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Monetary policy and the Dutch disease effect in an oil exporting economy

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ABSTRACT

In this paper, we build a Multi-sector Dynamic Stochastic General Equilibrium (DSGE) model to investigate the impact of both windfall (an increase in oil price) and boom (an increase in oil resource) on an oil exporting economy. Our model is built to see if the two oil shocks (windfall and boom) generate, in the same proportion, a Dutch disease effect. Our main findings show that the Dutch disease effect under its two main mechanisms, namely spending effect and resource-movement effect, occurs only in the case of flexible wages and sticky prices, when exchange rate is fixed. We also compare the source of fluctuations that leads to a strong effect in term of de-industrialization. We conclude that the windfall leads to a stronger effect than a boom. Finally, the choice of flexible exchange rate regime helps to improve welfare.

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1. Introduction

The Dutch disease theory was developed after the Netherlands found large sources of natural gas in the North Sea in the 1960s. Large capital inflows from increased export revenues caused demand for the Dutch florin to rise, which, in turn, led to an appreciation of the Dutch exchange rate. This appreciation made it difficult for the manufacturing sector to compete in international markets.

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This theory has been the subject of abundant theoretical literature since the beginning of the 80s. It has been developed in a partial equilibrium framework and can be presented in two forms: the spending effect and the resource movement effect. Both effects lead to a decline of the manufacturing sector. This decline occurs because of the fall of output in this sector. Indeed, if the oil supply is not perfectly inelastic, a rise of oil price leads to an increase of the demand of labor and capital in the oil sector and increases wages and capital return in this sector. If the production factors are mobile, capital and labor will move from the manufacturing sector to the oil and service sectors which will cause de-industrialization.

There are two main mechanisms by which the oil shocks affect the economic activity: the spending effect and the resource-movement effect.¹ These effects are the essential components of the Dutch disease theory. The spending effect is caused by higher domestic incomes due to the increased revenues coming from resource discovery or an increase in oil prices. The higher incomes lead to increased expenditures on both tradable and non-tradable goods. The price of tradable goods is determined in international markets, so the increase in incomes in this small country has no effect on the tradable goods price. However, prices of non-tradable goods are established in the domestic market and consequently, would rise due to the increase in demand caused by the rise in income and expenditures. The higher relative prices of non-tradable goods increase the relative profitability of the non-tradable goods sector and, as a result, contract the tradable goods sector (not including the boom sector) (Neary and Van Wijnbergen 1986, p. 2).

The resource movement effect occurs if the booming sector shares domestic factors of production with the other sectors of the economy. If so, then there is a tendency for the price of the factors to be bid up which would further squeeze the tradable goods sector. The boom increases the marginal product of factors initially employed in the booming sector, and so draws (mobile) resources out of other sectors. Consequently, there is a decline in the tradable goods sector whose producers would be unable to pay the higher prices for factors of production. These producers are unable to compete for the inputs and thereby prevent the manufacturers from purchasing all the supplies needed to maintain production levels. As a result, these producers decrease their output, contracting the traded goods sector.

Two types of external shocks generate these effects: windfall and boom. Although they are both positive external shocks, a windfall shock (a rise of price of natural resource) does not incur costs while a boom shock (an increase in the stock of oil resources) does incur costs.²

Recent studies like Sosunov and Zamulin (2007), Lartey (2008), Batt et al. (2008), Acosta et al. (2009) and Lama and Madina (2010) have used DSGE models to assess the impact of a positive external shock in the case of a small open economy. These articles discuss the impact of a positive external shock as an increase of capital inflow (Lartey, 2008), remittances (Acosta et al., 2009) or of commodity prices (Sosunov and Zamulin, 2007; Batte et al., 2009; Lama and Madina, 2010). These shocks are defined in the literature of the Dutch disease as windfall shocks. A boom shock which requires costs has not been studied. Indeed, none of these papers is directly concerned with the effect of boom shocks and even less by a comparison between both sources of Dutch disease. In addition, none of them assesses the role of monetary policy in each case. Finally, none of these models directly analyzes oil-exporting economies, which are the most vulnerable to this type of shocks.

In this context, we build a small open oil-exporting economy model with four sectors while the above-mentioned contributions build DSGE models with only tradable and non-tradable sectors. In this paper we add an oil sector to better reflect the mechanisms of the Dutch disease described in the literature by Corden and Neary (1982). The latter assume that the economy is composed of three sectors: (i) the booming sector: after the discovery of a new resource or a technological progress in the commodity sector or a rise of natural resource price; (ii) the lagging sector generally refers to the manufacturing sector but can also refer to agriculture; (iii) the non-tradable sector includes services, utilities, transportation, etc.

¹ The main difference between these two effects is that the first one (the spending effect) describes the inflationary outcome of an income shock which, in turn, causes an appreciation of the local currency (because of the going up of the relative price), while the second one denotes the movement of production factors from various sectors to the resource one due to higher marginal productivities.

² The search for new resource and its extraction require costs while the rise of price of oil not.

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