Volume Title: Commodity Prices and Markets, East Asia Seminar on Economics, Volume 20

Volume Author/Editor: Takatoshi Ito and Andrew K. Rose, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-38689-9
ISBN13: 978-0-226-38689-8

Volume URL: http://www.nber.org/books/ito_09-1

Conference Date: June 26-27, 2009

Publication Date: February 2011

Chapter Title: Comment on "The Effects of Oil Price Changes on the Industry-Level Production and Prices in the United States and Japan"

Chapter Authors: Warwick J. McKibbin

Chapter URL: http://www.nber.org/chapters/c11876

Chapter pages in book: (233 - 235)

The second result is easily anticipated. The third one is surprising, but is in fact reasonable. Japan is good at producing energy-efficient products. An increase in oil price may benefit Japan because this may induce even more people to purchase energy-efficient Japanese products such as cars or intermediate products used for producing them. This result may inspire government policy-making, especially at times of economic crisis.

Another point we should note is that outputs in United States and Japan during the sample period seem to be driven by world demand and domestic aggregate demand. This may mean that productivity changes or other supply-side factors are unimportant. It would be premature for us to arrive at this conclusion, because the model itself cannot distinguish supply shocks from demand shocks.

Comment Warwick J. McKibbin

This chapter explores the causes and impacts of oil price changes in the United States and Japan. It also focuses on the transmission of global oil shocks within these economies at the macroeconomic and industry levels. The introduction of the chapter talks about the scarcity of studies on the impact and causes of oil price shocks but this discussion is really about the studies that have used the vector autoregression (VAR) methodology. There is a large literature using large-scale macroeconometric models, computable general equilibrium models (e.g., the G-Cubed model of McKibbin and Wilcoxen [1999]), and energy models in academic journals such as *Energy Journal and Climate Change,* which explore the causes and impacts of oil price shocks. It is true that these approaches use a different methodology, but more widespread citation would be worthwhile.

The basis of the empirical part of the chapter is two independent VAR models. One model is for the United States and a separate model is for Japan. Each model has a global oil market, a domestic macroeconomic variable, and domestic industry-level variables. The disaggregation into industry-level detail is a contribution of the chapter.

Identification is critical in VAR models. Most of my comments focus on how identification is imposed in the chapter. The authors impose restrictions so that the global energy markets are not affected by feedback from the macroeconomic or industry variables. Similarly, the macroeconomic variables are affected by the global oil market but not by industry variables. Finally, the industry variables are affected by themselves and the global oil market

Warwick J. McKibbin is director of the Research School of Economics and of the Centre for Applied Macroeconomic Analysis (CAMA) at the Australian National University.

and macroeconomic variables. The two country VARs are completely independent from each other.

Given the identification of the model, both global oil markets give the same answer to the decomposition of shocks between oil supply shocks, global demand shocks, and oil-specific demand shocks. These shocks can then be used to explore how oil shocks feed through the United States and Japanese economies.

The authors find that the persistence and magnitude of changes in oil prices depends primarily on the nature of the shock to the oil market. They find that oil-specific demand shocks have the largest and most persistent effect on the oil price. Oil supply shocks have only temporary and insignificant effects on industrial production. They also find that global oil shocks have very different effects on Japan and the United States.

One set of issues regards the identification restrictions. It is hard to imagine that the two largest economies in the world do not affect the global oil market, yet there is no link back between responses in the country models on the global macroeconomic variable included in the energy market equations. Yet this is the assumption imposed by the specification of the VARs. This could be tested by relaxing the zero restrictions on the macroeconomic variables and the oil markets. However, if this was done then the equivalence of the oil markets would break down because the shocks presumably would be different in the U.S. model versus the Japanese model. This, then, suggests that both country models should be incorporated into a single VAR model, but degrees of freedom problems then arise and an approach like the Global VAR model of Dees et al. (2007) would be required.

It is also important how variables are ordered in terms of identification in the VAR model. It would be worth extending the approach of this chapter to explore the new sign restriction methodology such as by Fry and Pagan (2007).

Another issue regarding identification is the variables that are given zero restrictions in the macroeconomic parts of the VAR. In particular, exchange rates, inflation, and interest rates are excluded from the VAR (i.e., given zero restrictions), yet most macroeconomic VAR models find these variables are important. If the oil shocks propagate through the economy via changes in these variables then there may be a serious misspecification error. This might explain some of main differences between the transmission of shocks in the United States relative to Japan in the chapter. In particular the real exchange rate in Japan responds strongly to change in oil prices in the G-Cubed and macroeconometric models and therefore its omission from the VAR might be a problem. For example, suppose that an oil price rise depreciates the Japan real exchange rate, causing exports of manufacturing goods to rise and therefore stimulate industrial production (as found in the G-Cubed model). It might appear that oil has no impact on industrial production in Japan when in fact it does have a negative impact via input costs but a positive impact via exports. The general equilibrium story is very important for understanding the transmission story. The current specification excludes this understanding.

A further issue is the assumption that macroeconomic or aggregate variables drive industry outcomes whereas industry variables do not affect aggregate outcomes. This is hard to reconcile with the results from multisectoral macroeconomic models such as G-Cubed, where macroeconomic and sectoral adjustments are simultaneously determined. It is also a little surprising because the macro variable used is industrial production, which is the sum of the industry production data.

Another issue is the primacy given to oil prices rather than energy prices. We know from the oil price shocks of the 1970s and the more recent run up in oil prices from 2004 to 2008 that the prices of all energy sources (gas, coal, etc.) moved in a similar manner. It may be that not taking into account the more general energy sources could miss some key aspects of the transmission of oil shocks to the major economies.

Overall, there are some interesting extensions in this chapter to the standard approaches of estimating the effects of oil price shocks in the global economy. It is not surprising, and indeed is encouraging, that the model finds the same results as Killian (2009). The decomposition of oil shocks is probably robust to the specification issues raised in these comments but some of the results for the transmission through the economy need further exploration by relaxing the identification restrictions in ways outlined in these comments.

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