Relationship between Crude Oil Prices, Oil Exploration, and (Future) Oil Supply

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Crude Oil Consumption, Production, Nominal Prices
What is this project about?

- Crude oil prices show idiosyncratic behaviour
- Fundamental determinants: oil supply and oil demand
- Research question: relationship between oil price and oil supply?
Rig Count and Real Prices
UKCS: Exploration Expenses
Implications

- Exploratory effort determines oil discoveries
- Today’s discoveries determine future supply
- Decline in (conventional) oil discoveries
- Effect on local/global production?
Recent Research

- Anderson et al (2018), “Hotelling under pressure”: Drilling activity rather than oil production is affected by oil prices changes
- Toews and Naumov (2015): significant relationship between oil prices and drilling activity
- Mauritzen (2016): no concurrent reaction of field-level production in NCS
- Cologni and Manera (2014): no reaction of oil production to changes in real oil prices (various countries)
- Parmer et al (2018), analysis of investments in NCS: strong effect of lagged oil prices
Methodology

Project elements

- Quantify relationship between oil prices and drilling activity
  - Toews and Naumov (2015): 1% increase (decrease) in oil prices increases (decreases) global drilling activity by 1%

- Analyse relationship between drilling activity and discoveries
  - Smith (1980): Probabilistic model for oil discovery

- Forecast production from new discoveries and effect on global production
  - Long lags between discovery, approval for production and begin of production; geological features
  - Role of shale oil?

- Analysis on local/national level: understand effect on global oil price changes on (small) oil producing regions
Forecasting Oil Discoveries

- Smith (1980) estimates remaining reserves in an oil producing region and simulates sequence of discoveries
- Smith (1980) proposed probabilistic oil discovery model: by analysing the probability of the reserve discovery for the first 99 discoveries in North Sea
  - Data: 99 initial discoveries. Used to infer distribution of (future) discoveries.
  - Drawing without replacement
  - Forecast sequence of discoveries
  - Adjustment of distribution of discoveries
  - Monte Carlo Simulations
- Influence of exploratory effort on this sequence
Preliminary Analysis

Oil Price, Exploration Activity, Oil Supply
Discussion

- Relationship between oil prices, oil exploration, and (future) oil production
- Oil exploration and oil discoveries
- Today’s discoveries determine future supply
- Oil supply and demand have very different fundamental drivers
- Oil price responses to changes in demand and supply can be strong