The Correlation of Oil and Equity Prices: The Role of Zero Lower Bound
by Deepa Datta, Benjamin K. Johannsen, Hannah Kwon, and Robert J. Vigfusson

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Summary

This is an interesting paper!

Empirically, since 2008,
  - Oil and equity prices have a stronger comovement.
  - They are more responsive to macro news.
  - Attribute these changes to the ZLB.

Theoretically,
  - Augment a standard New Keynesian model with oil.
Comment 1: is the correlation driven by the ZLB?

blue: WTI; red: S&P 500; shade: ZLB
Comment 1: is the correlation driven by the ZLB?

Alternative explanations

- Financialization: Tang and Xiong (2012)
- Recession: Hamilton and Wu (2015)
Comment 2: no unconventional monetary policy

ZLB without UMP (normal times)

- Negative supply shock
  - Higher output

- Government spending shock
  - Higher consumption
  - Fiscal multiplier > (\(<\)) 1

\[\text{negative supply shock} \rightarrow \text{higher (lower) output}\]
\[\text{government spending shock} \rightarrow \text{higher (lower) consumption} \rightarrow \text{fiscal multiplier} > (\(<\)) 1\]
Comment 2: no unconventional monetary policy

Taylor rule

\[ i_t = c + (1 + \phi_\pi)\pi_t + \phi_y y_t \]

Fisher equation

\[ r_t = i_t - \mathbb{E}_t[\pi_{t+1}] \]

Basic channel

- normal times: inflation ↑ → real rate ↑ → C, I ↓
- ZLB without UMP: inflation ↑ → real rate ↓ → C, I ↑
- ZLB with UMP: inflation ↑ → real rate ↑ → C, I ↓
Comment 2: no unconventional monetary policy

Shadow rate and private borrowing rates

ZLB with UMP: inflation ↑ → shadow rate ↑
→ private borrowing rate ↑ → private real rate ↑ → C, I ↓
Comment 2: no unconventional monetary policy

Wu and Zhang (2016)

Negative supply shock

Government spending shock

Output

Consumption

Government spending multiplier

% dev. from S.S.
Comment 3: relation to macro news

Table 6: Oil Pre- and Post- Break Regression Results

<table>
<thead>
<tr>
<th></th>
<th>Cap. util.</th>
<th>Cons. conf.</th>
<th>Core CPI</th>
<th>GDP (adv.)</th>
<th>Init. claims</th>
<th>ISM manufact.</th>
<th>Leading ind.</th>
<th>New homes</th>
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<th>Unemp. rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surprise</td>
<td>0.29</td>
<td>0.22</td>
<td>0.20</td>
<td>-0.19</td>
<td>-0.02</td>
<td>0.57</td>
<td>0.06</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.39</td>
<td>-0.27</td>
</tr>
<tr>
<td></td>
<td>(1.61)</td>
<td>(1.29)</td>
<td>(1.11)</td>
<td>(-0.72)</td>
<td>(-0.28)</td>
<td>(1.71)</td>
<td>(0.44)</td>
<td>(-0.01)</td>
<td>(-0.01)</td>
<td>(-2.17)</td>
<td>(-1.39)</td>
<td></td>
</tr>
<tr>
<td>Surprise</td>
<td>-0.37</td>
<td>-0.17</td>
<td>-0.48</td>
<td>-0.28</td>
<td>0.39</td>
<td>0.55</td>
<td>-0.42</td>
<td>-0.11</td>
<td>0.92</td>
<td>0.66</td>
<td>0.41</td>
<td>0.26</td>
</tr>
<tr>
<td>*Post-break dummy</td>
<td>-1.27</td>
<td>-0.61</td>
<td>-1.42</td>
<td>-0.53</td>
<td>(2.68)</td>
<td>(1.82)</td>
<td>(-0.98)</td>
<td>(-0.28)</td>
<td>(2.29)</td>
<td>(1.92)</td>
<td>(1.08)</td>
<td>(0.80)</td>
</tr>
<tr>
<td>Post-break response</td>
<td>β_{1j} + β_{2j}</td>
<td>0.08</td>
<td>0.05</td>
<td>-0.28</td>
<td>-0.47</td>
<td>0.37</td>
<td>0.50</td>
<td>0.15</td>
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<td>F-stat</td>
<td>0.12</td>
<td>0.04</td>
<td>0.97</td>
<td>1.08</td>
<td>9.08</td>
<td>3.80</td>
<td>0.32</td>
<td>0.02</td>
<td>6.21</td>
<td>4.50</td>
<td>0.00</td>
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<tr>
<td></td>
<td>p-value</td>
<td>0.72</td>
<td>0.84</td>
<td>0.32</td>
<td>0.30</td>
<td><strong>0.00</strong></td>
<td>0.05</td>
<td>0.57</td>
<td>0.90</td>
<td><strong>0.01</strong></td>
<td>0.03</td>
<td>0.96</td>
</tr>
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- Oil responds to the labor data.
- What is special about that?
Comment 3: relation to macro news

How do we reconcile equity with oil?

- Oil responds to the labor data.
- Equity responds to manufacturing and sales data.

Table 7: Equity Pre- and Post- Break Regression Results

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<td>(3.15)</td>
<td>(0.62)</td>
<td>(0.08)</td>
<td>(0.77)</td>
<td>(-0.20)</td>
<td>(-0.22)</td>
<td>(-1.21)</td>
<td>(-1.31)</td>
<td>(0.03)</td>
<td>(0.54)</td>
</tr>
</tbody>
</table>

|                      | 0.12       | 0.12        | 0.39     | -0.34      | 0.12         | 0.38           | 0.01          | 0.05      | 0.31           | 0.30     | 0.55         | -0.06       |
|                      | (-0.84)    | (-0.80)     | (2.25)   | (-1.28)    | (1.61)       | (2.49)         | (0.02)        | (0.28)    | (1.53)         | (1.71)   | (2.82)       | (-0.37)     |

*Post-break dummy

Post-break response

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<tr>
<th>$\beta_{1j} + \beta_{2j}$</th>
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<td>0.26</td>
<td>0.20</td>
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</tr>
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Observations

| 280 | 283 | 283 | 95 | 1176 | 277 | 284 | 281 | 275 | 281 | 282 | 273 |
Comment 4: one year rolling window

The main results heavily depend on the one-year rolling window. Are they robust to alternative window size?

- What if the window is smaller? For example, 3 months or 6 months
- What about larger window size? For example, 2 years or 3 years.
Comment 4: one year rolling window and ZLB
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Also, the “break” date Sep 2008 really covers Sep 2007 - Sep 2008.
Comment 4: 3-month rolling window and ZLB

If I use 3 month moving average,
Conclusion

Overall, this is a very interesting paper!

- Comment 1: is the correlation driven by the ZLB?
- Comment 2: no unconventional monetary policy
- Comment 3: relation to macro news
- Comment 4: one year rolling window