OIL PRICE FLUCTUATIONS

Subin Kwon
Ao Luo
Alankrit Varma

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AGENDA

- Introduction
- History of Oil Price Fluctuations
- Measuring Oil Price Expectations
- Oil Price Shocks
- Problems in Anticipating Price Fluctuations

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Introduction

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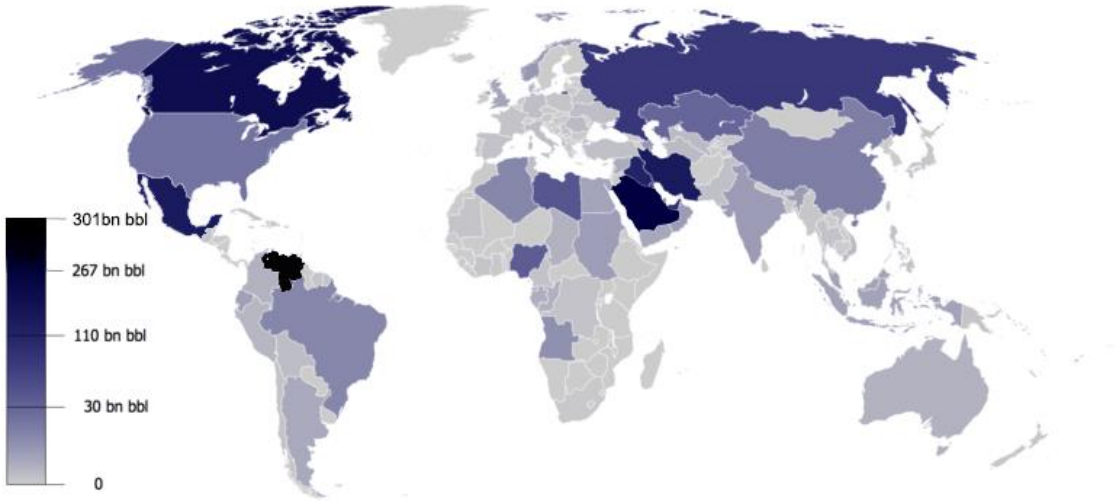
INTRODUCTION

- Crude oil is one of the most important commodities.
- The application of crude oil
- The crude oil reserve distribution



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Major Historical Oil Price Fluctuations

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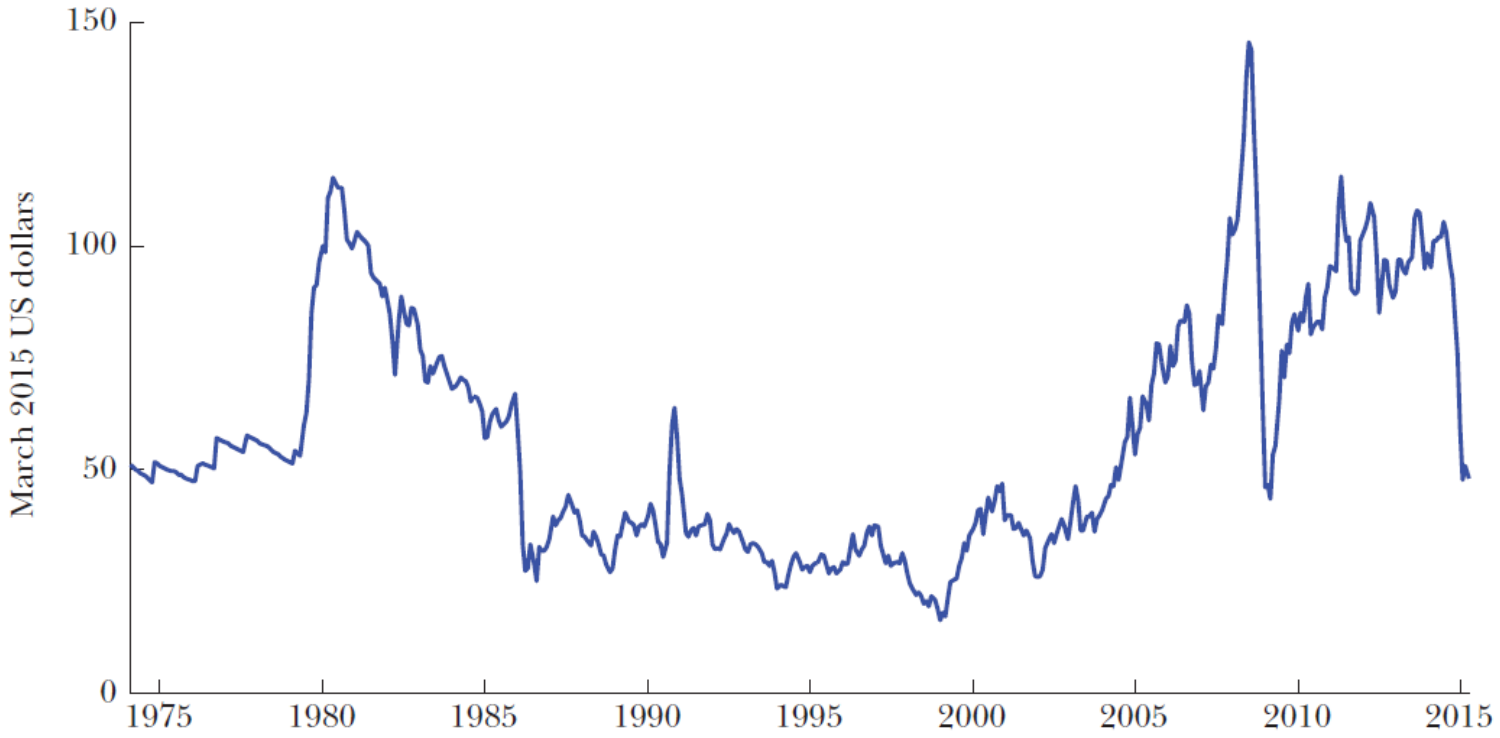
MAJOR HISTORICAL OIL PRICE FLUCTUATIONS

Inflation-Adjusted WTI Price of Crude Oil, 1974.1–2015.3



Source: US Energy Information Administration.
Note: The West Texas Intermediate (WTI) oil price series has been deflated with the seasonally adjusted US consumer price index for all urban consumers.

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- Prior to 1980, disruptions in global oil production due to exogenous events (wars and revolutions in OPEC countries) were considered to cause major oil price changes
- However subsequent research contradicts this claim and categorizes it as just one of the many contributing factors affecting these shifts in the global prices
- The most important determinant of the demand for oil has been shifts in the flow (or consumption) demand for oil associated with the global business cycle
- As the global economy expands, so does demand for industrial raw materials including crude oil, putting upward pressure on the price of oil

According to the literature the potential determinants of oil price fluctuations include:

- Shocks to global crude oil production arising from political events in oil-producing countries, the discovery of new fields, and improvements in the technology of extracting crude oil
- Shocks to the demand for crude oil associated with unexpected changes in the global business cycle
- Shocks to the demand for above-ground oil inventories, reflecting shifts in expectations about future shortfalls of supply relative to demand in the global oil market

Historically, inventory demand has been high in times of geopolitical tension in the Middle East, low spare capacity in oil production, and strong expected global economic growth.

1973/74 OIL CRISIS

- Initially attributed to the supply shock due to Israel-Arab war during October 1973
- In reality, OPEC countries deliberately cut oil production (~30%) in 1973
- Unfavorable term of the 1971 Tehran/Tripoli agreement was the major factor behind these cuts
- Price agreed upon in 1971 quickly eroded in real terms as a result of a depreciating US dollar and rising US inflation
- The decision to reduce oil production and raising of the oil price was motivated by the cumulative effects of the dollar devaluation, unanticipated US inflation, and high demand for oil fueled by strong economic growth
- Hence, price increase was endogenous with respect to global macroeconomic conditions

1979/80 OIL CRISIS

- The price of WTI crude oil rose from less than $16 per barrel in April 1979 to almost $40 in April 1980
- Traditional view faults the reduced output following the Iranian revolution
- But most of the shortfall was covered by Saudi Arabia's increased output in response to the revolution. The Iranian production also started recovering from May 1979
- Thus, this oil supply shock is not sufficient in completely explaining the 1979 oil price increase
- Empirical evidence credits only 1/3 of the increase to anticipation of future oil shortages, reflecting adverse geopolitical conditions
- Majority (2/3) of the cumulative oil price increase is explained by the demand shocks triggered by an unexpectedly strong global economy

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1980'S AND 1990'S

- 1981 witnessed an increase in the WTI price of oil from $36 per barrel to $38 in January 1981 due to the outbreak of the Iran–Iraq War (supply shock)
- However, early 1980s saw a systematic decline in the price of oil due to a more contractionary stance in global monetary policy regimes
- Paul Volcker's decision to raise US interest rates lowered the demand for oil (demand shock)
- Additionally, non-OPEC countries had expanded their production capacities following the first oil crisis pulling down the oil prices
- Demand for crude reduced, arguably caused by the Asian financial crisis of mid-1997, followed by economic crises in Russia, Brazil, & Argentina ($11 per barrel)
- Recovery in prices started in 1999, attributed to Venezuelan production drop and 2003 Iraq war

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2003 TO GLOBAL FINANCIAL CRISIS

- Between mid-2003 and mid-2008 the WTI price climbed from $28 to $134 per barrel caused by increases in the demand associated with an unexpected expansion of the global economy
- An alternative view is that this surge in the price of oil was the result of speculative positions taken by financial traders in the oil futures market
- However in mid-2008 the demand plummeted anticipating recession, with prices settling at $39 per barrel in February 2009
- The price of oil stabilized near $100 per barrel when fear of global financial system collapse subsided
- Between June 2014 and January 2015 the Brent price of oil fell from $112 to $47 per barrel
- The contributing factors for this were slowdown in global economic activity ($11), unexpected increase in production in US, Canada, & Russia ($16), and unanticipated weakening of the economy in late 2014 ($13)

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Measuring Expectations

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HOW TO MEASURE OIL PRICE EXPECTATIONS

- Economists' Oil Price Expectations
- Policymakers' Oil Price Expectations
- Financial Market Oil Price Expectations
- Consumers' Oil Price Expectations

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ECONOMISTS' OIL PRICE EXPECTATIONS

- Relating the price of oil to its own past values as well as past values of other key determinants of the price of oil suggested by economic theory.
- The central idea underlying vector autoregression(VAR) models of the global oil market.

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POLICYMAKERS' OIL PRICE EXPECTATIONS

- One possibility - Financial market participants have more information than can be captured by econometric models. It is equally possible for financial market participants to ignore, misinterpret, or miss information captured by model-based oil price predictions, especially if that information is costly to obtain.
- A natural source of information about the market expectation of the price of oil is the price of oil **futures contracts**.
- The most common approach to inferring the expected price of oil for immediate delivery in the physical market has been to treat the price of the oil futures contract of maturity *h* as the *h*-period ahead market expectation of the nominal price of crude oil.
- This is how the International Monetary Fund forms oil price expectations, and this has been common practice at many central banks in the world. This is why this approach is referred as the policymakers' oil price expectation.

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FINANCIAL MARKET OIL PRICE EXPECTATIONS

- The use of futures prices as measures of market expectations is valid only if the risk premium is negligible.
- There is a large horizon-specific time-varying risk premium in the oil futures market.
- The oil price expectation may be recovered by subtracting the Hamilton-Wu estimates of the risk premium from the oil futures price for a given horizon.

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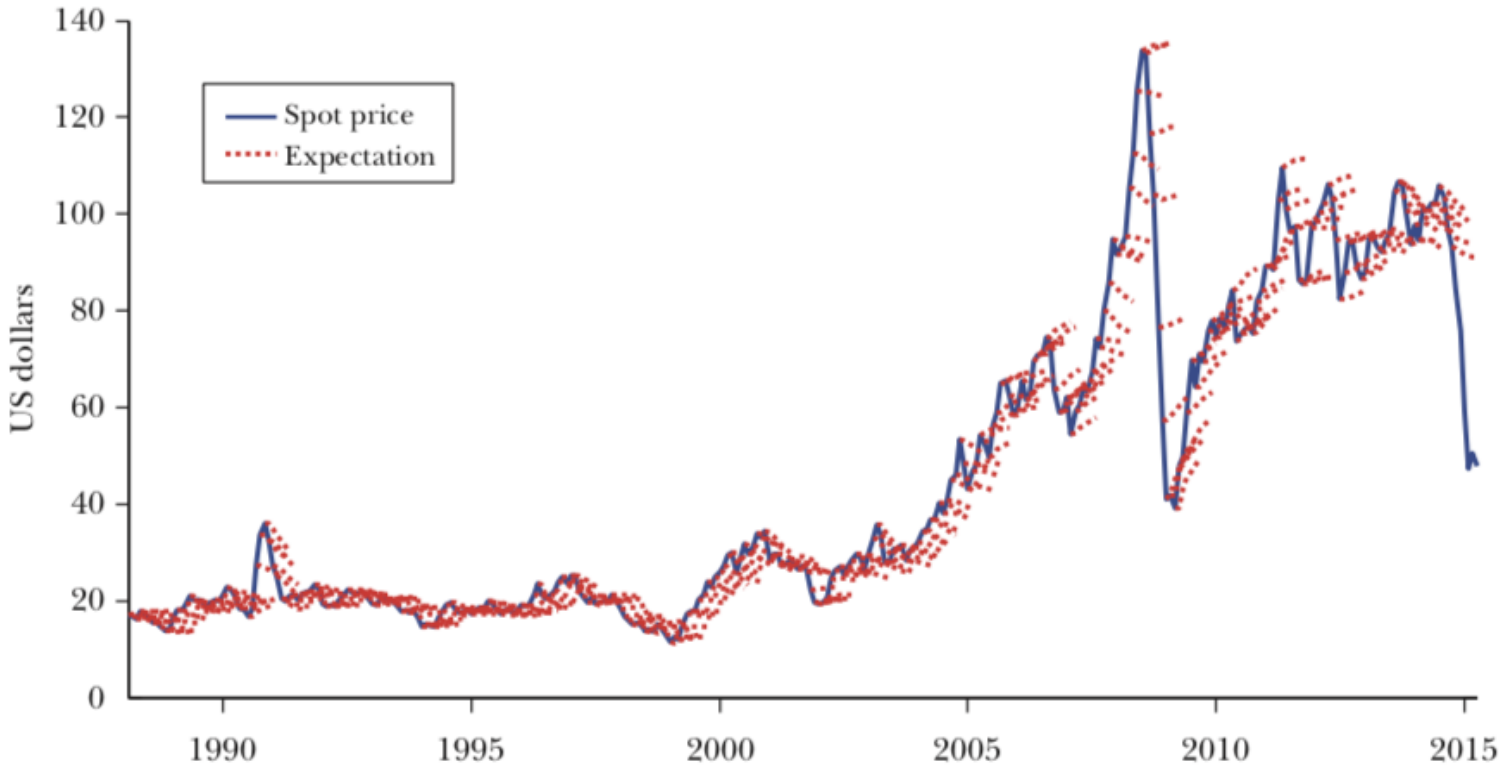
Alternative Expectations Measures Based on WTI Futures Prices

A: Monthly Oil Price Expectations Measure Obtained from the Oil Futures Curve



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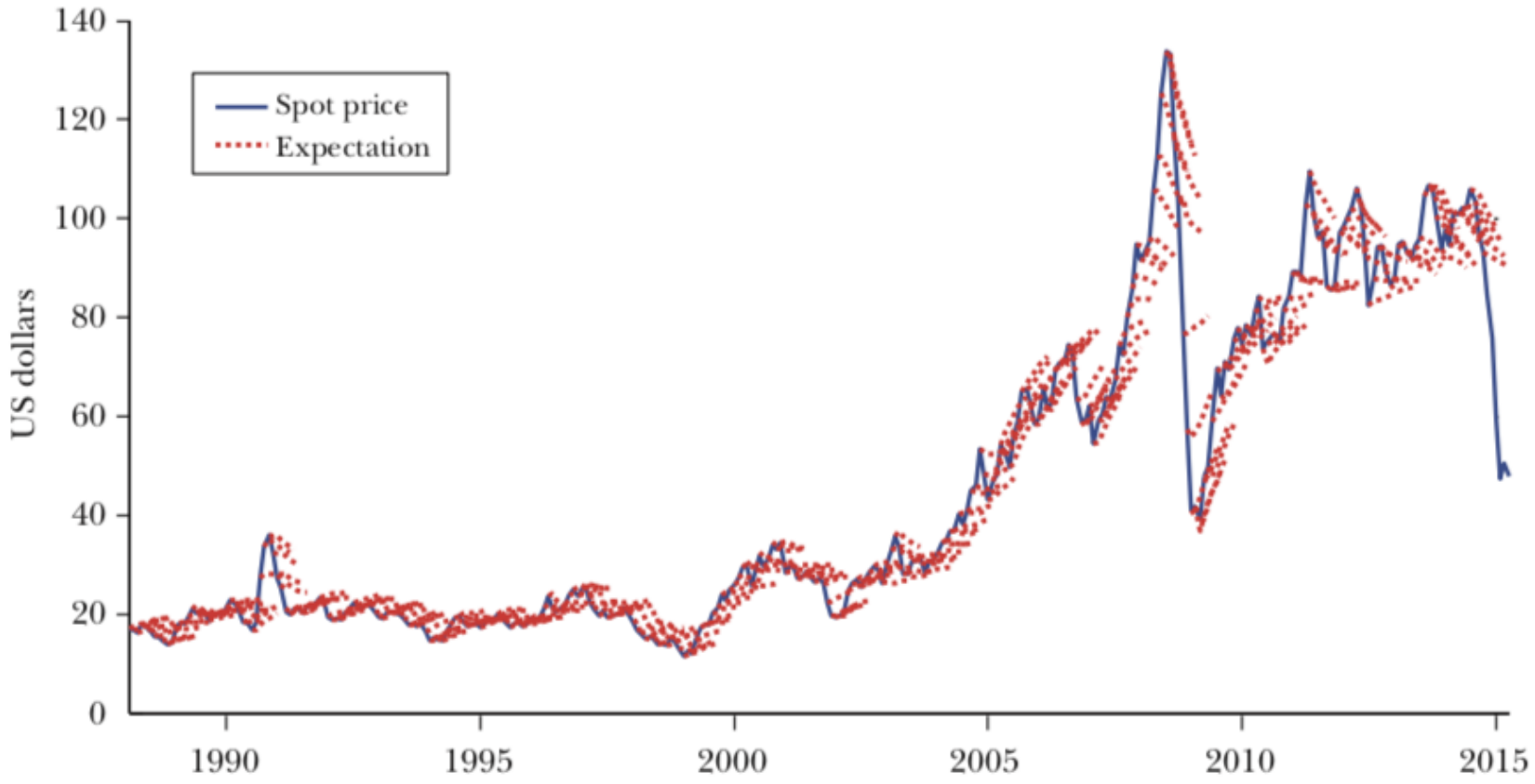
B: Monthly Financial Market Oil Price Expectations Obtained from the Risk-Adjusted Futures Curve



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CONSUMERS' OIL PRICE EXPECTATIONS

- Recent research has shown that households in the Michigan Survey of Consumers typically form expectations about the real (or inflation-adjusted) price of gasoline according to a simple no-change model such that the nominal gasoline price is expected to grow at the rate of inflation.
- Consumers forecast the real and nominal prices of crude oil along much the same lines, allowing us to proxy consumer expectations about the nominal price of oil based on the current price of oil and an inflation forecast.

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Oil Price Shock

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WHAT IS AN OIL PRICE SHOCK

- Unanticipated or surprise component of a
- How to measure? What benchmark?
- Four comparisons
  - Perceived by financial markets
  - Perceived by policymakers
  - Perceived by consumers
  - Measured by economists (VAR Model)

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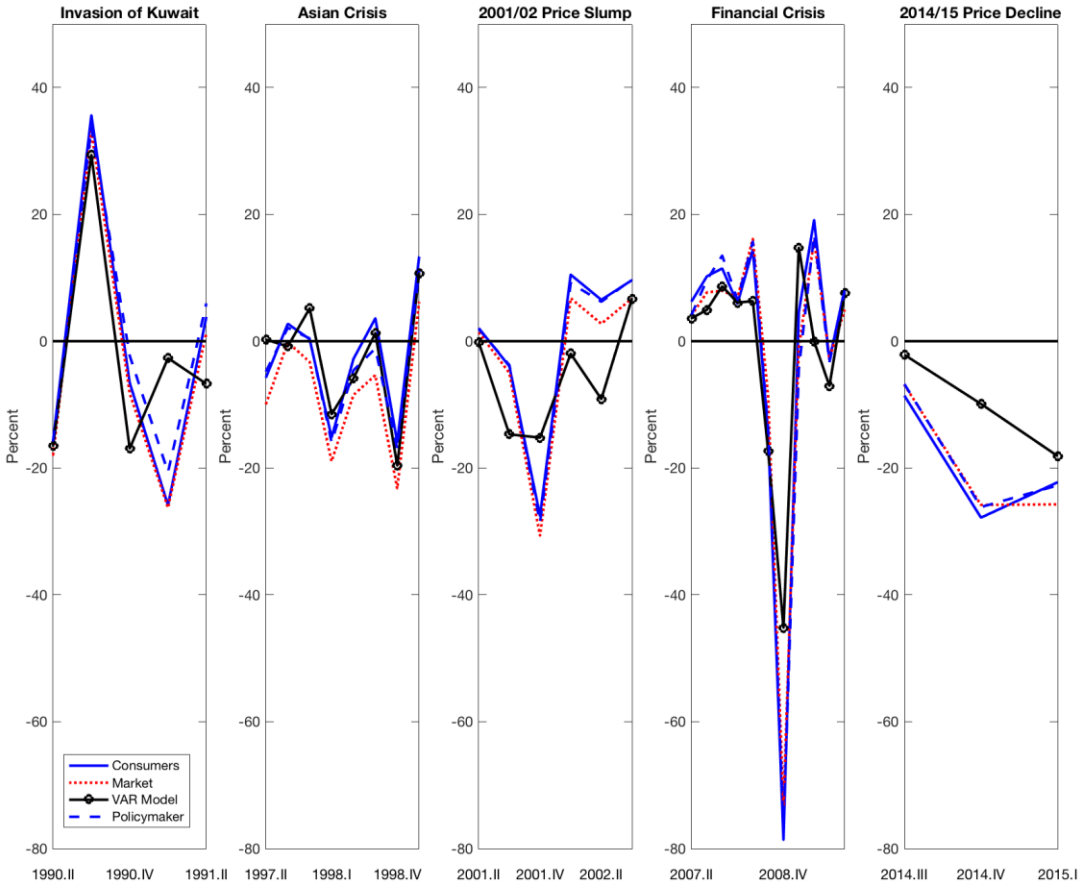
QUARTERLY SHOCKS TO NOMINAL WTI PRICE OF OIL BY EPISODE



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HETEROGENEITY IN OIL PRICE EXPECTATIONS

- VAR on average predict the shocks best
- Overall, shocks are largest from consumer's perspective
- Somewhat smaller from financial market perspective
- Policymakers' expectation close to consumers' expectations.

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SHOCK = - (EXPECTATION - SPOT) / SPOT

- Notice the most persistent surge in price of oil occurred between 2003 and mid-2008
- Which lies in the gap between 2001/02 price slump shock and financial crisis shock
- No large positive oil price shocks necessary to sustain increase in the price of oil

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Difficulties in Prediction

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CAN WE PREDICT OIL PRICE FLUCTUATION?

The answer is yes. But the performance is poor

- We know what are the determinants
  - Demand shift associated with growth,
  - supply shift associated with production
  - inventory demand
- We don't know the future evolution of these determinants

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DEMAND SHIFTS ASSOCIATED WITH THE GLOBAL BUSINESS CYCLE

- World GDP
- Global real economic evolution of global business cycle
- Prediction only for short horizons but very imprecise
- The accuracy of VAR for oil price improves under persistent economic expansions or contractions (i.e., predictable), but greatly reduced during normal times
- e.g., China's industrialization since 2003

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SUPPLY SHIFTS ASSOCIATED WITH THE OIL PRODUCTION

- Unpredictable disruptive political events in oil-producing countries
- Gauge the response of global oil production to surges in the price of oil driven by increased demand for crude oil
- Replaceable?

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INVENTORY DEMAND SHIFTS

- Oil price changes in response to a shift in uncertainty
- The prediction of timing of political crises and their impact
  - Eg. Arab Spring
- The prediction of timing of economic crises
- Most predictions simply ignore the possibility of future political or economic crises: because crises are rare.

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Q&A

"OIL."

- ???

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