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Exogenous oil shocks, fiscal policies and sector reallocations in oil producing countries

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ABSTRACT

Previous literature has suggested that different mechanisms of transmission of exogenous oil shocks are responsible for the negative effects on the economic performances of oil exporting countries. This paper aims at providing further evidence on the role of sectoral reallocation between private and public sectors in explaining the impact of shocks to oil revenues on the economic growth rates of major oil producing countries (namely the GCC – Gulf Corporation Council – countries). The effects of oil shocks and expansionary fiscal policy on the business cycle of oil producing countries are examined. The possibility to distinguish between various components of public sector spending policy (that is, purchases of consumption goods, investments in productive activities and compensation for public employees) is, in particular, allowed for. A real business cycle (RBC) model is calibrated to fit the data on an "average" oil producing country. Results from the simulation of the theoretical model suggest that the possibility that the expansion of the size of the government (due, in particular, to the increase in the number of employees) can explain a large fraction of the negative effects of shocks to oil revenues on the private sector of the economy. However, since the growth in size of the public sector more than compensate for the reduction in size of the private sector, an increase in oil revenues has the effect to boost total output.

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1. Introduction

This paper aims at providing further evidence on the effects of exogenous oil shocks on the macroeconomic performances of oil exporting countries by means of a theoretical framework based on the RBC modeling of macroeconomic activity. The questions we would like to answer can be summarized as follows. How are oil shocks likely to affect the economic activity of oil exporting countries? More specifically, what are the effects of oil shocks and expansionary fiscal policy on consumption, investments and labor markets? Do oil shocks increase the role of the public sector in the economy?[1] How important are changes in the allocation of production inputs across sectors in determining the economic consequences to an expansion of government consumption expenditure?

This paper extends the previous literature on the macroeconomic effects of exogenous oil shocks on the economic stance of oil exporting countries in various directions. In particular, in this work, we aim at studying as the main mechanism of transmission of oil shocks to the overall economy of oil producing countries the reallocation effects associated with oil shocks and the fiscal policy implemented by the government.

The hypothesis that oil price shocks drive large aggregate reallocation of production factor is investigated by several previous studies. Earlier works lack, however, the sectoral detail on job creation and destruction that we examine. In other words, our theory can be viewed as an attempt to describe the Dutch disease that often affects oil producing nations.

A real business cycle (RBC) model is employed to explain the sectoral reallocation adjustment process that follows a negative wealth effect induced by an exogenous oil shock. This model is, in particular, calibrated to an "average" oil exporting country. This allows us to describe the effects of government activity in affecting the economic performances of this country. We also derive some analytical conditions of fiscal policy under which negative economic effects of shocks to oil revenues and government consumption expenditure are reduced. Implications of fiscal policies aimed at reducing the so-called natural resource curse are, hence, presented. In particular, a two-sector economy in which the public sector role is separately considered from the role of private firms is examined. The rough quantitative consistency with second moments of the data is, then, analyzed.

In order to examine the effects of exogenous shocks on our simplified economy, the effects of one positive percent shock to oil revenues

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[1] In the present paper, the words *government* and *public sector* are used interchangeably.

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and government consumption expenditure on relevant variables are, hence, examined and discussed. Many assumptions of our analysis are similar to those considered in the work on the cyclical effects of fiscal policy when investment in public capital is allowed for (see, inter alia, Finn, 1998 and Lansing, 1998). Nevertheless, the focus is quite different.[2] We concentrate on the mechanism of transmission of exogenous oil shocks on producing countries, whereas Finn (1998) considers the different effects of government fiscal policy on both private and public sectors for the US economy.

We focus our attention on annual data for major oil producing countries. In particular, economic data referring to the Gulf Cooperating Council (GCC) countries of Bahrain, Kuwait, Oman, Qatar, the United Arab Emirates and the Kingdom of Saudi Arabia are examined for the 1994–2009 period. One of the most important features of this organization is that its member countries own the largest world's proven oil reserves. According to British Petroleum data referring to the end of 2009, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates possess approximately 37.2% of world's oil proven reserves. Saudi Arabia, in particular, is the world's largest oil producer with approximately 19.8% of total world's oil reserves (or 265 billion barrels). Despite diversification efforts in government expenditure growth, particularly in the past few years, in GCC countries governments still account for about 40% of overall aggregate demand, one of the highest share in the world.[3]

One of the main results we obtain is that oil shocks cause a reallocation of economic activities between the private and public sectors of the economy. In particular, higher oil revenues seem to cause negative effects on both private investments and capital. In fact, higher investments by the public sector are associated with reductions in the process of accumulation of capital by the private sector of the country. However, although the estimated impact on demand for labor supply in the private sector is negative, supply for public labor increases. As the positive effect on public employment outpaces the negative impact on employment in the private sector, the overall employment rate of the economy increases. All in all, while the importance of the private sector lessens out, the role of the public sector in the economy expands. Moreover, since this latter effect tends to be larger with respect to the former, the impact of exogenous oil shocks on total output is argued to be positive.

A shock to government consumption expenditure has as its main effect to increase economy's wealth. In fact, despite the fact that more of the economy's goods are consumed by the government, private investments, employment and overall production respond positively to an expansionary fiscal policy. In addition, a shock to government consumption impacts negatively the level of public investments and the level of public capital. However, as employment in the public sector increases significantly in response to a shock in government expenditure, public output expands. Finally, our model predicts an instantaneous negative effect on total investments and on the stock of capital in the economy. Nevertheless, driven by an expansion of the number of employees in the economy, total output increases as a consequence of expansionary fiscal policy.

The paper is organized as follows. Section 2 reviews the previous literature on the effects of exogenous oil shocks on the allocation of resources in oil importing countries. Section 3 presents the theoretical model employed in order to examine the macroeconomic effects of oil shocks in oil exporting countries. In particular, Section 3.1 outlines the assumptions of the framework employed in our analysis, while Section 3.2 considers the set-up of our theoretical model. Section 4 investigates the consequences of disturbances to oil revenues to key macroeconomic variables. Sections 4.1 and 4.2 describe the framework implemented in order to calibrate model and the main results referring to the simulation of the RBC model. Section 4.3 outlines the main results of one percent oil and government consumption expenditure shock on relevant variables of both public and private sectors. Section 4.2 discusses how results vary if different assumptions on key parameters and steady-state ratios are made. Section 5 concludes.

2. Literature review

There is a large body of research which tries to assess how oil shocks influence the business cycle of oil producing countries. According to many empirical papers, countries which are endowed with relevant natural resources are characterized by lower economic growth rates with respect to countries with few natural resources. Important studies on the failures of resource-led development include, for instance, Gelb (1988), Gylfason (2001), Sachs and Warner (1995), Sachs and Warner (2001) and Sala-i Martin and Subramanian (2003). In particular, Sachs and Warner (2001) find a strong inverse relationship between the log of the export contribution to growth during the period 1970–1990 and the log of natural resource abundance in1970. As noted by Sala-i Martin and Subramanian (2003), countries that depend heavily on the export of natural resources tend to suffer from a variety of problems, including authoritarian governance, antistate protests and/or civil wars, high corruption levels, high poverty rates, etc.[4]

Other authors find a positive effect of a large endowment of oil and other mineral resources on long-term economic growth. According to Alexeev and Conrad (2009), although large endowments of oil and other mineral resources do not affect significantly political institutions, positive effects on long-term economic growth may, nevertheless, occur.

Starting from the pioneristic works of Bruno (1981), Corden and Neary (1982) and Forsyth and Kay (1980), the effects of domestic resource discoveries on tradable and non-tradable sectors of open economies are assessed by many theoretical and empirical studies. According to this branch of literature, oil discoveries prompt huge booms in investments, especially in the non-traded goods sectors of the economy. In contrast, investments and profits in the traded sectors are squeezed by the oil boom. As the non-traded goods sectors expand, the traded goods sectors of these countries tend to shrink.

On the other hand, Cuddington (1989) emphasizes the issues related to the effects of the spending policy implemented by the public sector. According to this author, poor management of oil wealth and, in particular, inefficient spending by the public sector induces significant imbalances in the internal market. Sachs and Warner (1995) briefly survey the Dutch disease explanation for the natural resource curse. According to this mechanism, export windfalls have adverse effects on the real exchange rate of these countries. This, in turn, renders most other exports uncompetitive. Thus a rapid and, often distorted, growth of the non-tradable sector may occur. In turn, the industrialization process of the country, as well as the traditional economic sectors (i.e. agriculture), are negatively affected. Hausmann and Rigobon (2003) argue that distorted allocations of spending over time by the public sector are enhanced in the presence of common-pool problems or uncertainty over property rights over the resource income. This fact, in turn, may further enhance low economic performances. Fasano-Filho and Iqbal (2003), in an analysis of how to improve economic performance of the Gulf Council Countries, suggest to reallocate oil wealth in such a way to improve economic incentives directed at boosting the growth of the private sector.

[2] Several assumptions of the theoretical model also differ significantly with respect to this paper. The main differences involves the source of exogenous growth, the functional form taken by government budget constraint, the role of the public sector in the economy as far as productive activities are concerned.

[3] Source: our elaborations on World Bank's data (World Development Indicators, 2010) and Penn's World Tables data.

[4] For a review of the literature on the effects of oil endowments on oil producing countries see Alexeev and Conrad (2009).

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