OPEC in the News: The Effect of OPEC on Oil Price Uncertainty

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All statements made in this presentation are my own opinions and do not necessarily reflect the official opinions of the Federal Reserve Bank of Dallas nor the Federal Reserve System as a whole.
THE PAPER

- Investigate relationship between oil price uncertainty and OPEC events
- Quantify impacts of OPEC “shocks” on uncertainty
- Explore how shocks have contributed to uncertainty historically
LITERATURE


- Oil price volatility and economic activity - Bernanke (1983), Ferderer (1996), Jo (2013), others

- Broader uncertainty literature - Sandmo (1970), Bloom (2009), DSGE uncertainty shocks, others
Method

- Construct article count variable to identify important OPEC-related events
- Embed article count in monthly structural VAR model w/ measure of oil price uncertainty, VIX Index
- Analyze impulse response functions, variance and historical decompositions
Key Findings

1. OPEC-related events are associated with a persistent increase in oil price uncertainty

2. Important contributor to oil price uncertainty from late 1990s to late 2000s, Arab Spring, late 2014

3. Robust to alternative count and model specifications

4. Macro uncertainty plays an important, independent role
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ARTICLE COUNT VARIABLE

- Use Dow Jones Factiva, keyword “OPEC”
- Search 3 major newspapers (NYT, FT, WSJ)
- Get monthly count of total articles
ARTICLE COUNT VARIABLE

Article count variable (normalized)

Deviation from mean


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<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 1999</td>
<td>OPEC meeting</td>
</tr>
<tr>
<td>March 2000</td>
<td>OPEC meeting</td>
</tr>
<tr>
<td>September 2000</td>
<td>OPEC meeting</td>
</tr>
<tr>
<td>July 2001</td>
<td>OPEC meeting (extraordinary)</td>
</tr>
<tr>
<td>November 2001</td>
<td>Post 9/11 OPEC meeting (extraordinary)</td>
</tr>
<tr>
<td>May 2004</td>
<td>Militant attack on Saudi oil facility</td>
</tr>
<tr>
<td>June 2004</td>
<td>OPEC meeting (extraordinary)</td>
</tr>
<tr>
<td>November 2007</td>
<td>Month prior to OPEC meeting (extraordinary)</td>
</tr>
<tr>
<td>October 2008</td>
<td>OPEC meeting (extraordinary)</td>
</tr>
<tr>
<td>December 2008</td>
<td>OPEC meeting (extraordinary)</td>
</tr>
<tr>
<td>December 2014</td>
<td>Oil price collapse</td>
</tr>
</tbody>
</table>

Identified events during a month when the article count variable was more than 2 standard deviations above its mean. The events are listed chronologically.
Uncertainty Data

Graph showing the annualized percentage of VIX Index and implied volatility from 1996 to 2014. The graph highlights significant volatility peaks, particularly in 2008 and 2014, indicating periods of high uncertainty.

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EMPIRICAL MODEL

Structural VAR

\[ A_0 z_t = \alpha + \sum_{i=1}^{3} A_i z_{t-i} + \epsilon_t, \]  

(1)

Reduce-form VAR

\[ z_t = A_0^{-1} \alpha + A_0^{-1} \sum_{i=1}^{3} A_i z_{t-i} + A_0^{-1} \epsilon_t, \]  

(2)

\[ e_t \equiv \begin{pmatrix} e_{t}^{\text{article}} \\ e_{t}^{\text{VIX}} \\ e_{t}^{\text{IV}} \end{pmatrix} = \begin{bmatrix} a_{11} & 0 & 0 \\ a_{21} & a_{22} & 0 \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{pmatrix} \epsilon_{t}^{\text{article}} \\ \epsilon_{t}^{\text{VIX}} \\ \epsilon_{t}^{\text{IV}} \end{pmatrix}. \]
**Impulse Response Functions**

Article shock

VIX shock

Own-shock

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### Top three article count shocks

<table>
<thead>
<tr>
<th>Shock size</th>
<th>Month</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6</td>
<td>March 1999</td>
<td>OPEC meeting</td>
</tr>
<tr>
<td>2.3</td>
<td>March 2000</td>
<td>OPEC meeting (extraordinary)</td>
</tr>
<tr>
<td>2.2</td>
<td>July 2001</td>
<td>OPEC meeting (extraordinary)</td>
</tr>
<tr>
<td>2.2</td>
<td>June 2014</td>
<td>ISIS in Iraq</td>
</tr>
<tr>
<td>2.2</td>
<td>October 2014</td>
<td>Month prior to OPEC meeting</td>
</tr>
</tbody>
</table>

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<tr>
<td>8.2</td>
<td>October 2008</td>
<td>Financial crisis</td>
</tr>
<tr>
<td>4.4</td>
<td>August 2011</td>
<td>Eurozone crisis</td>
</tr>
<tr>
<td>3.7</td>
<td>May 2010</td>
<td>Eurozone crisis</td>
</tr>
</tbody>
</table>

Top three values of each structural shock and the event that occurred in the month of the shock.
Historical Decompositions

Cumulative effect of the article count shock

Cumulative effect of the VIX shock

Cumulative effect of own-shock

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ROBUSTNESS

Consider following changes to SVAR model:

1. Ordering (VIX first)
2. Excluding VIX
3. More lags
4. Different source for counts (Bloomberg)
Response of implied volatility to article count shock

- Baseline
- VIX first
- No VIX
- Six lags
- Bloomberg

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CONCLUSIONS

- Construct article count variable to identify important OPEC-related events
- Shocks to the article count are associated with increased oil price uncertainty
- Shocks played important role in uncertainty at certain periods of time