

ONLINE APPENDIX FOR "WHY AGNOSTIC SIGN RESTRICTIONS ARE NOT ENOUGH: UNDERSTANDING THE DYNAMICS OF OIL MARKET VAR MODELS"

Lutz Kilian
University of Michigan

Daniel Murphy
University of Michigan

Constructing a Bound on the Impact Price Elasticity of Oil Supply Elasticity

The consensus in the literature is that the short-run elasticity of oil supply is close to zero. Neither Hamilton (2009a,b) nor Kilian (2009a) provide econometric estimates of the short-run elasticity of oil supply. One way of obtaining an upper bound on that elasticity is to focus on historical episodes of well-defined and exogenous oil price shocks such as the outbreak of the Persian Gulf War on August 2, 1990. That event caused a sharp increase in the real price of oil in August of 1990. As discussed in Kilian (2008b), this increase in the real price of oil reflected both a positive oil-market specific demand shock (driven by precautionary or speculative demand in anticipation of an invasion of Saudi Arabia by Saddam Hussein) and a negative oil supply shock (reflecting the cessation of Iraqi and Kuwait oil production). There is no evidence of the global aggregate demand shock having played any role in this episode.

Given the timing of that event, production data for August of 1990 are informative about the oil supply response outside of Iraq and Kuwait to this price incentive. For this production response to be informative about the impact price elasticity of oil supply, we first need to address the origin of the price stimulus. If the jump in the real price of oil in August of 1990 had been driven entirely by an oil-market specific demand shock, the observed supply response could be interpreted as an estimate of the impact price elasticity of oil supply by construction. To the extent that at least some of the price increase in August was driven by the disruption of Kuwaiti and Iraqi oil production instead, however, this interpretation is not possible.

The question arises whether oil producers respond differently to price increases driven by oil supply disruptions than to price increases driven by oil-market specific demand shocks. The

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E-mail: lkilian@umich.edu (Kilian); dpmurphy@umich.edu (Murphy)

answer depends on the persistence of these price responses. The more persistent the price incentive, the stronger the response of oil production is likely to be. To the extent that, for any reasonable bound on the oil supply elasticity, the price response to an oil-market specific demand shock is approximately as persistent as the response to an oil supply shock (measured by the half-life of the response), this distinction is unlikely to be important. Our premise therefore is that oil producers in the rest of the world in August of 1990 responded to the oil price increase without making a distinction between the component of the oil price increase driven by the oil supply disruption and the component driven by oil-market specific demand increases.

Considering, in addition, that (a) there was spare capacity in global oil production prior to the invasion, and (b) that there was rare unanimity among oil producers in 1990 that it was essential to offset market fears about a wider war in the Middle East by a decisive increase in oil production, one can treat the observed response of oil production outside of Kuwait and Iraq in August of 1990 as a plausible upper bound. In other words, we would expect the average response over the sample to similar price incentives during other time periods to be weaker.

Data provided by the Energy Information Administration show that, in August of 1990, the global production of crude oil from all oil producers excluding Iraq and Kuwait increased by 1.17%, whereas the price jumped by 44.3% implying a ratio of 0.0258.¹ This ratio provides an empirically plausible upper bound on the ratios a_{13}/a_{33} as well as a_{12}/a_{32} .

¹ Source: Energy Information Administration. In July 1990 dollars, the real price of oil increased from \$16.54 per barrel to \$24.04 per barrel from July to August. Oil supply from all producers excluding Iraq and Kuwait increased from 55,197 barrels per day to 55,844 barrels per day.