Media Reinforcement in International Financial Markets

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Media

– An avenue through which information is gathered, processed, and disseminated
– Large amount of data are generated by media daily

Academic research has focused on direct effects
– Media coverage can predict returns
– Mainly focused on individual stocks and US aggregate equity

This work studies the interaction of media and asset prices
– Individual stocks
– Aggregate equity markets
– Currencies
How Does the Media Interact with Asset Prices?

How to measure optimism / pessimism?

– Asset prices is one indicator
– Look at media sentiment!

This work advances a simple concept:

When return and sentiment reinforce one another
– There is unusually high optimism, which results with overreaction
• The role and content of media and its impact on asset prices:
  – e.g., Tetlock (2007), Tetlock, Saar-Tsechansky, and Macskassy (2008), and Chen, De, Hu, and Hwang (2014)

• Short-term return autocorrelation:
  – e.g., Jegadeesh (1990), Lehman (1990), Jegadeesh and Titman (1995), Copper (1999), and Avramov, Chordia, and Goyal (2006)

• Information dissemination in financial market:
  – e.g., Chan (2003), Tetlock (2010), and Griffin, Hirschey, and Kelly (2011)

• Investor behavioral biases:
  – e.g., Daniel, Hirshleifer, and Subrahmanyam (1998), Barber and Odean (2008), and Solomon, Soltes, and Sosyura (2014)
The Power of the Media

- Wealth of information
- A careful examination of the data and the correction for various effects

<table>
<thead>
<tr>
<th>General Media</th>
<th>Specialized Media</th>
<th>Corporate Communications</th>
<th>Social Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What is the world saying?</td>
<td>• What is the industry saying?</td>
<td>• What are companies saying?</td>
<td>• What are people saying?</td>
</tr>
</tbody>
</table>
The Data

**Countries**

- FX and Equity indices
  - 12 developed market currency: AUD, CAD, CHF, DKK, EUR, GBP, ILS, JPY, NOK, NZD, SEK, SGD
  - +2 developed market equity: HKD, USD
  - 17 emerging markets: ARS, BRL, CLP, CNY, COP, EGP, IDR, INR, MXN, MYR, NGN, PHP, PLN, RUB, THB, TRY, ZAR

**Media Coverage**

- Currencies
- Equity indices

**Other Asset Classes**

- Large-cap stocks
- Commodities

**Sentiment Scoring**

- Textual analysis
The Data – Cont’d

Number of articles covering firms

FX / Country articles by year

Number of articles by country of source (FX, Country)

FX / Country articles by source type
Brexit Vote (June 23, 2016)
1-day abnormal country equity sentiment

• Prior to Brexit vote, sentiment seemed mostly positive

• Once ‘Leave’ was announced, global sentiment turned sharply negative, with UK, European countries, the Americas and Australia leading the way

• In contrast, Russia and China exhibit a positive sentiment shock
US Presidential Election (Nov 8, 2016)
1-day abnormal FX sentiment

• The extent of the results became clear only after midnight ET. Therefore, media on 11/8/2016 does not reflect the surprising results whereas media coverage on 11/9/2016 reflect the full extent of the results

• While world sentiment turned negative overall, a few countries displayed positive sentiment, notably, Russia and Turkey
French Presidential Election (April 23, 2017)
1-day abnormal country equity sentiment

• The results of the first round indicated strong performance of Emmanuel Macron, the center-leaning candidate, alleviating concerns of anti-European pressures

• Other than a few exceptions (e.g., Portugal, Poland), country equity sentiment reacted positively
Tests using Portfolio Returns

• First examine the relative autocorrelation in the different markets

• Form 10-day-ladder portfolios based on past weekly returns

• Then, add past weekly media sentiment

• Sample: March 2013 – April 2017
Media Reinforcement – Portfolio Sorts

10-day-ladder portfolios sorted by past weekly return and sentiment

<table>
<thead>
<tr>
<th>Media</th>
<th>FX Developed¹</th>
<th>Country Equity²</th>
<th>Large Stocks³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Returns</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low Return</td>
<td>High Return</td>
<td>Low Return</td>
</tr>
<tr>
<td>Low Sentiment</td>
<td>+2.04%</td>
<td>-1.15%</td>
<td>+2.12%</td>
</tr>
<tr>
<td></td>
<td>[1.94]</td>
<td>[-1.33]</td>
<td>[1.78]</td>
</tr>
<tr>
<td>High Sentiment</td>
<td>+0.83%</td>
<td>-1.72%</td>
<td>+0.31%</td>
</tr>
<tr>
<td></td>
<td>[0.91]</td>
<td>[-1.92]</td>
<td>[0.27]</td>
</tr>
<tr>
<td>Reversal</td>
<td>-2.90%</td>
<td>-2.53%</td>
<td>-3.34%</td>
</tr>
<tr>
<td></td>
<td>[-1.91]</td>
<td>[-1.56]</td>
<td>[-1.75]</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>-3.76%</td>
<td>-5.11%</td>
<td>-4.57%</td>
</tr>
<tr>
<td></td>
<td>[-2.10]</td>
<td>[-2.49]</td>
<td>[-2.09]</td>
</tr>
</tbody>
</table>

¹ Sentiment measured from FX media;
² Sentiment measured from FX media;
³ Sentiment measured from stock equity media
Portfolios in event time: Stocks

Reinforcement effect

- High return and high sentiment leads to low return
- Low return and low sentiment leads to high return
Reinforcement or Feedback? Empirical Design

- Decomposition of Expected and Unexpected return and sentiment:

\[
Ret_{i,t} = \alpha_i + \sum_{j=1}^{5} \gamma_{i,j} \times \Delta Tone_{i,t-j} + \sum_{j=1}^{5} \delta_{i,j} \times Ret_{i,t-j} + \epsilon_{i,t}
\]

\[
\Delta Tone_{i,t} = \beta_i + \sum_{j=1}^{5} \theta_{i,j} \times \Delta Tone_{i,t-j} + \sum_{j=1}^{5} \mu_{i,j} \times Ret_{i,t-j} + \epsilon_{i,t}
\]

- In-sample estimation, per asset

- Expected components explain a small fraction of total variance:
  Average $R^2$ ranges between 1.23% to 2.37%
10-day-ladder portfolios sorted by past weekly *expected* return and sentiment

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<td></td>
<td>Low Sentiment</td>
<td>High Sentiment</td>
<td>Low Sentiment</td>
</tr>
<tr>
<td></td>
<td>Low Return</td>
<td>High Return</td>
<td>Low Return</td>
</tr>
<tr>
<td>Media</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FX Developed</td>
<td>-2.06% [-2.70]</td>
<td>1.29% [1.51]</td>
<td>-1.99% [-1.67]</td>
</tr>
<tr>
<td>Country Equity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Sentiment</td>
<td>-0.24% [-0.27]</td>
<td>1.01% [1.31]</td>
<td>-2.45% [-2.30]</td>
</tr>
<tr>
<td>High Sentiment</td>
<td></td>
<td></td>
<td>Low Sentiment</td>
</tr>
<tr>
<td>Reversal</td>
<td>2.09% [1.89]</td>
<td>4.34% [2.61]</td>
<td>9.99% [6.20]</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>3.06% [2.38]</td>
<td>2.47% [1.20]</td>
<td>9.76% [4.52]</td>
</tr>
</tbody>
</table>

The expected components generate continuation; no reinforcement effect
Portfolio Sorts – Unexpected Components

10-day-ladder portfolios sorted by past weekly *unexpected* return and sentiment

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<tr>
<td><strong>Returns</strong></td>
<td>Low Return</td>
<td>High Return</td>
<td>Low Return</td>
</tr>
<tr>
<td>Low Sentiment</td>
<td>2.03% [1.92]</td>
<td>-0.38% [-0.39]</td>
<td>3.14% [2.64]</td>
</tr>
<tr>
<td>High Sentiment</td>
<td>0.69% [0.72]</td>
<td>-2.34% [-2.79]</td>
<td>0.75% [0.64]</td>
</tr>
<tr>
<td>Reversal</td>
<td>-2.76% [-1.97]</td>
<td>-3.99% [-2.51]</td>
<td>-4.35% [-2.23]</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>-4.37% [-2.55]</td>
<td>-6.69% [-3.35]</td>
<td>-4.70% [-2.23]</td>
</tr>
</tbody>
</table>

The unexpected components generate reversal; The results are consistent with reinforcement rather than feedback
Macroeconomic News and Earnings Announcements

Construct portfolios excluding news dates in formation period

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</tr>
<tr>
<td></td>
<td>Low Return</td>
<td>High Return</td>
<td>Low Return</td>
</tr>
<tr>
<td>Low Sentiment</td>
<td>+1.92% [2.01]</td>
<td>-0.64% [-0.74]</td>
<td>+2.34% [1.58]</td>
</tr>
<tr>
<td>High Sentiment</td>
<td>+019% [0.19]</td>
<td>-1.48% [-1.66]</td>
<td>+0.93% [0.67]</td>
</tr>
</tbody>
</table>

The results are not due to main information events
Additional Analyses

- Including additional sources for FX and Country equity
- Alternative measures of sentiment
- Cross-sectional regressions using quartile dummies
- Different types of media
  - Strong in local media
- Effect is stronger for large caps, highly covered by the media
- Calculation of risk-adjusted returns (per asset class)
- Emerging markets and Commodities
Relation to Intensity of Media Coverage

- Higher media coverage intensifies reinforcement
Relation to Liquidity: Individual Stocks

- Reinforcement effect more prominent in large caps
- Liquid firms attract more investors
What happens When You Combine All of These?

**Strategy**

- Construct the 2 x 2 return/sentiment portfolios
- Weekly formation period, skip one day, 10-day ladder
- Long: low return low sentiment  
  Short: high return high sentiment
- Start day: 3/1/2013,   End day: 4/27/2017

**Performance**

- Examine FX (developed), Country equity (all), and firm equity (large caps) separately
- Combine all (volatility weighted)

Combined; IR = 1.75
Summary and Conclusion

• Media is a fruitful avenue for research

• Reinforcement effect in financial markets

• Robust results