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External shocks and monetary policy in an oil exporting economy (Algeria)☆

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Abstract

To investigate the dynamic effect of external shocks on an oil exporting economy, we estimate, using Bayesian approach, a DSGE model based on the features of the Algerian economy. We analyze the impulse response functions of our external shocks according to alternative monetary rules. The welfare cost associated with each monetary policy rule is considered. We find that, over the period 1990–2010, core inflation monetary rule allows better to stabilize both output and inflation. This rule also appears to be the best way to improve a social welfare.

JEL classification: E3; E5; F4

Keywords: Monetary policy; External shocks; Oil exporting economy; Algeria; DSGE model

1. Introduction

During 2000s, oil exporting countries benefited from exceptional windfalls due to high oil prices. From January 2000 to December 2010, the IMF oil index risen from 47.23 to 169.33. If we

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consider its peak (in July 2008), the index was more than five times as high as just eight years ago. This boom in oil prices has renewed interests in academics and international institutions circles about its macroeconomic consequences in rich resources countries.[2] In this paper, we focus our attention on a specific oil exporter: Algeria. This country is among the top three oil producers in Africa. In addition, Algeria is heavily dependent from hydrocarbon sector insofar as revenues generated from it account for around 30% of the GDP and more than 95% of export earnings. Despite significant oil revenues, macroeconomic performances in Algeria have been far from impressive. Over the period 2000–2010, the average real GDP growth was 3.9%, consistently below growth performances in MENA region (5.4%). If we consider only oil exporting countries from this region, the growth gap is even more important.

Two main strands of literature provide potential explanations for these poor macroeconomic performances. First, the natural resource curse hypothesis suggests that the abundance of natural resources may be detrimental to long term economic growth (Breisinger, Diao, & Wiebelt, 2014; van der Ploeg, 2011). Interestingly, this literature shows that, besides structural factors such as an insufficient economic diversification, weak institutional quality exerts a powerful influence on the ability of countries to adopt productivity-enhancing reforms (Addison & Baliamoune-Lutz, 2006; Arezki & Nabli, 2012). A second strand of literature focuses on macroeconomic stabilization policy in the aftermath of oil price shocks by using dynamic general equilibrium models. An extensive literature has been dedicated to fiscal rules as public spending tend to go hand in hand with oil receipts, generating pro-cyclical policy (Baunsgaard et al., 2012; El Anshasy & Bradley, 2012). Other studies analyze the macroeconomic implications of alternative monetary policy rules for a small open economy hit by external shocks (Devereux, Lane, & Xu, 2006; Medina & Soto, 2005).

Our paper is linked to this second strand of literature, and, more especially, on monetary policy. We estimate, by using the Bayesian approach, a DSGE model for Algerian economy investigating the dynamic effect of four external shocks (oil price, real exchange rate, international interest rate and foreign inflation), and examining the appropriate monetary policy rule. To do so, we propose a Multisector Dynamic, Stochastic, General equilibrium (MDSGE) model with real and nominal rigidities. The aim is, first, to compare the importance of each shock as a source of fluctuations of the Algerian economy and their welfare implications and secondly, to define the appropriate monetary policy rule that insulates the economy from the impacts of these shocks. Our motivation is twofold. On the one hand, as oil exporting countries rely heavily on oil export earnings and their growth portrays a high dependence on imports – for consumption goods, intermediate inputs, and capital goods – they are particularly exposed to external shocks. As a result, these countries experience higher business cycles volatility relative to other emerging and developing economies (IMF, 2012). On the other hand, as stressed in many IMF Country Report issues, monetary policy instruments are imperfectly transmitted to the real economy through usual transmission channels, and the inflation-output trade-off is far from satisfactory. Indeed, excess liquidity – due to hydrocarbon revenues – is a structural feature of the banking sector, limiting the ability of the central bank to influence the economy through the intereste rate. In this context, determining the best monetary policy rule is particularly critical.

The estimated model differs from the previous literature in many aspects. First, given that in several oil exporting countries, authorities aim to smooth oil price changes, we assume that the

[2] See, for instance, Arezki, Gylfason, and Sy (2011) and Baunsgaard, Villafuerte, Poplawski-Ribeiro, and Richmond (2012).