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Oil shocks and external balances

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ABSTRACT

We provide estimates of the effects of demand and supply shocks in the global crude oil market on several measures of oil exporters' and oil importers' external balances, including the oil trade balance, the non-oil trade balance, the current account, capital gains, and changes in net foreign assets (NFA). First, we show that the effect of oil demand and supply shocks on the merchandise trade balance and the current account, which depending on the source of the shock can be large, depends critically on the response of the non-oil trade balance. Our results provide evidence of an intermediate degree of international financial integration. Second, we document the presence of large and systematic valuation effects in response to these shocks. Valuation effects overall tend to cushion the effect of oil demand and supply shocks on the NFA positions of oil exporters and oil importers. Third, we quantify the overall importance of global business cycle demand shocks as well as oil-market specific demand and supply shocks for external balances.

1. Introduction

A large literature has investigated the macroeconomic impact of oil-price shocks, focusing in particular on the response of real economic growth and consumer price inflation in oil-importing countries (see, e.g., Barsky and Kilian, 2004; Kilian, 2008a; Hamilton, 2008). A much smaller literature including, for example, Bruno and Sachs (1982), Ostry and Reinhart (1992), and Gavin (1990, 1992) has studied the impact of oil price shocks on external accounts. Recent developments in the crude oil market and the emergence of large global external imbalances have reignited the long-standing policy discussion about the role of oil prices in determining external balances (see, e.g., Rebucci and Spatafora, 2006).

There is renewed interest in the question of how oil revenues will be recycled in the global economy, along with the recognition that the impact of oil price shocks may depend on their source. On the one hand, a concern in policy discussions is that oil price shocks have large and potentially harmful effects on external accounts, forcing countries to borrow from abroad to offset adverse terms-of-trade shocks. On the other hand, it is sometimes suggested that there is not enough international risk sharing. In that view, the ensuing imbalances may not be large enough to cushion the domestic impact of oil price shocks effectively. Thus, it is interesting from both a policy and a theoretical point of view to investigate and to quantify the impact of oil price shocks on external balances.

Our paper provides the most comprehensive analysis to date of the relationship between oil prices and external balances. We document the dynamic effects of oil demand and oil supply shocks on external balances of oil-exporting and oil-importing economies during 1975–2006. The paper also examines the changing importance of these shocks over time by means of historical decompositions, and it uses variance decompositions as a measure of the average importance of these shocks for external balances.

Our analysis departs from the existing literature in several dimensions. First, we not only control for reverse causality from global macroeconomic conditions to the real price of oil, but we also differentiate between alternative sources of the variation in the real price of oil. Our analysis illustrates the importance of distinguishing between oil price changes driven by crude oil supply shocks, by oil-market specific demand shocks and by innovations to the demand for all industrial commodities driven by the global business cycle.

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Second, previous studies tended to focus exclusively on the trade balance and the current account. In this paper, we further differentiate between the effects of shocks in the crude oil market on the oil-trade balance and the non-oil trade balance, highlighting the role of the non-oil trade balance in offsetting oil trade deficits. Estimates of the response of the non-oil trade balance, to the extent that these shocks have purely transitory effects, shed light on the degree to which international financial markets are incomplete and thus provide a useful benchmark for the design of theoretical models of the transmission of oil demand and supply shocks under incomplete markets. We also consider the effects of such shocks on capital gains and losses on gross foreign assets and liabilities. The existence of such valuation effects in general has been documented by Gourinchas and Rey (2007a,b) for the United States and by Lane and Milesi-Ferretti (2007a) for other countries. In this paper, we address the complementary question of whether there are systematic valuation effects in response to oil demand and oil supply shocks that help financially integrated economies cope with oil trade imbalances.

Third, previous studies focused on selected oil-importing advanced economies. In contrast, we focus on broad aggregates of oil exporters and major oil importers. This approach allows us to interpret our empirical results in light of recent theoretical advances (i) in modeling oil demand and oil supply shocks in the two-country dynamic stochastic general equilibrium (DSGE) framework (see Bodenstein et al., 2008), and (ii) in modeling valuation effects in incomplete markets in the DSGE framework (see Ghironi et al., 2007; Devereux and Sutherland, 2008). Empirical evidence on the responses of external balances is especially important because theory puts few restrictions on these responses.

Our first result is that each of the three oil demand and oil supply shocks that we consider has different effects on external balances. For example, the effect of an oil supply disruption on the oil trade balance tends to be small, short-lived and statistically insignificant, consistent with the estimated response of the price of oil. In contrast, an unexpected increase in the demand for crude oil causes a persistent, large and statistically significant oil trade deficit. Similarly, the timing, magnitude, and even the direction of the response of other components of the current account may differ with the type of shock.

Our second result relates to the question of market completeness. Whereas the theoretical literature has tended to focus on the limiting cases of financial autarky or complete markets, our estimates of the responses of the non-oil trade balance provide evidence of considerable, but not perfect international financial market integration.

The third set of results relates to the capital gains and losses triggered by oil demand and supply shocks. Using the Lane and Milesi-Ferretti (2007b) NFA data set, we document the presence of large and systematic valuation effects in response to these shocks for broad aggregates of oil importers and oil exporters. Valuation effects manifest themselves in capital gains or capital losses. Our analysis suggests that these capital gains and losses play an important role in explaining the dynamics of changes in NFA positions, making it necessary to consider the degree of international financial integration of a country and the composition of its foreign asset holdings and liabilities in predicting the effect of such shocks. We conclude that international financial integration has tended to cushion the effect of oil demand and supply shocks on the change in NFA positions of oil exporters and oil importers overall.

Our fourth set of results is about quantifying the importance of global business cycle demand shocks as well as oil-specific demand and supply shocks for external balances. We provide evidence, for example, that these shocks jointly account for 82% of the variation in oil exporters' changes in NFA (expressed as a share of GDP). Oil-market specific demand and supply shocks jointly account for about half of the variation, whereas demand shocks associated with the global business cycle account for an additional one-third. For an aggregate of major oil importers the corresponding shares are lower, but still large.

The remainder of the paper is organized as follows. Section 2 motivates our focus on demand and supply shocks in the crude oil market and describes the econometric methodology used in this study. Section 3 discusses the data. Section 4 reviews the mechanisms by which shocks to oil demand and oil supply are expected to drive external balances. Section 5 reports the estimation results. Section 6 contains our conclusions.

2. Empirical methodology

Theoretical models of the effect of oil price shocks on the economy in general (and on external accounts in particular) have typically been constructed under the premise that one can think of varying the price of crude oil, while holding all other variables in the model constant. In other words, oil prices are treated as exogenous with respect to the global economy. This premise is not credible (see, e.g., Barsky and Kilian, 2002, 2004; Hamilton, 2003). There are good theoretical reasons and there is strong empirical evidence that global macroeconomic fluctuations influence the real price of crude oil (see Kilian, 2008b,c, forthcoming). For example, it is widely accepted that a global business cycle expansion (as in recent years) tends to raise the real price of oil.[1] The fact that the same economic shocks that drive macroeconomic aggregates (and thus external accounts) also may drive the price of crude oil makes it impossible to separate cause and effect in studying the effect of higher oil prices on external accounts without a structural model of oil prices.

A second limitation of standard theoretical models is the implicit premise that that the effect of an exogenous change in the price of crude oil will be the same, regardless of which demand or supply shocks in the oil market are responsible for this change. This premise is questionable. Since oil price shocks historically have been driven by varying combinations of oil demand and oil supply shocks, their effect on external aggregates is bound to be different from one period to the next. Indeed, this fact helps account for the apparent instability in the reduced form relationship between oil prices and the macroeconomy. Recent work by Kilian (forthcoming) and Kilian and Park (forthcoming) has shown that the effects of demand and supply shocks in the crude oil market on U.S. macroeconomic aggregates are qualitatively and quantitatively different, depending on whether the oil price increase is driven by a booming world economy (resulting in high demand for all industrial commodities including crude oil), by a disruption of global crude oil production, or by shifts in precautionary demand for crude oil that reflect increased concerns about future oil supply shortfalls (also see Alquist and Kilian, forthcoming). It is quite natural to expect similar differences in the effect of these shocks on external accounts. In this section, we outline an empirical methodology that addresses both of these concerns and allows us to assess empirically the effect of oil demand and oil supply shocks on external balances.

Our empirical approach involves two main steps. The first step is to trace fluctuations in the real price of crude oil to the underlying demand and supply shocks in the crude oil market. The second step is to assess empirically the responses of external accounts of selected countries and country groups to the demand and supply shocks in the crude oil market identified in the first step. To the extent that the latter shocks are predetermined with respect to macroeconomic aggregates and external accounts, standard regression methods can be used to estimate the responses of external accounts by country or region and to determine the extent to which historical fluctuations in external accounts were driven by the

[1] As noted by Hamilton (2008), "it is clear … that demand increases rather than supply reductions have been the primary factor driving oil prices over the last several years."