Policy News and Stock Market Volatility

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Based on research with Scott Baker, Nick Bloom and Kyle Kost

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On Stock Market Volatility

The history of thought in financial markets has shown a surprising lack of consensus about a very fundamental question: what ultimately causes all those fluctuations in the price of speculative assets like corporate stocks…? One might think that so basic a question would have long ago been confidently answered.

Robert Shiller, 2014
Explaining Stock Market Volatility

Stock market ups and downs cannot be rationalized by realized future dividends discounted at a constant rate. See Shiller (1981) and many related papers.

That demonstration led to voluminous research:
1. One major line stresses time-varying expected returns in asset-pricing models with rational agents.
2. Another major line stresses non-rational beliefs, limits to arbitrage, and fads that move equity prices in ways not fully tethered to real investment opportunities.

See Cochrane (2017) and Barberis (2018) for recent reviews.
Our Paper

We develop new data and evidence that inform rational and behavioral interpretations of the volatility in equity returns. What we do:

1. Identify articles about stock market volatility in leading U.S. newspapers. Use them to construct an Equity Market Volatility (EMV) tracker.

2. Parse the underlying text to quantify drivers of stock market volatility, as perceived by journalists.

3. Extend the approach to construct EMV trackers tailored to specific economic and policy categories.
Figure 1: Newspaper-Based Equity Market Volatility Tracker, 1985-2018

Notes: The Equity Market volatility (EMV) tracker runs from January 1985 to October 2018. We construct it using scaled frequency of articles that contain terms about Economics, the Stock Market, and Volatility in 11 leading U.S. newspapers, as detailed in Section 2.1. We scale the EMV tracker to match the mean value of the VIX from 1985 to 2015.
Constructing an Equity Market Volatility Tracker, 1

We first specify terms in three sets, as follows:

\[ E: \{ \text{economic, economy, financial} \} \]

\[ M': \{ \text{“stock market”, stock OR stocks, “equity market”, equity OR equities, S&P OR “S & P”, “Standard and Poors” OR “Standard and Poor’s” OR “Standard and Poor” OR “Standard & Poors” OR “Standard & Poor’s} \}

\[ V': \{ \text{volatility OR volatile, “realized volatility”, uncertain OR uncertainty, risk OR risky, variance, VIX} \} \]

*Implicitly, we apply a parsimony principle here.*
Second, we randomly select a 30% sample of articles that contain at least one element in each of $E, M'$ and $V'$ from 1990 to 2015.

Here, we use four newspapers for which we could download many articles that meet our criteria: the Miami Herald, Dallas Morning News, San Francisco Chronicle, and Houston Chronicle.
Third, using the sampled articles, we construct a candidate EMV tracker for each permutation of elements in $M'$ and $V'$. Specifically, we count articles that contain the candidate permutation, scale that count by the number of all articles in the same paper and month, standardize the scaled frequency counts to unit standard deviation for each paper, and then average the resulting standardized, scaled counts over papers by month.

These mechanics follow Baker, Bloom and Davis (QJE, 2016) exactly.
Fourth, we select the permutation that achieves the highest R-squared value in an OLS regression of the 30-day VIX on the candidate EMV tracker using monthly data from 1990 to 2015.

This approach to term-set selection differs from the human-audit approach of Baker, Bloom and Davis (QJE, 2016). Each approach has advantages and disadvantages.

Since we use observations from 1990-2015 to select our EMV terms, we can use observations before 1990 and after 2015 to assess out-of-sample performance.
Constructing an Equity Market Volatility Tracker, 5

Having settled on our term-set criteria — E, M and V — we now follow the BBD mechanics using article counts from all 11 major newspapers.

Key practical point: Once we have our term sets, we don’t need to intensively interrogate the full text of articles. Instead, we need only access an interface that returns counts of articles that meet particular criteria. Proquest, Factiva, etc., and many newspaper websites have this capability. We automate the access protocols and count retrieval for easy updating.
### Table 2: Regressions of Stock Market Volatility Measures on the EMV Tracker

<table>
<thead>
<tr>
<th></th>
<th>(1) $VIX_t$</th>
<th>(2) $VIX_t$</th>
<th>(3) $VIX_t$</th>
<th>(4) $VIX_t$</th>
<th>(5) Log($VIX_t$)</th>
<th>(6) $RVol_t$</th>
<th>(7) $RVol_t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$EMV_t$</td>
<td>0.76 (0.06)</td>
<td>0.53 (0.10)</td>
<td>0.43 (0.08)</td>
<td>0.47 (0.10)</td>
<td>0.96 (0.09)</td>
<td>0.79 (0.13)</td>
<td></td>
</tr>
<tr>
<td>$EMV_{t-1}$</td>
<td></td>
<td>0.20 (0.09)</td>
<td></td>
<td>-0.12 (0.09)</td>
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<td></td>
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<tr>
<td>$EMV_{t-2}$</td>
<td></td>
<td></td>
<td>0.21 (0.05)</td>
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<td>-0.02 (0.09)</td>
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<tr>
<td>Log($EMV_t$)</td>
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<td></td>
<td></td>
<td></td>
<td>0.78 (0.03)</td>
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<tr>
<td>$VIX_{t-1}$</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>0.58 (0.06)</td>
<td>0.67 (0.09)</td>
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<tr>
<td>$RVol_{t-1}$</td>
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<td></td>
<td></td>
<td>0.24 (0.12)</td>
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<tr>
<td>$R^2$</td>
<td>0.61</td>
<td>0.70</td>
<td>0.83</td>
<td>0.84</td>
<td>0.60</td>
<td>0.65</td>
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</tr>
</tbody>
</table>
Figure 2: VIX and Fitted VIX from a Regression on EMV, 1985-2018

**Notes**: Data for the CBOE 30-Day VIX data from 1990 to 2017 appended to the VIX series in Berger et al. (2019) from 1985 to 1989. "Fitted VIX" values are from the regression VIX on EMV reported in Table 2, column (1) Both series run from January 1985 to October 2018.
Parsing the Text and Constructing Category-Specific Trackers, 1

We parse the text in our best-fit EMV articles to quantify journalist perceptions about the particular forces that drive volatility in equity returns.

• Classify these forces into 10 general economic categories and about 20 policy-related categories.

• If certain category-relevant terms appear in an EMV article, we infer that the article discusses one or more topics covered by the category in question.
For example, our term sets for Interest Rates (one of our general categories) and Monetary Policy (one of our policy categories):

**Interest Rates:** {interest rates, yield curve, fed funds rate, overnight rate, repo rate, T-bill rate, bond rate, bond yield}

**Monetary Policy:** {monetary policy, money supply, open market operations, fed funds rate, discount window, quantitative easing, forward guidance, interest on reserves, taper tantrum, Fed chair, Greenspan, Bernanke, Volker, Yellen, Draghi, Kuroda, Jerome Powell, lender of last resort, central bank, federal reserve, the fed, European Central Bank, ecb, Bank of England, bank of japan, people’s bank of china, pboc, pbc, central bank of china, Bank of Italy, Bundesbank}
Next, we calculate the share of EMV articles in each category and multiply by the EMV tracker value to obtain category-specific trackers. For example, to measure the importance of trade policy considerations in equity market volatility during month $t$, we calculate

$$\left( \frac{\# \{E \cap M \cap V \cap \text{Trade Policy}\}_t}{\# \{E \cap M \cap V\}_t} \right) \times EMV_t,$$

where $\#$ denotes the count of newspaper articles in the indicated set, and $EMV_t$ is the value of our overall EMV tracker in month $t$. 


Percent of Articles about Equity Market Volatility in Leading U.S. Newspapers that Discuss Trade Policy Matters, 1985 to 2018

NAFTA Negotiations, Agreement, Ratification and Introduction; January 1992 to June 1995 Mean: 6.7%

Tariff Hikes, Trade Tensions, March-December 2018; Mean: 26.0%

Trump Takes Office, Pulls out of TPP, January 2017

Trump Election, November 2016

Brexit Referendum, June 2016

1985-2015 Mean: 2.7%

Constructing the Preceding Chart

Compute the ratio, \[
\frac{\text{count of EMV articles that mention Trade Policy}}{\text{count of EMV articles}}
\]
in each month from January 1985 to December 2018 and plot the monthly time series.

The “count of EMV articles” in the denominator is the number of articles in 11 leading U.S. newspapers that contain at least one term in each of the following three sets:

- **(E)conomy**: \{economic, economy, financial\}
- **(V)olatility**: \{uncertain, uncertainty, volatility, volatile, risk, risky\}

The numerator is the count of the subset of EMV articles that also contains one or more terms in **Trade Policy**: \{trade policy\}, \{tariff, import duty\}, \{import barrier, import restriction\}, \{trade quota\}, \{dumping\}, \{export tax, export duty\}, \{trade treaty, trade agreement, trade act\}, \{wto, world trade organization, Doha round, Uruguay round, gatt\}, \{export restriction\}, \{investment restriction\}, \{Nafta, North American Free Trade Agreement\}, \{Trans-Pacific Partnership, TransPacific Partnership\}, \{Federal Maritime Commission\}, \{International Trade Commission\}, \{Jones Act\}, \{trade adjustment assistance\}
Figure C.7: Trade Policy EMV Tracker, 1985-2018

Notes: We construct the Trade Policy EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in Trade Policy. See Appendix B for the list of terms.
To help assess our newspaper-based EMV tracker for Trade Policy, let’s consider other indicators of trade-policy shocks and uncertainty
Trade Policy News Jolted the U.S. Stock Market in 2018

Consider all daily jumps in the U.S. stock market greater than 2.5%, up or down, since 1900. Classify the reason for the jump based on human readings of next-day accounts in the Wall Street Journal.

<table>
<thead>
<tr>
<th></th>
<th>Number of Daily Jumps Greater than</th>
<th>Number Attributed to Trade Policy News</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900 - 2017</td>
<td>1,103</td>
<td>7</td>
</tr>
<tr>
<td>During 2018</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Baker, Bloom, Davis and Sammon (2019)
U.S. Stocks Sell Off on Concerns About Trade

Trade-war fears, along with broader concerns about technology companies and the outlook for economic growth and interest rates, intensified Thursday, sending the Dow Jones Industrial Average tumbling more than 700 points and adding to fears that stocks could be headed for a larger reckoning. Thursday’s selling, which sent shares of manufacturers, aluminum producers and steelmakers sharply lower, culminates months of growing investor anxiety over U.S. trade policy. It came as many say the market was already under pressure, gripped by concern over rising interest rates and sliding technology shares. Trade tensions ratcheted higher as the Trump administration said it would impose tariffs on tens of billions of dollars of Chinese imports on top of duties on steel and aluminum imports, provoking the ire of officials from China to Germany to Mexico.

... Investors are concerned that China will retaliate, leading to “tit for tat” escalations of policies hindering trade and leading to slower growth, he said....
U.S. Equity Market Performance by China Exposure, March 2018 to February 2019

March 2018 = 100

Source: Bloomberg Finance, Wind Information Co. Database, IMF Staff Calculations.
China’s Stock Market Performance in 2018

Main Index = Shanghai Stock Exchange Composite Index

Small Cap Index = China Shenzhen Small Medium Enterprise Composite Index

Source: Bloomberg Finance, Wind Information Co. Database, IMF Staff Calculations.
Trade Policy Matters Became a Leading Source of Economic Uncertainty in 2018

Percentage of Articles about Economic Policy Uncertainty in Leading National Newspapers that Discuss Trade Policy Matters

<table>
<thead>
<tr>
<th>Time Period</th>
<th>United States</th>
<th>Japan</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987-2015</td>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>2000-2015</td>
<td>2</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>NAFTA: January 1992 to June 1995</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>China WTO Accession: Jan 2000 to Dec 2002</td>
<td>3</td>
<td>5</td>
<td>36</td>
</tr>
<tr>
<td>November 2016 to December 2018</td>
<td>9</td>
<td>20</td>
<td>39</td>
</tr>
<tr>
<td>March-December 2018</td>
<td>15</td>
<td>27</td>
<td>48</td>
</tr>
</tbody>
</table>

Trumpian Trade Policy Uncertainty

Indices normalized to 100 from 1987 to 2015

Trump Takes Office, US Withdraws from TPP

March-Oct. 2018: Trump Announces New Tariff Hikes; Trade Policy Tensions Intensify, Especially Between the U.S. and China

Brexit

United States

Japan

This chart shows a newspaper-based index of trade policy uncertainty based on the Renmin Daily and the Guangming Daily.

Source: Davis, Liu and Sheng (2019). The index is normalized to 100 from January 2000 to November 2018.
Returning to our EMV Trackers
## Percent of EMV Articles that Discuss Selected Topics

<table>
<thead>
<tr>
<th>Topic</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macroeconomic News &amp; Outlook</td>
<td>72</td>
</tr>
<tr>
<td>Commodity Markets</td>
<td>44</td>
</tr>
<tr>
<td>Interest Rates</td>
<td>31</td>
</tr>
<tr>
<td>Fiscal Policy</td>
<td>35</td>
</tr>
<tr>
<td>Monetary Policy</td>
<td>30</td>
</tr>
<tr>
<td>Regulation (All)</td>
<td>25</td>
</tr>
<tr>
<td>Financial Regulation</td>
<td>15</td>
</tr>
<tr>
<td>National Security Policy</td>
<td>13</td>
</tr>
<tr>
<td>Elections and Political Governance</td>
<td>3</td>
</tr>
</tbody>
</table>
Figure 7: Fraction of EMV Articles that Discuss Policy Matters, 12-Month Moving Average, 1985-2018.

Notes: We sum EMV article counts over policy-related categories and divide by the sum of EMV article counts over all categories (general and policy-related). We compute this ratio for each newspaper and month, average over papers by month and then compute a moving average with six lags and leads, truncating lags (leads) near the sample start (end).
Figure 5: Macroeconomics EMV Tracker

Notes: We construct the Macroeconomics EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in Macroeconomic News and Outlook. See Appendix B for the list of terms.
Notes: We construct the Financial Crisis EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in Financial Crises. See Appendix B for the list of terms.
Figure 10: Monetary Policy EMV Tracker, 1985-2018

Notes: We construct the Monetary Policy EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in Monetary Policy. See Appendix B for the list of terms.
Figure 11: Tax Policy EMV Tracker, 1985-2018

Notes: We construct the Tax Policy EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in Taxes. See Appendix B for the list of terms.
Notes: We construct the Government Spending, Deficits and Debt EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in Government Spending, Deficits and Debt. See Appendix B for the list of terms.
Figure 13: Financial Regulation EMV Tracker, 1985-2018

Notes: We construct the Financial Regulation EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in Financial Regulation. See Appendix B for the list of terms.
Figure 14: Elections and Political Governance EMV Tracker, 1985-2018

Notes: We construct the Elections and Political Governance EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in Elections and Political Governance. See Appendix B for the list of terms.
Figure 15: National Security EMV Tracker, 1985-2018

Notes: We construct the National Security EMV tracker as the product of our overall EMV tracker and the share of EMV Articles that contain one or more terms in National Security. See Appendix B for the list of terms.
Summary

• We develop a simple, transparent, scalable method for constructing newspaper-based Equity Market Volatility (EMV) trackers.
• Our EMV tracker moves closely with the VIX and RV on the S&P 500.
• We also parse the text in EMV articles to quantify journalist perceptions about the forces that underlie stock market volatility and its movements.
• The share of EMV articles that discuss policy matters has risen over time.
• Monetary Policy and Tax Policy are the most important policy sources of stock market volatility, followed by our aggregated Regulation category.
• The contribution of specific policy categories to stock market volatility fluctuates markedly over time.
Next Steps

Combine EMV trackers with firm-level policy risk exposure measures to explain and diagnose movements in firm-level stock price volatilities.
All EMV trackers are available and updated monthly at PolicyUncertainty.com.
References


Extra Slides
Figure 4: Petroleum Markets EMV Compared to Oil Price Volatility, Monthly, 1985 to 2018

Notes: CBOE Crude Oil Volatility Index is the monthly mean of daily CBOE Crude Oil ETF Volatility Index values. Crude Oil Realized Volatility reflects daily price data for West Texas Intermediate. We extract both series from the St. Louis Federal Reserve FRED database. The Petroleum Markets EMV tracker is constructed from scaled frequency counts of newspaper articles. See Sections 2.1 and 3.4 in the text for details.
Figure 9: Policy-Related EMV Tracker and BBD EPU Index, 1985-2018

Notes: The BBD EPU Index is from Baker Bloom and Davis (2016). To construct the Policy-Related EMV tracker, we multiply our overall EMV tracker by the fraction of EMV articles the discuss policy matters. We multiplicatively rescale Policy-Related EMV to match mean of the BBD EPU Index from 1985 to 2009.
Table 3: Summary Statistics for the VIX, EMV and NVIX, January 1985 to March 2016

<table>
<thead>
<tr>
<th></th>
<th>VIX</th>
<th>EMV</th>
<th>NVIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Deviation</td>
<td>7.81</td>
<td>8.14</td>
<td>4.83</td>
</tr>
<tr>
<td>Skewness</td>
<td>2.19</td>
<td>2.40</td>
<td>1.27</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>10.76</td>
<td>11.37</td>
<td>7.43</td>
</tr>
<tr>
<td>Pairwise Correlation with VIX</td>
<td>0.78</td>
<td>0.70</td>
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</tr>
<tr>
<td>Mean Absolute Difference with VIX</td>
<td>3.69</td>
<td>4.03</td>
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</tbody>
</table>

Notes: The NVIX measure developed by Manela and Moreira (2017) runs through March 2016 and is downloadable at [http://apps.olin.wustl.edu/faculty/manela/data.html](http://apps.olin.wustl.edu/faculty/manela/data.html). See the notes to Table 2 for definitions of VIX and EMV. We multiplicatively scale the NVIX and EMV to match the mean value of the VIX from 1985 to 2015.
Table C.2: Fit Sensitivity to Alternative Newspaper Weightings in Regressions of VIX on EMV, 1985-2017

<table>
<thead>
<tr>
<th></th>
<th>(1) Baseline</th>
<th>(2) Dallas MN</th>
<th>(3) Houston Chronicle</th>
<th>(4) Miami Herald</th>
<th>(5) SF Chronicle</th>
<th>(6) USA Today</th>
<th>(7) Boston Globe</th>
<th>(8) Chicago Tribune</th>
<th>(9) WSJ</th>
<th>(10) NYT</th>
<th>(11) LAT</th>
<th>(12) Wash. Post</th>
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<tbody>
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<td><strong>Panel A: Doubling the weight on the indicated newspaper</strong></td>
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<tr>
<td>$\text{EMV}_t$</td>
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<td>0.76</td>
<td>0.74</td>
<td>0.75</td>
<td>0.74</td>
<td>0.75</td>
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<tr>
<td>$R^2$</td>
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<td>0.607</td>
<td>0.604</td>
<td>0.615</td>
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<td>0.606</td>
<td>0.609</td>
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<td>0.613</td>
<td>0.607</td>
<td>0.600</td>
<td>0.608</td>
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<td><strong>Panel B: Dropping the indicated newspaper</strong></td>
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<td>0.613</td>
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<td><strong>Panel C: Using only the indicated newspaper</strong></td>
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<td>$R^2$</td>
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<td>0.393</td>
<td>0.406</td>
<td>0.378</td>
<td>0.329</td>
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</tbody>
</table>

Notes: All series are at the monthly level. EMV is the Equity Markets Volatility Index. The dependent variable is always the VIX where VIX refers to the monthly average of daily close of the VIX implied volatility index on the S&P500. Columns (2)-(12) of Panel A correspond to a different version of our EMV Index as the independent variable where the version is constructed such that the column title newspaper has twice the weight as the other newspapers. Columns (2)-(12) of Panel B correspond to a different version of our EMV Index as the independent variable where the version is constructed such that the column title newspaper has been removed from the index. Robust standard errors in parentheses. The slope coefficient is statistically significant at the 1% level in all regressions.