[5] and impose sign restrictions in our GVAR framework to discriminate between various types of structural shocks[6]: (i) supply shocks on crude oil, (ii) aggregate demand shocks, identified by demand shocks affecting all industrial commodity markets, and (iii) demand shocks specific to the oil market. Third, we go further than the previous literature—in particular compared to Cashin et al. (2014) which is the closest study to ours—by paying particular attention to the adjustment channel, and distinguish in turn between trade channel and valuation effects. This distinction is shown to be crucial since we find evidence that the main adjustment mechanism to oil shocks is based on the trade channel, the valuation channel being at play only on the short run. To our best knowledge, such a result has not been established previously, although it has important policy implications in highlighting that a full understanding of the effects of oil price shocks on global imbalances requires to consider both channels, and to account for the time horizon.

The rest of this paper is organized as follows. Section 2 briefly describes the GVAR approach. Section 3 presents the data and outlines our estimation methodology. Results and related comments are reported in Section 4, while Section 5 concludes the paper.

2. The global VAR framework

Consider a set of $N+1$ countries/regions indexed by $i = 0, 1, 2,..., N$, with country 0 denoting the reference one.[7] The GVAR model consists in a collection of individual VARX models for each country that are linked together via a "linkage matrix". For the ease of exposition, and without loss of generality, consider *VARX*(1, 1) specifications (see Pesaran et al., 2004, and Dees et al., 2007 for a generalization).[8] Those individual VARX models, that account for common global variables, are given by:

$$x_{i,t} = a_{i,0} + a_{i,1}t + \Phi_i x_{i,t-1} + \Sigma_{j=0}^{1}\Psi_{i,j}x_{i,t-j}^{*} + \Sigma_{j=0}^{1}\tau_{i,j}d_{t-j} + \varepsilon_{i,t} \quad (1)$$

for $t = 1, 2,..., T$ and $i = 0, 1, 2,..., N$. $x_{i,t}$ is a $(k_i \times 1)$ vector containing country-specific domestic variables, $x_{i,t}^{*}$ is a $(k_i^{*} \times 1)$ vector of country-specific foreign variables, and d_t is a m-dimensional vector of observed common global variables assumed to be weakly exogenous to the global economy. Φ_i, $\Psi_{i,j}$, and $\tau_{i,j}$ are of dimension $(k_i \times k_i)$, $(k_i \times k_i^{*})$ and $(k_i \times m)$

[2] See, e.g., Choi and Hammoudeh (2010), Dwyer et al. (2011), Vivian and Wohar (2012), Creti et al. (2013), and Silvennoinen and Thorp (2013).

[3] For instance, Kilian et al. (2009) show that oil-supply shocks have a relatively small and short-lived impact on oil trade balance, while oil-demand shocks lead to large and persistent oil trade deficits in oil-importing countries. In addition, relying on a VAR specification, Kilian (2009) shows that, unlike the two other types of shocks, pure supply shocks in the oil market have a short-term impact on crude oil prices, and therefore a limited effect on macroeconomic variables. See also Apergis and Miller (2009) and Hahn and Mestre (2011).

[4] See, for instance, Kilian (2008b), Blanchard and Gali (2010) and Peersman and Van Robays (2012); the main exceptions being Cashin et al. (2014) and Esfahani et al. (2014).

[5] See e.g. Hamilton (2008) and Kilian (2008b).

[6] See also Lippi and Nobili (2012) and Baumeister and Peersman (2013a, 2013b) who were the first to propose sign restrictions in oil market VAR models.

[7] The United States and the Gulf region are alternatively regarded as the reference country/region.

[8] In our empirical analysis, we use the Akaike information criterion to select the lag orders corresponding to both domestic and foreign variables, allowing lags up to four. Tables for the selected lag orders, as well as the results regarding the number of cointegrating relationships based on the trace test are available upon request to the authors.