Oil price shocks and Spain's macroeconomic developments

Rebeca Jiménez-Rodríguez
Department of Economics
University of Salamanca
E-37007 Salamanca (Spain)
Phone: +34 923 29 46 40 (ext. 35 14)
Fax: +34 923 29 46 86
e-mail: rebeca.jimenez@usal.es

Marcelo Sánchez
Euro Area Macroeconomic Developments Division
European Central Bank
D-60311 Frankfurt am Main (Germany)
Tel.: +49 69 1344 6531
Fax: +49 69 1344 6353
e-mail: marcelo.sanchez@ecb.int

Overview

There is a large literature on the macroeconomic consequences of oil price shocks, which largely focuses on the latter's impact on domestic prices and especially real output (see Hamilton, 2008, for a recent survey of the literature on the US; and see Jiménez-Rodríguez and Sánchez, 2005, and the references therein for evidence also on economies outside the US). The initial studies for the US identified a linear negative link between oil prices and real activity. It was eventually found that by the mid-1980s such linear relationship began to lose significance. The reason was that the declines in oil prices occurred over the second half of the 1980s were found to have smaller positive effects on economic activity than those predicted by linear models. The three leading non-linear approaches have been developed by Mork (1989), Lee et al. (1995), and Hamilton (1996) with the aim of re-establishing the negative relationship between increases in oil prices and real output developments.

The impact of oil prices on interest rates has received comparatively less research attention. One important exception is the debate between Bernanke et al. (1997) and Hamilton and Herrera (2004) about the relative role played by oil shocks and monetary policy in US business cycle fluctuations. The former study suggests that monetary policy could be used to undo any recessionary consequences of an oil price shock. Hamilton and Herrera (2004) emphasise that the size of the effect that Bernanke et al. (1997) attribute to oil shocks is substantially smaller than the one that results from choosing an optimal lag length.

The present paper extends the empirical work on oil price impacts by examining the case of Spanish interest rates. We focus on the period since Spain's EU accession in 1986. This topic has not been analysed to date in the relatively small number of studies covering Spain in the related literature. It is however potentially very interesting since Spain is an economy that, over the period under study, both exhibits considerable oil import dependence – thus being expected to be adversely affected by oil shocks - and has been found to play a considerable role in "synthetic" euro area developments.

Our paper differs from previous analyses of macro impacts of oil prices in Spain in both scope and methodology. De Miguel et al. (2003) use an extended real business cycle model to analyse the real output impact of the shock, estimating that a one standard deviation shock to real oil prices (amounting to about a 20% hike) induces a fall in real output of some 0.5% in the short run. Barrell and Pomerantz (2004), using NiGEM international simulations as from 2005, compute the real output impact of an oil price shock in Spain, showing that this impact is rather modest over the first year and that it gains in strength over the following three years. Cuñado and Pérez de Gracia (2003), while focusing on other European economies in their impulse response analysis, report some results for Spain. In particular, the negative correlation between oil prices and industrial production is found to drop somewhat after the mid-1980s.

Methodology

We consider a *p*th-order structural near-VAR model that includes both international macroeconomic variables and domestic macroeconomic variables. Let Y_{1t} be a (N_1×1) vector that contains the international macroeconomic variables: real oil price (oil_t) and foreign interest rate (i_t^*). Let Y_{2t} be a (N_2 ×1) vector that contains the domestic macroeconomic variables: real GDP (y_t), consumer price index (cpi_t), real wage (rw_t), long-term interest rate (lr_t), and real effective exchange rate (xr_t). The vector of endogenous variables thus is $Y_t=[Y_{1t} \quad Y_{2t}]'$. We do not allow that domestic variables affect international variables, but the latter variables do affect the former.

The near-VAR model is the following

$$\begin{bmatrix} Y_{1t} \\ Y_{2t} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \sum_{j=1}^{p} \begin{bmatrix} \Phi_j^{11} & 0 \\ \Phi_j^{21} & \Phi_j^{22} \end{bmatrix} \begin{bmatrix} Y_{1t-j} \\ Y_{2t-j} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix}$$

where u_t is the generalisation of a white noise process with variance-covariance matrix Ω and the coefficient matrices Φ_j^{11} is diagonal. To find the suitable lag length for the VAR, we use the likelihood ratio test.

The structural near-VAR approach assumes that the disturbances u_t are related to structural shocks ε_t via a matrix, A_0, such that $A_0 u_t = \varepsilon_t$, with ε_t being a white noise vector with variance-covariance matrix given by the *identity* matrix (without loss of generality). We identify the model by using a non-recursive structure which imposes exclusion on the contemporaneous impact of the structural shocks based on prior theoretical and empirical information about the economic structure. More concretely:

$$\begin{bmatrix} a_1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_2 & a_3 & 0 & 0 & 0 & 0 & 0 \\ a_4 & 0 & a_5 & 0 & 0 & 0 & 0 \\ a_6 & 0 & a_7 & a_8 & 0 & 0 & a_9 \\ 0 & 0 & 0 & a_{10} & a_{11} & 0 & 0 \\ a_{12} & a_{13} & a_{14} & a_{15} & 0 & a_{16} & 0 \\ a_{17} & a_{18} & a_{19} & a_{20} & a_{21} & a_{22} & a_{23} \end{bmatrix} \begin{bmatrix} u_t^{oil} \\ u_t^{i^*} \\ u_t^{y} \\ u_t^{cpi} \\ u_t^{rw} \\ u_t^{lr} \\ u_t^{xr} \end{bmatrix} = \begin{bmatrix} \varepsilon_t^{oil} \\ \varepsilon_t^{i^*} \\ \varepsilon_t^{y} \\ \varepsilon_t^{cpi} \\ \varepsilon_t^{rw} \\ \varepsilon_t^{lr} \\ \varepsilon_t^{xr} \end{bmatrix}$$

As a result of the zero-restrictions imposed to identify our structural near-VAR, the system is overidentified with five overidentifying restriction. Imposing overidentifying restrictions allows us to check the validity of the set of the full identifying restrictions.

Main Results

This paper studies the role of oil price shocks in shaping interest rates in Spain. The main empirical findings for the period since Spain's EU accession in 1986 are the following. Real short-term interest rates tend to rise following an unexpected oil price hike, while nominal interest rates increase very gradually. The share of real interest rate variability explained by oil prices is around 10%. Historical decompositions show that oil prices impacted both real and nominal interest rates at around the 1990 oil price spike. With regard to the latest episode of high oil prices, nominal interest rates are found to be pushed upwards at two times, namely, in 1999 and 2005-2006. In light of higher inflationary pressures, the increase of nominal interest rates in 1999 appears not to have prevented a fall in real rates, which are found to rise in response to the shock only in 2000-2001.

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