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Oil price shocks and trade imbalances

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ABSTRACT

This study aims to examine whether a large part of the variability of trade balances and their oil and non-oil components is associated with oil price fluctuations. The long-run causality running from oil price to overall, oil and non-oil trade balances and their short-run dynamics are investigated by applying the Toda and Yamamoto, 1995 (TY) causality approach and generalized impulse response functions (IRFs), respectively to the monthly data spanning from January 1999 to November 2011. Three Asian economies that represent three distinct characteristics in terms of oil are chosen and examined: Malaysia as an oil exporter, Singapore as an oil refinery and Japan as an oil importer. The stability of the causality is also checked and the estimated impulse responses across different periods are examined. The results have implications for both policy makers and economic modeling of the impact of oil price shocks.

1. Introduction

Trade has been a key engine for economic growth while oil is the most traded commodity in the world. High and rising trade deficit, however, hinders economic growth. Given the importance of oil as an internationally traded commodity and the volatility of its price, oil price shocks could explain the emergence of large trade imbalances across the globe. This study aims to explore such a possibility, which could render theoretical and policy implications.

A number of economic studies have investigated the macroeconomic impacts of oil price shocks, especially in oil-importing countries with a focus on the responses of real economic growth and consumer price inflation (see, e.g. Barsky and Kilian, 2004; Hamilton, 2005 for recent reviews). Much fewer studies, however, were conducted on the trade channel of the transmission of oil price shocks to an economy. Notable studies are Backus and Crucini (2000), Kilian et al. (2009), and Bodenstein et al. (2011); out of which, Kilian et al. (2009) provides the most comprehensive analysis of the effects of oil price shocks on external balances.

It could be misleading to conclude the relatively small number of studies in the literature as a lack of interest in this question. It is a common premise in policy discussion that oil price shocks would have large and often negative effects on external accounts including trade balance. When oil prices surge, countries are forced to borrow from abroad to offset adverse terms-of-trade shocks. There are some doubts that international risk sharing is not enough, implying that the ensuing imbalances may not be large enough to effectively cushion the domestic impact of oil price shocks (Kilian et al., 2009). It is thus of crucial importance from both policy and theoretical points of view to examine the impact of oil price shocks on trade balances.

The link between oil price shocks and trade balances is a relatively new concern in the literature. A very first study on this subject is carried out by a suitably adapted dynamic equilibrium model of international business cycles based on properties of business cycles in eight developed countries between 1955 and 1990 (Backus and Crucini, 2000). The study found that oil accounts for much of the variation in the terms of trade over the period 1972–1987. Their results seem likely to hold regardless of the financial market structure. However, it is argued that the nature of financial market risk sharing may have major implications for the responses of external balances to the permanent oil price shock (Bodenstein et al., 2011). A two country DSGE model (the US – as a home country – versus "rest of the world") was employed in the study to investigate how a rise in oil prices affects the trade balance and the non-oil terms of trade for the US case. The study generalized Backus and Crucini's (2000) model by allowing for the convex costs of adjusting the share of oil used in the production and consumption. Instead of using the "complete markets" framework as in Backus and Crucini (2000), the study introduced

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incomplete financial markets across national borders in its benchmark specification. It was found that, under complete markets, the non-oil terms of trade remain unchanged, and so as for the non-oil trade balance whereas under incomplete markets, the former suffers from a depreciation that induces the latter to improve enough to correct the deficit.

A dynamic equilibrium model of international business cycles or a generalized dynamic equilibrium model may present insightful findings but both of which suffer from a drawback. It is related to the fact that the parameter values were calibrated based on the US data and simulated in the models. Such results and conclusions may not be generalized for other economies that have some distinctive characteristics in terms of oil, e.g., not only an oil exporting economy but also an oil-deficient or oil importing economy. There are also several other deficiencies in the current literature on the oil price–trade balance relationship. First, the number of studies in this area is few (see Backus and Crucini, 2000; Bodenstein et al., 2011; Bollino, 2007; Kilian et al., 2009; Rebucci and Spatafora, 2006; Setser, 2007) and most of them studied the subject for the US case thus there has been no consensus on the matter. Second, a panel data set of countries, including oil-exporting and oil-importing economies, were examined in one study (Kilian et al., 2009) but there have been no studies for the cases of oil-refinery economies such as Singapore. Third, most of the studies have only investigated the short-run dynamics between oil price shocks on external balances (including trade) while having ignored the possible long-run causality. Fourth, most of the existing studies run an entire sample and elicit interpretation from the results, which may mislead due to the ignorance of possible structural breaks as there could be various and significant variations of the relationships within a long period of time. Last but not least, the decomposition of overall trade balances into oil and non-oil balances seems being ignored. This issue is actually rare in economic studies as few oil-producing countries publish or include an analysis of the non-oil balance in the budget. It is shown that an excessive focus on the overall trade balance often leads to fiscal policy moving in tandem with oil revenue, resulting in a volatile non-oil fiscal deficit with concomitant adverse macroeconomic and fiscal consequences (Barnett and Ossowski, 2002). This highlights that decomposing the overall balance into oil and non-oil balances is critical for policy makers, especially in oil-dependent economies, in order to understand fiscal policy developments, evaluate sustainability, and determine the macroeconomic impacts of fiscal policy.

This study aims to be a valuable addition to the scarce literature on the subject and to make up the abovementioned deficiencies in the current literature. It investigates whether a large part of the variability of trade imbalances is associated with extreme movements in global oil prices. The possible relationships are being somewhat generalized by examining three oil-distinctive economies. The country sample of this study consists of an oil exporter (Malaysia), an oil-refinery economy (Singapore) and a net oil importer (Japan). All three economies chosen are highly dependent on trade for growth. For instance, in the case of Malaysia, the dependency to the external trade demand was very strong and became a key factor to induce its economic growth. Almost two-thirds of the growth (value added) was geared by the external demand compared with one third of domestic final demand inducement (Shan et al., 2011). Such an economy could possibly be sensitive to any external shocks and it is thus of crucial importance to see if and how oil price shocks impact its trade imbalances.

The methodological approach takes into account the possible existence of an endogenous structural break in performing unit root tests and cointegration analysis on the entire sample spanning from January 1999 to November 2011. The Toda and Yamamoto (1995) causality (TY hereafter) procedure was then performed on the entire sample for each country case. With the entire sample results, this study examines if Malaysia' improvements in trade balances are associated with rising oil prices. For an oil refinery economy like Singapore, it tests whether the results indicate long-run impacts of oil prices on the overall trade balance and its components. For Japan, it examines whether and how oil price shocks have led to significant movements in oil and non-oil components but not for the economy's overall trade balance.

This study confirms the results based on the entire sample by the stability analysis. It breaks the entire sample further into three sub-samples corresponding to major economic events to capture the possible different natures of oil price shocks. The results of this study could have implications for both policy makers and economic modeling of the impact of oil price shocks. It follows the Gregory and Hansen (1996) approach to cointegration with structural change and the TY procedure to test for the long-run non-causality between the variables of interest. To investigate the short-run dynamics between the variables of interest, the generalized impulse response function (IRF) by Koop et al. (1996) and Pesaran and Shin (1998) was employed to examine how each type of trade balance in each country case responds to a generalized one standard deviation shock of the world oil price.

The balance of the paper is organized as follows. Section 2 discusses the mechanisms by which oil price shocks are expected to drive external (including trade) balances. Section 3 describes the data and preliminary observations. Section 4 presents the econometric framework of this study. Section 5 reports the empirical results. The stability, robustness and policy implications of the results are also presented. Section 6 concludes the main findings of this study.

2. Theoretical background

The impact of oil price shocks on the external accounts of an economy work through two main channels, the trade channel and the financial channel. The trade channel works through changes in quantities and prices of tradable goods whereas the financial channel works through changes in external portfolio positions and asset prices (Kilian et al., 2009). This study focuses on the trade channel and discusses the mechanisms by which oil prices are expected to drive trade balances and review the related literature.

Oil price shocks have direct and indirect economic impacts for both oil-importing and oil-exporting economies. The indirect impact is the transmission of the shock through the international trade. First, a rise in world oil prices is often thought to bring inflationary pressure and raise prices in trading-partner countries. This in turn raises the domestic import prices in both oil-importing and oil-exporting economies. Monetary authorities of trading-partner economies may also raise interest rates in an effort to curb inflation, leading to declines in consumption, investment and thus economic growth in the trading-partner economies. This in turn decreases the demand for many export commodities from the domestic economy of both oil importers and oil exporters.

For a net oil-exporting economy, the direct effect of rising world oil prices is expected to be positive, as it gets more export revenues. The indirect effects are, however, expected to be negative. First, as mentioned in the previous paragraph, rising global oil prices raise the domestic import prices in both oil importers and exporters. Second, an exogenous increase in the world oil price constitutes a negative supply shock to net oil importers, resulting in a slowdown in the domestic economic growth of oil importing economies and in turn reduces their oil exports and other exports from oil exporters. The gain for an oil-exporting economy is thus not as large as one could assume at first glance. The net impact of oil price shocks on the trade balance of an oil-exporting economy depends on the magnitude of higher oil export revenues relative to the rising price of the home country's imports. This argument strengthens a common concern that large fluctuations in the world oil price not only bring adverse effects to the economies of oil importers but also poses challenges for policy makers in oil-exporting economies. To oil exporters, the oil revenue poses fiscal challenges that stem from the fact that it is exhaustible, volatile and largely originates from abroad. Oil price hikes may further cause increased uncertainty, especially for those economies perceived to be risky like emerging markets. The capital account may also be adversely affected due to a decline in foreign portfolios and direct investments into the country, or even a capital flight. Thus, even though