RESPONSES TO REVIEWER #1

Q1: First, the generated structural shocks depends essentially on the real oil price. So how might the results change, if only real oil price is used, instead of the shocks. Will the model produce a better in-sample fit, for instance from what it is currently? I understand that one will not be able to analyze the impact of various shocks, but it would be interesting to see how the realized price of real oil itself affects this volatility

A1: Thank you for the suggestion. As your suggestion, we have assessed the impact of real oil price on the WTI oil volatility. The result is shown in the table below.

Table7：Parameter estimates of GARCH-MIDAS with oil real price

μ	α	β	γ	m	θ	ω_1	ω_2
Full Sample (Maximized LLF: -8071.93)							
0.0035	0.0428**	0.9380***	-0.0237**	0.5335*	-0.0213*	14.9797	6.7311
(0.0103)	(0.0142)	(0.0147)	(0.0121)	(0.3142)	(0.011)	(13.3327)	(10.422)
Pre-2004 sample (Maximized LLF: -4260.96)							
0.0035**	0.0665**	0.9252**	-0.0092**	2.5499	-0.1990***	8.3156*	2.7801**
(0.0143)	(0.023)	(0.021)	(0.0191)	(0.6798)	(0.0473)	(4.6111)	(1.2532)
Post-2004 sample (Maximized LLF:-3805.61)							
-0.0183	0.0201*	0.9645***	0.0380**	1.3606	-0.1611**	4.3731***	2.4999***
(0.0172)	(0.0104)	(0.0095)	(0.0132)	(0.8523)	(0.0662)	(0.994)	(0.5573)

Note: This table reports estimation results for parameters in Equations (3)-(5) with X being the oil real price; the value in parenthesis refers to the standard deviation. We take the lags for 3 years respectively. ***, ** and * indicate significance at 1%, 5% and 10% levels.

Q2: Now the real oil price is based on the refiner's acquisition cost, but the daily data is that of the WTI oil price. What happens if one uses the monthly average of the daily WTI oil price.

A2: Thank you for this question.

The refiners' acquisition cost (RAC) for imported crude oil includes transportation and other fees paid by the refiner. It is the average price paid by U.S. refiners for imported. That is non-US crude oil booked into their refineries in accordance with accounting procedures generally accepted and consistently and historically applied by the refiners concerned.

We choose it for two reasons: First, compared with the US price of domestic crude oil (WTI oil price), which was regulated during the 1980s, RAC for imported crude oil is likely to be a better proxy for the price of oil in global markets. Supportive evidence can be found in Kilian (2009), Alhajji and Huettner (2000), Baumeister and Peersman (2013), and many others. Second, since the process to construct the oil shocks is based on the work of Kilian (2009), we keep in consistence with Kilian to use the same variable.

Q3: A third is related to the data. Why does the data start from 1990 and not 1986? The global activity index starts from 1968 on Lutz Kilian's website, and WTI is available from 1986 at daily frequency. May be it would also be good to extend the

data till 2015, given the recent collapse of the oil price.

A3: Thanks for the suggestion.

The monthly data for the petroleum stocks in OECD from EIA is available from 1988.1 to 2015.8 and the data is only released on a quarterly basis during 1984-1987. Therefore, in our revision, the data is extended to be from 1988 to August 2015.

Reference

Alhajji A F, Huettner D. OPEC and world crude oil markets from 1973 to 1994: cartel, oligopoly, or competitive? [J]. The Energy Journal, 2000, 21(3): 31-60.

Baumeister C, Peersman G. The role of time‐varying price elasticities in accounting for volatility changes in the crude oil market [J]. Journal of Applied Econometrics, 2013, 28(7): 1087-1109.

Kilian L. Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market[J]. American Economic Review, 2009, 99(3): 1053-1069.