Uncertainty, Expectation Dispersion, and the Reaction to News

Benjamin Born (Frankfurt School, CEPR, CESifo)
Jonas Dovern (Friedrich-Alexander-Universität Erlangen-Nürnberg, CESifo)
Zeno Enders (Heidelberg University, CESifo)

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Financial Markets Closely Watch Indicator Releases

Stock Market Drops After U.S. Adds Just 20,000 Jobs -- Smallest Increase in 17 Months

Weak economic data stoked fears of sputtering economic growth.

THE WALL STREET JOURNAL.

Stocks Fall, Weighed Down by Tech Losses and Jobless Claims

Major indexes drop as technology shares continue to decline and jobless claims remain above pre-pandemic peak.
Financial Markets Closely Watch Indicator Releases

- Release of macro information move asset prices (Fleming/Remolona, 1999; Andersen et al., 2007; Beechey/Wright, 2009)

- Link between macro news and asset prices varies:
  - Boom vs. recession (McQueen/Roley, 1993; Boyd et al., 2005)
  - Information content (Ehrmann/Sondermann, 2012; Gilbert et al., 2017)
  - Expectations about monetary policy responses (Law et al., 2020)
What Makes a Signal Important/Useful?

• We offer fresh look at two specific dimensions in this context:
  - Uncertainty about macro fundamentals
  - Dispersion of forecasts of macro indicators

• Theoretical model with information frictions in which
  - … at times where little is known about fundamentals (high uncertainty) signals become important
  - … signals that are closely linked to fundamentals (low forecast dispersion) are important

• Empirical results confirm opposed effects of uncertainty and dispersion, respectively, on strength of news effect on stock market
Model

- Fundamental factor follows random walk:
  \[ x_t = x_{t-1} + \varepsilon_t \]
  - Long-run profits \(\rightarrow\) stock prices

- Changes of this factor not observable:
  - Macro indicators:
    \[ i_t = \varepsilon_t + v_t(i) \]
    \[ v_t(i) \sim N(\mu_{v,t}, \sigma_{v,t}^2) \]
  - Noisy component with unknown time-varying mean and variance

- Agents get private noisy signals about relation between indicator and fundamental change:
  - \( s_t(j) \) drawn from distribution of \( v_t(i) \)
  - High \( \sigma_{v,t}^2 \) \(\rightarrow\) large dispersion of forecasts
Model

Step 1: nowcasts of $i_t$

- $E_t[i_t] = \nu_t(j)$
- No trading ($E[x_t] = x_{t-1}$)

Step 2: survey publication

- Noise distribution revealed $\Rightarrow E_t[i_t] = \bar{\nu}_t$, $\sigma_{v,t}^2$ known
- No trading ($E[x_t] = x_{t-1}$)

Step 3: indicator release

- Update of $E[x_t] = x_{t-1} + \rho_{i,t}(i_t - \bar{\nu}_t)$
- Depends on variances of fundamental shock and link between indicator and fundamental shock:
  $\rho_{i,t} = \frac{\sigma_{\epsilon,t}^2}{\sigma_{\epsilon,t}^2 + \sigma_{v,t}^2}$
- Trading
Survey on Forecasts of Macro Indicator Releases

- **Bloomberg survey:**
  - Various indicators covered
  - Individual forecasts available
  - Very short forecast horizon

- **Indicators**
  - Law et al. (2020) + GDP + CPI inflation

- **Sample:**
  - Avg. number of forecasters is 51.4
  - Number of indicator releases covered is 1,671

- **Computation of i) dispersion and ii) news**
## Survey on Forecasts of Macro Indicator Releases

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Acronym</th>
<th>Freq.</th>
<th>First obs.</th>
<th># obs</th>
<th>Avg. # forecasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chg. in non-farm payrolls</td>
<td>CNP</td>
<td>m</td>
<td>01/08/1997</td>
<td>197</td>
<td>70.5</td>
</tr>
<tr>
<td>Initial jobless claims</td>
<td>IJC</td>
<td>w</td>
<td>11/02/1999</td>
<td>824</td>
<td>36.9</td>
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<tr>
<td>ISM manufacturing index</td>
<td>ISM</td>
<td>m</td>
<td>01/06/1998</td>
<td>195</td>
<td>64.6</td>
</tr>
<tr>
<td>Conf. Board cons. confidence</td>
<td>CCI</td>
<td>m</td>
<td>23/02/1999</td>
<td>193</td>
<td>59.4</td>
</tr>
<tr>
<td>GDP growth</td>
<td>GDP</td>
<td>q</td>
<td>30/04/1998</td>
<td>66</td>
<td>68.3</td>
</tr>
<tr>
<td>CPI inflation</td>
<td>CPI</td>
<td>m</td>
<td>16/06/1998</td>
<td>196</td>
<td>66.5</td>
</tr>
</tbody>
</table>

*Notes:* Observed frequencies in our sample are weekly (w), monthly (m), and quarterly (q). The last observations in our sample are from March 2015.
Stock Market Data

• **Tick-by-tick data for S&P500 futures:**
  - Some releases not during trading hours of stock exchange
  - Data provider: TickData

• **Track return over window around data release:**
  - Our baseline +/- 5 minutes
  - Results robust when we switch to longer windows (- 15 minutes to + 30 minutes)
Fundamental Uncertainty

• **Baseline proxy:**
  - Real uncertainty (Ludvigson et al., 2021)

• **Alternative proxies:**
  - Economic policy uncertainty (Baker et al., 2016)
  - VIX
  - Monetary policy uncertainty (Husted et al., 2020)
  - Macro uncertainty (Ludvigson et al., 2021)
  - Financial uncertainty (Ludvigson et al., 2021)
Uncertainty vs. Dispersion

Dispersion vs. Uncertainty over time from 2000m1 to 2015m1.
Empirical Model

- Interested in interaction of effects on returns of
  - news and dispersion
  - news and uncertainty

- Event study framework (one indicator release = one observation)

\[ R_{t}^{T+5} = \alpha + \sum_{i=1}^{I} \left( \beta_{1}^{i} \text{News}_{t}^{i} + \beta_{2}^{i} \text{Disp}_{t}^{i} + \beta_{3}^{i} \text{News}_{t}^{i} \times \text{Disp}_{t}^{i} \right) \]

\[ + \beta_{4} \text{Unc}_{t} + \sum_{i=1}^{I} \left( \beta_{5}^{i} \text{News}_{t}^{i} \times \text{Unc}_{t} \right) + \gamma'X_{t} + \varepsilon_{t} \]

- We will plot the effect of news on returns for different levels of dispersion and uncertainty (all variables standardized)
Results: No Interactions/Plain News Effect
Results: State-dependent News Effects

Further results
Conclusion

- Study addresses important question:
  - “How do market prices react to news?”

- Look at the role of uncertainty and forecast dispersion:
  - (Until recently) literature treated both as very similar animals
  - Our model: fundamentally different effects on link between macro news and stock price movements

- Empirical results confirm model predictions

- Implications:
  - Don’t mix expectation dispersion and uncertainty
  - Indicator releases should be evaluated in light of additional information
Thank you for your attention!
## Results: Significance of Slope Differences

<table>
<thead>
<tr>
<th></th>
<th>CNP</th>
<th>IJC</th>
<th>ISM</th>
<th>CCI</th>
<th>GDP</th>
<th>CPI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong> Real uncertainty</td>
<td>44.06</td>
<td>10.38</td>
<td>1.85</td>
<td>14.43</td>
<td>4.68</td>
<td>9.93</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.17)</td>
<td>(0.00)</td>
<td>(0.03)</td>
<td>(0.00)</td>
</tr>
<tr>
<td><strong>Baseline</strong> Economic policy uncertainty</td>
<td>19.44</td>
<td>5.44</td>
<td>18.64</td>
<td>7.40</td>
<td>2.35</td>
<td>8.93</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.02)</td>
<td>(0.00)</td>
<td>(0.01)</td>
<td>(0.13)</td>
<td>(0.00)</td>
</tr>
<tr>
<td><strong>Baseline</strong> Implied volatility – VIX</td>
<td>19.10</td>
<td>10.16</td>
<td>8.92</td>
<td>16.64</td>
<td>0.43</td>
<td>6.04</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.51)</td>
<td>(0.01)</td>
</tr>
<tr>
<td><strong>Baseline</strong> Monetary policy uncertainty</td>
<td>0.03</td>
<td>3.03</td>
<td>7.89</td>
<td>1.70</td>
<td>1.17</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>(0.85)</td>
<td>(0.08)</td>
<td>(0.00)</td>
<td>(0.19)</td>
<td>(0.28)</td>
<td>(0.62)</td>
</tr>
</tbody>
</table>

**Notes:** Test of difference in slopes for the interaction effects between news and dispersion and news and uncertainty. Test statistic with p-value in parentheses. Economic policy uncertainty: daily newspaper-based proxy (Baker et al., 2016); monetary policy uncertainty: monthly newspaper-based proxy (Husted et al., 2020).
Results: Robustness Checks

Monetary pol. uncertainty

Longer window size