



Country-Specific Oil Supply Shocks and the Global Economy: A Counterfactual Analysis

EPRG Working Paper 1512

Cambridge Working Paper in Economics 1516

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This paper investigates the economic consequences of *country-specific* oil supply shocks for the global economy in terms of their impacts on real output, oil prices and financial markets. While there is a large body of literature investigating the macroeconomic effects of shocks to the *aggregate* oil supply, most studies have focused on a handful of industrialized/OECD countries with the analysis being mainly done in isolation from the rest of the world. Although some of these papers aim to identify the underlying source of the oil shock (demand versus supply), most of these oil-price shocks are taken to be *global* in nature rather than originating from a particular oil-producing country (or region). Moreover, the focus of the literature has been predominantly on net oil importers.

The paper also makes a theoretical contribution to the analysis of oil shocks.

In particular, we propose a new scheme for identification of country-specific supply shocks based on the assumption that changes in an individual country's oil production are unimportant relative to changes in the world oil supplies, and as a result the correlation of oil prices and country-specific oil supply shocks tends to zero for a sufficiently large number of oil producers. We show that such an identification procedure is applicable even if the country-specific oil supply shocks are weakly correlated. Our identification approach differs from the literature, which considers identification of global supply shocks typically by imposing sign restrictions on the structural parameters of a three equation VAR model in oil prices, world real output, and global oil production.

An analysis of the effects of country-specific oil supply shocks is required to answer counterfactual questions regarding the possible macroeconomic effects of oil sanctions, or region-specific supply disruptions due to wars or natural disasters. To this end, we first develop a model of the global oil market and

derive an oil price equation which takes account of developments in the world economy as well as the prevailing oil supply conditions. We then integrate this within a compact quarterly model of the global economy comprising 34 countries using a dynamic multi-country framework known as the Global VAR (GVAR). This approach allows us to analyze the international macroeconomic transmission of the effects of country-specific oil supply shocks, taking into account not only the direct exposure of countries to the shocks but also the indirect effects through secondary or tertiary channels. The combined model (which we refer to as GVAR-Oil) is used for a number of counterfactual exercises. In particular, we examine the direct and indirect effects of shocks to Iranian and Saudi Arabian oil output on the world economy, on a country-by-country basis, and provide the time profile of the effects of country-specific oil shocks on oil prices, real outputs across countries, and real equity prices.

Our findings suggest that an adverse shock to Iranian oil output, equivalent to a fall in the Iranian oil supply of around 16% in the first four quarters, is neutralized in terms of its effects on the global economy. This is mainly due to an increase in Saudi Arabian oil production to compensate for the loss in OPEC supply and to stabilize the oil markets, which is borne out by the recent episode of oil sanctions against Iran by the U.S. and European countries. This outcome is made possible due to the large Saudi Arabian spare capacity, which allows it to act as a swing producer at the global level. However, a negative shock to Iranian oil supply does lead to a fall in Iranian real output of around 6% in the short-run, and rebounds somewhat ending with a drop in real output of around 3.5% over the long run, as the Iranian economy adjusts to the new reduced level of oil income. Moreover, Saudi Arabia tends to benefit from a negative shock to Iranian oil production. In the long run Saudi real output increases by 3.1% in response to the negative shock to Iran's oil output.

In contrast, an adverse shock to oil production in Saudi Arabia (around 11% per quarter) has far-reaching implications for oil markets and the global economy. A Saudi negative oil supply shock causes oil prices to rise substantially and reach 22% above their pre-shock levels in the long run. This is not surprising, given that most of the other oil exporters are producing at (or near) capacity and cannot increase their production to compensate for the loss in Saudi Arabian oil supply. As a result, the shock to Saudi oil output has significant effects for the global economy not only in terms of real output, which falls in both advanced (including the U.K. and the U.S.) and emerging economies, but also in terms of financial markets as global real equity prices fall by around 9% in the long run.

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Publication June 2015
Financial Support