BANK FOR INTERNATIONAL SETTLEMENTS

Speculation in the oil market

by

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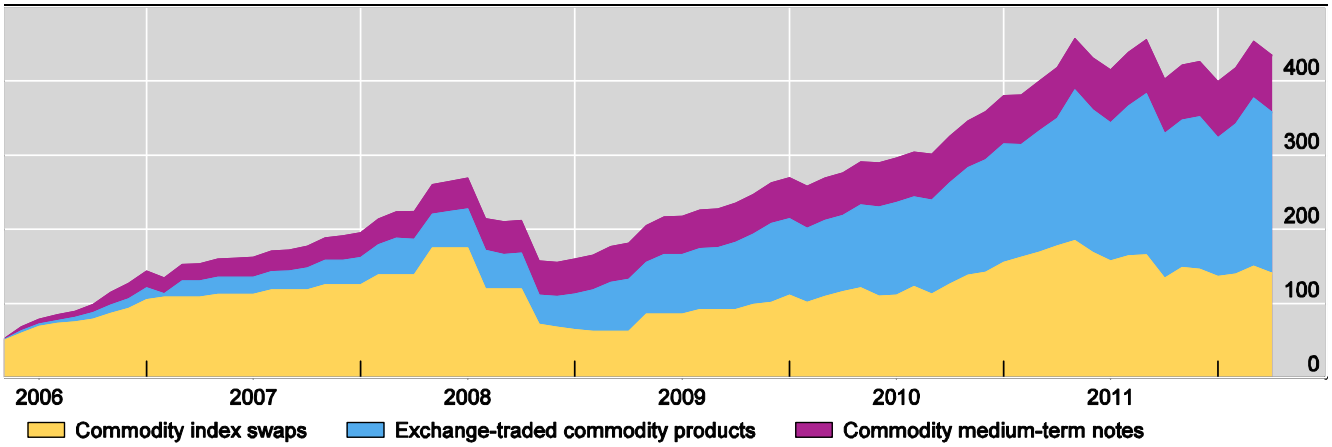
The views expressed in the following do not necessarily reflect those of the Bank for International Settlements

Scope of the paper

- Assess the role of speculation in the oil market against the background of the growing financialisation of commodities in the 2000s

Commodity assets under management

In billions of US dollars



Source: Barclays Capital.

- Hypothesis: Speculation in futures market drove up futures prices which influenced price expectations and thereby demand and supply conditions in the spot market

Contribution to the literature

- Extension of previous work by Kilian and Murphy (2012) considering a supply-side channel of speculation in the oil market

  - Kilian and Murphy (2012)
    - Assess the role of speculative oil demand shocks based on a small-scale VAR using sign restrictions
    - Finding: no role of speculative shocks in pre-2008 oil price surge, main driver is a global aggregate demand shock

  - Juvenal and Petrella (2012)
    - Assess the role of speculative oil demand and supply shocks based on a FAVAR using sign restrictions
    - Finding: significant role of speculative shocks in pre-2008 oil price surge, main driver remains global aggregate demand shock

Empirical approach of the paper I

- FAVAR

$$\begin{bmatrix} \mathbf{y}_t \\ \mathbf{f}_t \end{bmatrix} = \Phi(L) \begin{bmatrix} \mathbf{y}_{t-1} \\ \mathbf{f}_{t-1} \end{bmatrix} + \mathbf{u}_t,$$

  - y = (growth of world oil production, oil inventories, real oil prices)'
  - f = unobservable factors from large set of macroeconomic and financial variables from the G7 (supposed to account for global demand conditions) estimated based on principal components

- FAVAR vs Kilian/Murphy small scale VAR
  - Factors Granger cause the variables in the VAR
  - Informational sufficiency of the VAR is rejected

Empirical approach of the paper II

- Sign restrictions for shock identification

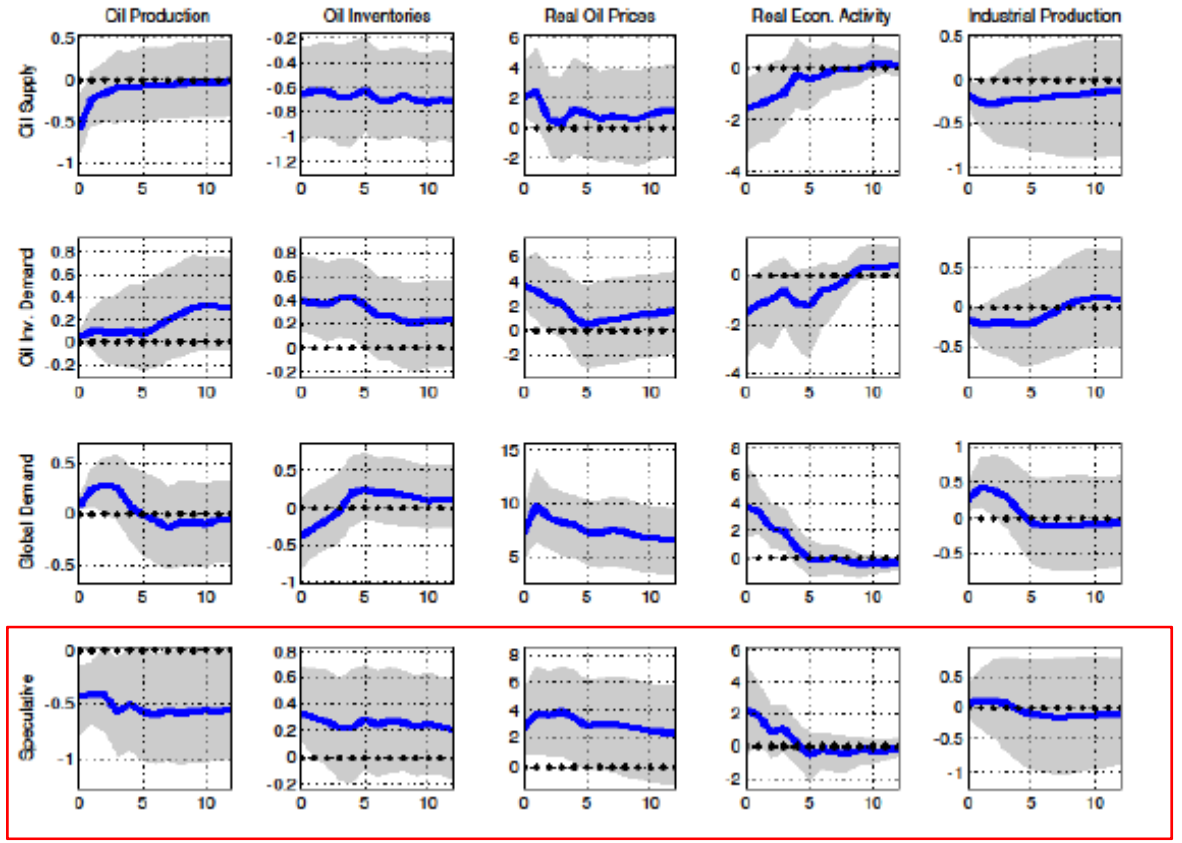
Table 3. Sign Restrictions

Shock	Oil production	Oil inventories	Real oil prices	Real activity[a]
Oil supply	−	−	+	−
Oil inventory demand	+	+	+	−
Global demand	+		+	+
Speculative	−	+	+	

  - Oil inventory demand shock = speculative demand shock in KM
    - Increase in demand for inventories in expectation of higher future demand/prices
  - Speculative shock = speculative supply shock
    - Expectation of higher future prices induces producers to reduce current supply by lowering production and increase inventories
    - After fundamental oil supply shock inventories are assumed to be drawn down

Main results I

Figure 2. Impulse Responses: Main Variables



Main results II

Table 6. Variance Decomposition of the Oil Price (FAVAR)

Horizon	Oil supply	Oil inventory demand	Aggregate demand	Speculative
1	0.0638	0.1315	0.3924	0.0900
2	0.0459	0.0742	0.4378	0.0984
3	0.0289	0.0475	0.4596	0.1095
4	0.0253	0.0388	0.4555	0.1269
8	0.0484	0.0464	0.4078	0.1043
12	0.0842	0.0677	0.3595	0.0924

Table 7. Variance Decomposition of Inventories (FAVAR)

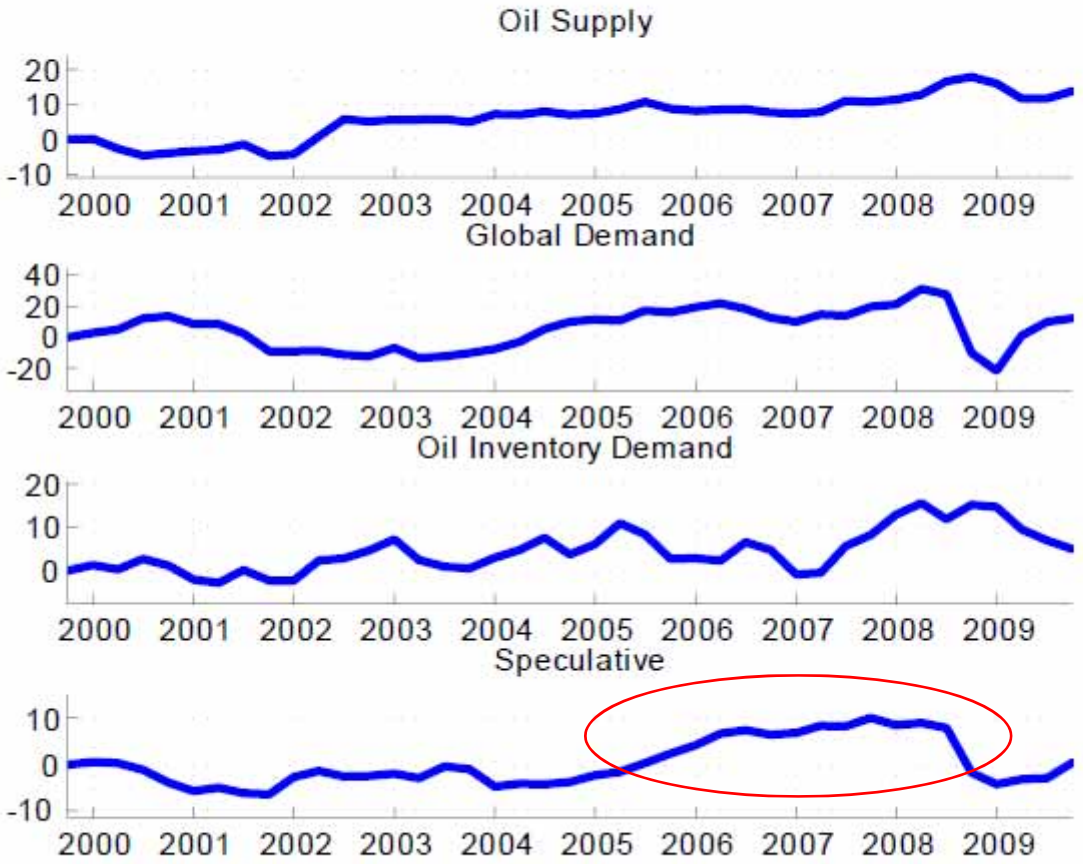
Horizon	Oil Supply	Oil inventory demand	Aggregate demand	Speculative
1	0.2196	0.1230	0.1612	0.0858
2	0.2241	0.1456	0.1289	0.1012
3	0.2538	0.1407	0.1069	0.0978
4	0.3031	0.1436	0.0897	0.0778
8	0.3228	0.0992	0.1166	0.0958
12	0.3162	0.1281	0.0866	0.0828

Table 8. Variance Decomposition of Oil Production (FAVAR)

Horizon	Oil Supply	Oil inventory demand	Aggregate demand	Speculative
1	0.3500	0.0023	0.0064	0.1885
2	0.1913	0.0294	0.0914	0.2009
3	0.1273	0.0467	0.1153	0.2112
4	0.1200	0.0400	0.0929	0.2487
8	0.0834	0.1360	0.0924	0.2367
12	0.0956	0.1635	0.0741	0.2169

Main results III

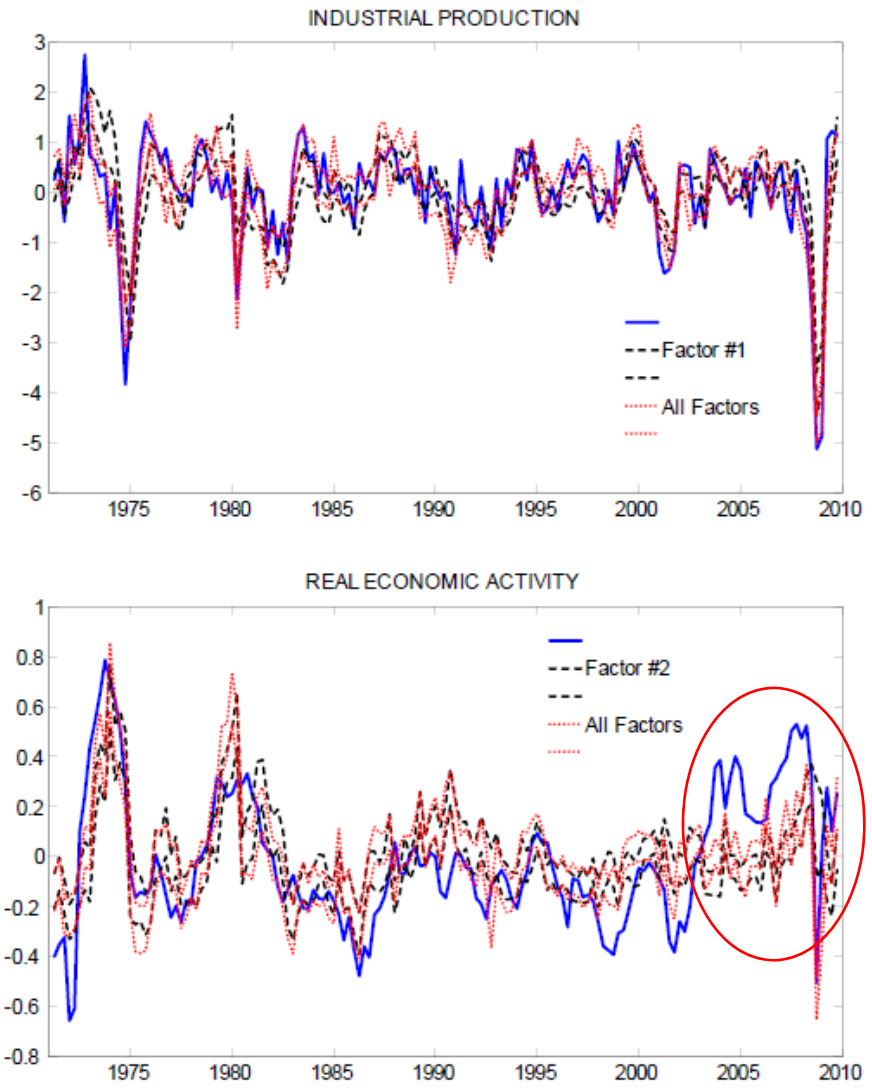
Figure 4. Historical Decomposition of the Oil Price for the Last Decade



Comments I: Why a FAVAR?

- Factors are supposed to account for global demand…
- …but sign restrictions are imposed on two real activity indicators not perfectly fitted by the factor model
- Variance shares explained by the shocks drop considerably compared to VAR
- Gain not clear: Possibilities of FAVAR approach not really exploited (except for analysis of commodity price comovements)

Figure 1. Factor Fit for Measures of Real Economic Activity



Getting more out of the FAVAR

- Factor approach could be taken more seriously: Global demand = first factor(s) of real activity measures?
  - Problem: database covers only G7, but oil price surge in 2000s associated with high demand from EMEs

- Dynamic effects of fundamental and speculative oil market shocks in different countries (AEs vs EMEs) could be explored

Comments II: Does the identification scheme work?

Table 3. Sign Restrictions

Shock	Oil production	Oil inventories	Real oil prices	Real activity[a]
Oil supply	−	−	+	−
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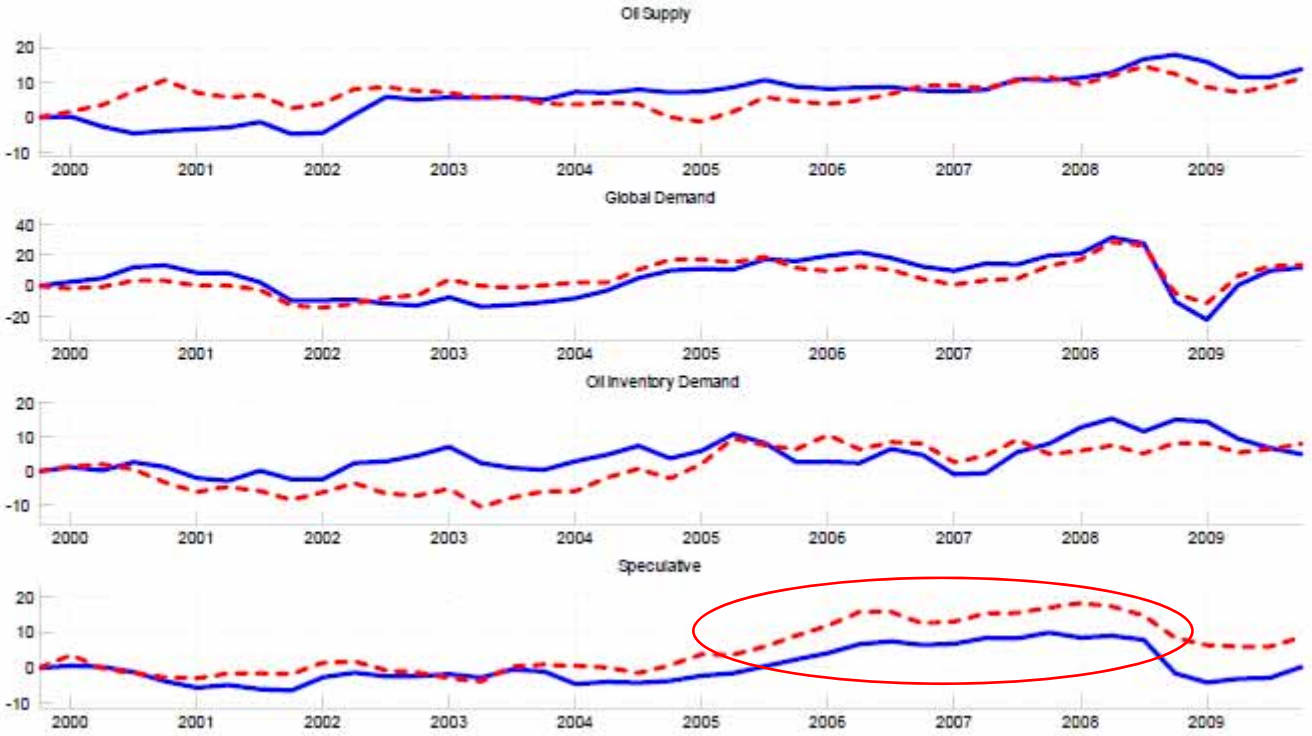
- Not clear whether the sign restriction on inventories is sufficient to separate fundamental from speculative supply shocks
- Kilian and Murphy (2012): fundamental oil supply shock may trigger drawing down of inventories, but may also lead to increased inventory demand in anticipation of rising oil prices
- Sign restrictions involve the assumption
  - that the former effect is larger than the latter (supported by evidence that inventories fall after oil supply shock in KM)
  - that speculative oil supply cut-backs also involve accumulation of inventories on the ground

A tighter identification scheme?

- Original hypothesis: Speculative supply shock reflects the effect of price expectations which are driven by financialisation of commodity markets
- Identification scheme could be tied more closely to this original hypothesis by imposing restrictions on oil futures prices and futures-spot price spread as in Lombardi and van Robays (2011)
- Futures markets developed only in the 1980s so that sample period would be shortened
- Is that a problem?
  - Focus is on oil price surge in the 2000s
  - The authors report results for sub-sample estimation starting in mid-1980s and get even stronger results

Figure F2. Historical Decomposition of the Oil Price: Benchmark and Subsample



Comments III: Where is monetary policy?

Table 3. Sign Restrictions

Shock	Oil production	Oil inventories	Real oil prices	Real activity[a]
Oil supply	−	−	+	−
Oil inventory demand	+	+	+	−
Global demand	+		+	+
Speculative	−	+	+	

- No restriction imposed for the output effect of the speculative supply shock
- Reason: Increased speculation could be driven by low real interest rates which would stimulate economic activity (IRFs suggest that it does go up in fact)
- This is a testable hypothesis: interest rates are included in the factor model (do they go down in response to speculative shock?)
- Problem: Same considerations also apply to the inventory demand shock
  - If negativity constraint on output is dropped for inventory demand shock, it is no longer separated from the global demand shock (also in KM)
  - Maybe better to just impose negativity constraint on output also for speculative shock? Identify monetary policy shock?

Conclusions

- Paper makes important contribution to the literature by drawing attention to potential supply-side effects of oil market speculation and proposing a way how to identify them
- Identification scheme not uncontroversial, but not unreasonable either
- Monetary policy causes some (subtle) problems
- Merits of FAVAR approach remain unclear