

November 15, 2022

Quantifying Economic Narratives for Financial Market Applications: A New Approach to Asset Pricing

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What's the question?

- **Motivation**

- Micro efficiency vs. Macro inefficiency (Samuelson's *Dictum*)
- “We need to incorporate the contagion of narratives into economic theory. Otherwise, we remain blind to a very real, very palpable, very important mechanism for economic change, as well as a crucial element for economic forecasting” (Shiller's *Narrative Economics*)

- **The purpose of this talk**

- Quantify economic narratives
- Use them to build asset-pricing models

Using media coverage to quantify narratives

• Data

– Point-in-time digital media collection

– Large universe:
~150k sources
~2mn items / week

– Noise reduction;
biases

Information Production Bias	Article Length Bias	Calendar Bias	Redundancy Bias
Some reporters specialize coverage to focus on select financial assets or topics and cover them with a consistent tone.	Shorter articles tend to exhibit more extreme opinions of certain financial assets and topics.	Reporters have regularly scheduled deadlines and topics, which dictates consistently what they cover and when they cover it.	Some sources simply redistribute news items without adding new content, contributing to the media's echo chamber.

• Information reservoirs

– Attention segmentation

– Bias correction



International Media	Domestic Media	Trading Media	Other Media
<ul style="list-style-type: none">• What is the world saying?	<ul style="list-style-type: none">• What are the locals saying?	<ul style="list-style-type: none">• What are the experts saying?	<ul style="list-style-type: none">• What are less recognized sources saying?

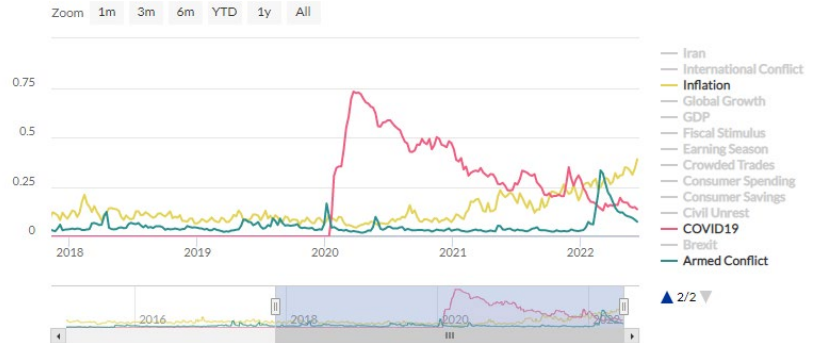
Using media coverage to quantify narratives – cont'd

- **Quantifying narratives**

- Priced vs. non-priced

- Evergreen vs. emerging

Aggregate Intensity



- **Information reservoirs**

- Information diffusion

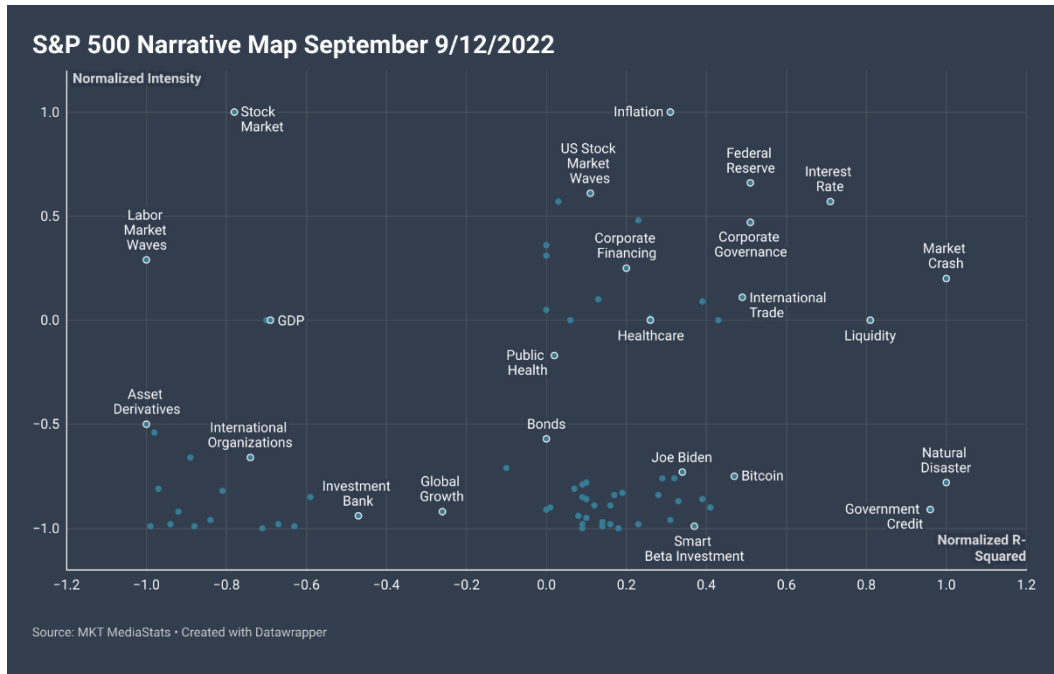
COVID19 Intensity



Do narratives drive financial markets?

- Use regression analysis

–Regress SPY on narrative intensity changes (“The Narrative Map”)



Use cases

- **Using inflation attention to price securities**
 - Creating an inflation index

- **A market-based measure of exposure to a narrative**
 - A new measure for ESG

- **Thematic trends**
 - Megatrend rotation
 - Emerging themes

Building an equity inflation index

- Calculate stock-level sensitivity to inflation using quantified narratives to proxy for investor attention

– Estimate stock-month regression; interaction with inflation attention (IA):

$$R_i = a + \beta_M R_M + \beta_F F + \beta_I F \times IA$$

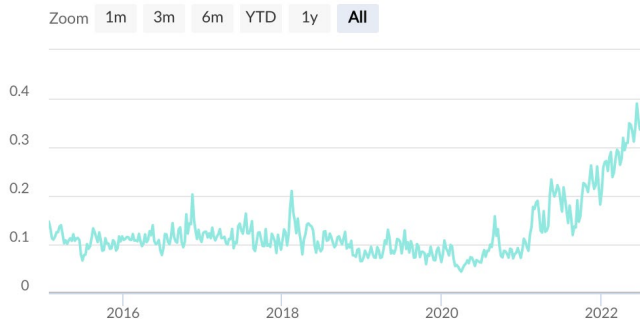


– Indirect factors (F):
Oil, Gold, Inflation Breakeven

– Direct media factors:
Fed policy, inflation direction

- Stock-level sensitivity score (MIS) can be used in various contexts

Inflation Intensity



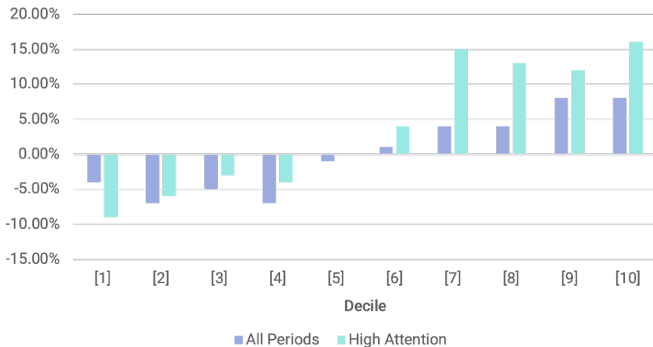
Building an equity inflation index – cont'd

- **Build portfolio with the highest inflation-sensitive stocks:**

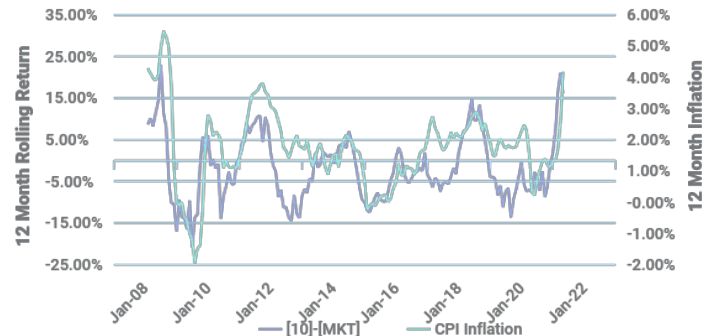
High-inflation-score stocks display high correlation with CPI; stronger correlations during high-attention periods

Consequently, active performance of the top decile of inflation score stocks highly correlated with CPI

CPI Inflation and Decile Portfolios
Correlation 1973-2021



Decile [10] Excess Return and CPI Inflation



– Inflation-attention model outperforms no-media (naive) model:
Correlation with CPI inflation (2017-2022) **0.63-0.85**
(vs. 0.13-0.19 using the Naive model)

A market-based measure of ESG

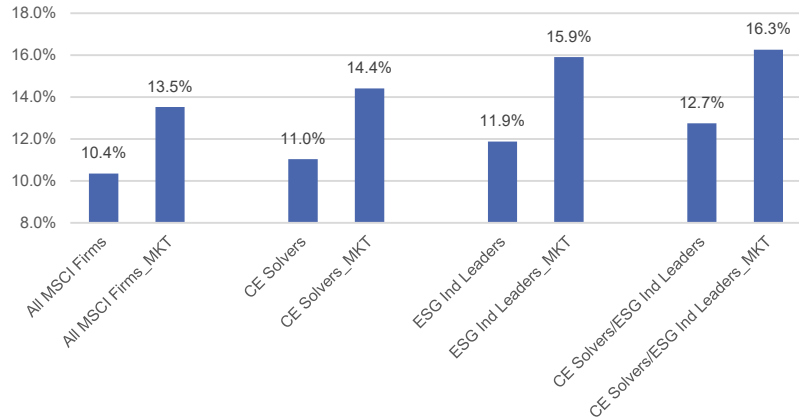
- **Apply approach to ESG**

- Quantify environment friendliness
- Calculate narrative betas [intensity + sentiment]
- MKT-ENV scores

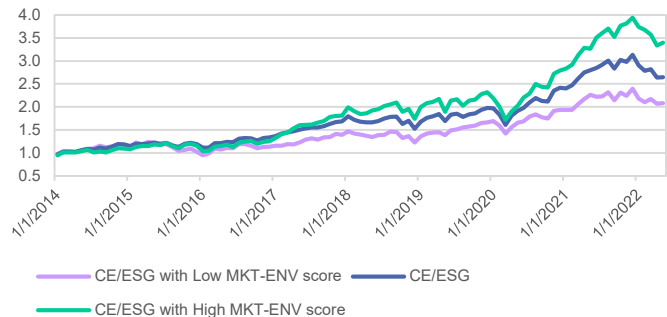
- **MSCI classification**

- Carbon emission solvers; ESG industry leaders
- Restrict to high scores to enhance identification

**Average Annualized Return
[Jan 2014 - May 2022]**



**Cumulative Return of Carbon Emission Solvers/ESG
Industry Leaders with Low and High MKT-ENV Scores
[Jan 2014 - May 2022]**



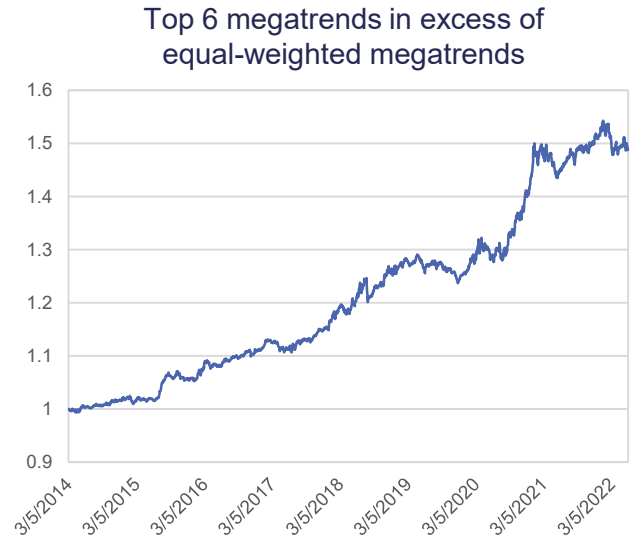
Thematic trends: Megatrend rotation

- **Measure media attention to themes**

- 24 MSCI megatrends
- Calculate media attention [intensity + sentiment]

- **Build strategy**

- Rotate into top 6 megatrends with intense positive coverage
- Low correlation with momentum



Thematic trends: Emerging themes

- **Detect emerging themes and form a rotation strategy**

- Generate equity baskets exposed to each theme

- Rotate monthly into baskets of most recent emerging themes

US Basket Update
[MTD as of 10/26/2022]

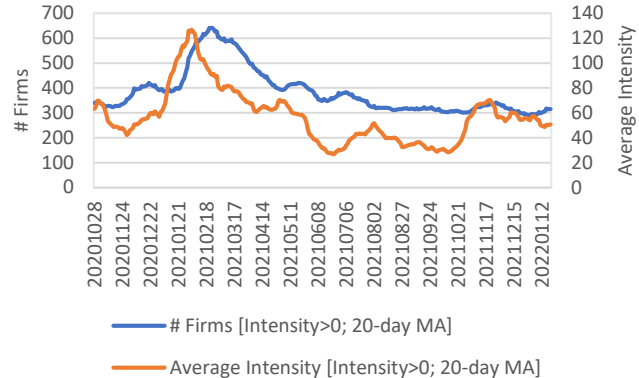
Top Trending Narratives / Themes	MTD Return	MTD Excess to MSCI US
Space Exploration	+8.78%	+1.20%
Student Services	+11.57%	+3.99%
Water Stress	+9.57%	+1.99%
Natural Capital	+10.58%	+3.01%
Natural Gas	+16.02%	+8.44%
Natural Disasters	+5.61%	-1.97%
Iran	+18.01%	+10.43%
Smart Cities	+10.15%	+2.57%
Web3	+9.64%	+2.06%
Health & Fitness	+6.14%	-1.44%



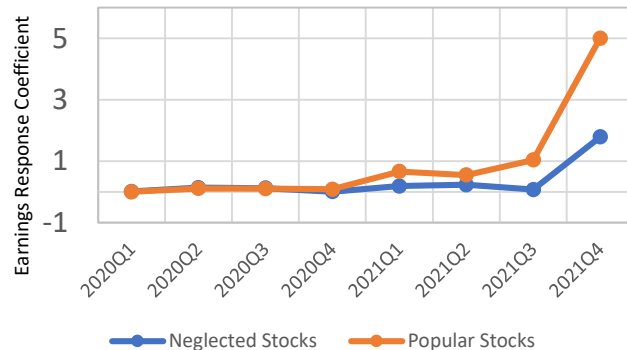
What about social media?

• Does social media intensity affect price informativeness?

- Theoretical motivation
- Data: Reddit
- Measures: Liquidity, ERC



- Social intensity reduces price informativeness [higher ERCs]



Social media and asset-pricing anomalies

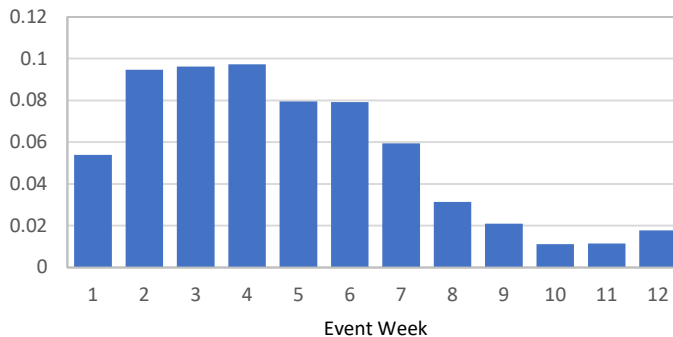
- **Examine anomalies**

- Regressions and portfolio sorts show slow price correction for high-social stocks

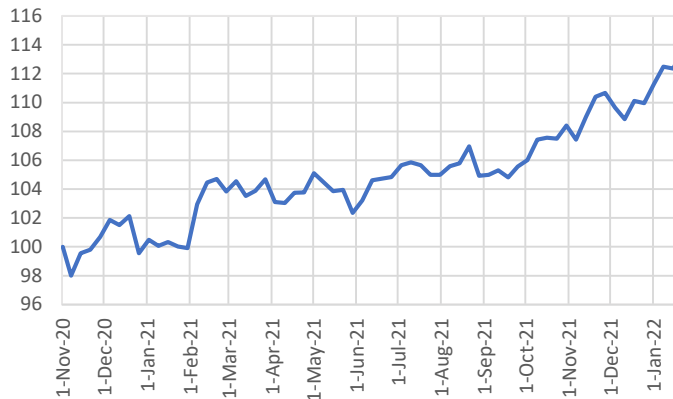
- Mainly affecting overpriced stocks

- Trading strategy: Long high-social short low-social, among overpriced stocks

- Return: 13.4%
Sharpe: 1.5



■ Coefficient of $\Delta\text{SocialCoverage} \times \text{OverpricingScore}$



Conclusion

- **A new approach to quantifying narratives**
 - The framework extends traditional factor models to a general class of models including intangible factors, based on attention
- **Pricing assets with attention**
 - Interaction terms
 - Gauge market-based exposure to narratives
 - Narrative betas to measure risk and form baskets
- **Scalable approach extended to hundreds of other narratives and economic scenarios**
- **Social media has distinct implications**