Recent Oil Price Fluctuations Linked to World Economy

Recent research by U-M Economics Professor Lutz Kilian and Economics PhD Candidate Daniel P. Murphy shows that unexpected fluctuations in global real economic activity, rather than speculation or unexpectedly declining oil supplies, are the main reason behind recent oil price fluctuations.¹

Their analysis implies that imposing regulatory limits on trading in oil futures markets or efforts to increase domestic oil production would have little effect on the real price of oil in global markets. “There is little U.S. policy makers can do to avoid similar oil price surges but to promote energy conservation and the development of alternative sources of energy,” conclude the researchers.

Kilian and Murphy’s research is particularly topical as dramatic price fluctuations in the global market for crude oil since 2003 have renewed public interest in understanding the evolution of the real price of oil. There has been much debate in policy circles about whether the sustained surge in the real price of oil between 2003 and mid-2008 was caused by speculative trading in oil markets, by unexpected reductions in oil supplies (because of OPEC withholding oil supplies from the market or because global oil production has peaked), or by unexpectedly strong growth in the global economy, particularly in China.

Speculative Trading

Much has been made of the alleged role of speculators in oil markets in recent years. A popular perception is that the sharp increases in the real price of oil, especially in 2007/2008, can only be explained by speculative trading. This explanation centers on important changes in oil futures markets that took place at about the time when the real price of oil started taking off. Oil futures contracts traditionally have been used by oil market participants to lock in the price at which crude oil is to be bought and sold at some future date.

There is evidence that after 2003, financial investors with no ties to the oil market entered the oil futures market in large numbers in search of higher returns. Many observers believe that increased demand by these investors drove up the price of oil futures contracts and that this price increase spilled over into the spot market for crude oil (and ultimately to the price paid by consumers at the gas pump).

What has not been explained to date, however, is how this increase in the oil futures price drove up the spot price. Kilian and Murphy observe that the oil futures market and the spot market for crude oil are two distinct markets that are linked by an arbitrage condition.

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A speculator (defined as a market participant who buys in anticipation of rising future prices rather than for current consumption) has two choices, say Kilian and Murphy. One is to lock in the expected profit by buying an oil futures contract; the other is
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to buy oil, put it into storage (leading to an accumulation of crude oil inventories), and later sell that oil at a profit. By arbitrage, one form of speculation causes the other form of speculation, linking the oil futures price and the spot price of oil. This logic allows a simple test of the speculation hypothesis. If there indeed was speculation in oil futures markets, then we should have seen speculation cause oil inventory accumulation in the spot market.

It might seem that this hypothesis could be tested simply by measuring the accumulation of above-ground crude oil inventories. This is not the case because crude oil inventories move for many reasons. For example, a slowdown in global real economic activity will be associated with an accumulation of oil inventories, so increased inventory accumulation is not a sure sign of speculative pressures, nor would a lack of inventory accumulation in a growing world economy indicate that there are no speculative pressures.

Hence, speculative pressures can be measured only with the help of a fully specified structural econometric model that simultaneously models all forces that affect crude oil inventories. Kilian and Murphy’s analysis of such a model shows that speculative pressures actually had little to do with the surge in the real price of oil during 2003-2008 or between 2008 and the end of 2010 for that matter. Although they find considerable evidence of speculative pressures in the spot market in 1979, 1986, and 1990, there is no such evidence for 2003-2010.

An alternative version of the speculation hypothesis is that oil producers rather than oil traders may have acted as speculators during 2003-08. In this interpretation, oil producers such as OPEC who expect the real price of oil to rise have an incentive to keep the oil below the ground in anticipation of higher prices later. The accumulation of below-ground oil inventories is equivalent to a reduction of oil production. Kilian and Murphy’s model shows that, even as global oil production slowed during 2006-2008, there is no evidence that unexpected declines in oil production can explain the sustained rise in the real price of oil during that same period. Hence, there is no evidence to support this alternative form of the speculation hypothesis.

Unexpected Oil Supply Reductions
A second potential explanation of rising oil prices is that the growth of global crude oil production no longer suffices to sustain rapid growth in the world economy. This oil supply skepticism has gained popularity with the dissemination of the peak oil hypothesis, which predicted that global oil production would begin to decline after 2005. This prediction is based on the extrapolation of past production data and is not without controversy. Peak oil could matter in two guises.

One view is that markets were surprised in recent years by the lack of additional global oil production. If so, one would expect to see evidence of negative shocks to the flow of crude oil production driving up the real price of oil in recent years. An alternative interpretation is that traders anticipating (rightly or wrongly) that oil production was about to peak began to accumulate oil inventories.

Neither of these interpretations is supported by the model estimates in Kilian and Murphy, allowing us to conclude that the peak oil hypothesis cannot explain recent price fluctuations in the global market for crude oil.
Global Economy Growth
The model instead favors a third explanation. It attributes the sustained surge in the real price of oil between 2003 and mid-2008 almost entirely to shifts in oil demand driven by an unexpectedly booming world economy. Rather than being driven by a single cataclysmic event, this surge reflected continued upward revisions to global oil demand.

It may be argued that surely professional forecasters would not have been surprised repeatedly and systematically in the same direction over the course of several years. However, related research by Kilian (with a former undergraduate student at Michigan), using detailed data on professional real GDP growth forecasts by country, confirms that professional forecasters during 2003-2008, but not before 2003 or after mid-2008, indeed systematically underestimated world economic growth, especially in emerging Asia, consistent with the implications of the Kilian and Murphy model. Moreover, business-cycle driven shifts in the demand for oil also explain the subsequent collapse and partial recovery of the real price of oil between late 2009 and 2010.

Policy Implications
The relative importance of these three competing explanations of recent oil price fluctuations matters a great deal for economic policy. To the extent that speculative trading is perceived to be the core of the problem, there has been considerable political pressure to impose regulatory limits on trading in oil futures markets. The analysis by Kilian and Murphy shows that this response would be ineffective at best.

To the extent that dwindling global oil supplies are perceived to be the main problem, in contrast, politicians of both parties have called for increasing domestic oil exploration and production. Simulations of the Kilian and Murphy model show that even a drastic increase in U.S. oil production would have little effect on the real price of oil in global markets.

Finally, to the extent that the recent price surge was associated with increased global oil demand driven by unexpectedly strong economic growth, the model implies that efforts aimed at reviving the global economy after the financial crisis, if successful, will cause the real price of oil to recover as well, creating a policy dilemma. There is little U.S. policymakers can do to avoid similar oil price surges but to promote energy conservation and the development of alternative sources of energy.

In the short run, however, the model indicates that the continued weakness of global demand, notwithstanding the Libyan supply disruption of 2011, will prevent a resurgence of the real price of oil.

