Media Emotion Intensity and Commodity Futures Pricing

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This study introduces media emotion intensity—measuring the proportion of emotional versus factual content in news—as a novel predictor of commodity futures returns. Emotion intensity measures the proportion of emotional content relative to factual content in media news. The media emotion intensity factor generates an economically significant annual premium of approximately 13%, even after accounting for transaction costs. This premium is more pronounced for commodities with low media coverage, high momentum, high basis-momentum, high hedging pressure, and backwardation. Emotion intensity significantly predicts the trading tendencies of both commercial and non-commercial traders and the cross-section of commodity futures returns at both portfolio and individual levels. The study also finds that media emotion intensity predicts future commodities' sentiment. Further, other commonly considered risk sources cannot subsume the predictability of the media emotion intensity factor.

Introduction

In recent decades, the financialization of commodity markets has intensified the search for factors that can explain and predict the cross-section of futures returns (Tang and Xiong, 2012). While the equity market has a vast library of predictive signals, the number of established factors in commodity markets remains limited, with benchmarks such as basis, momentum, and basis-momentum being the most prominent (Szymanowska *et al*., 2014; Boons and Prado, 2019).

The role of media in asset pricing has been well-documented, primarily through two lenses: news sentiment (the balance of positive versus negative words) and media coverage (the volume of news) (Tetlock, 2007; Fang and Peress, 2009). This study extends existing literature by introducing a novel dimension of media influence: media emotion intensity, defined as the proportion of emotional versus factual content in news. Rather than measuring *if* news is positive or negative, our factor measures the *degree* to which news content is emotional versus factual. For instance, even if the overall sentiment of two articles about oil is neutral, one might be written in a dry, data-driven style while the other uses evocative and emotional language to describe the same events. It is this crucial distinction that our factor captures.

The theoretical motivation for the media emotion intensity factor is twofold. First, the media strategically employs emotion to attract attention and engage readers, a trend that has accelerated in the digital age (Beckett, 2015). Second, a rich body of neuroscientific and psychological research shows that humans struggle to ignore emotion in decision-making, which can trigger behavioral biases and override rational

processes, especially under uncertainty (Vuilleumier, 2005; Loewenstein, 1996). Our research proposes that high emotional intensity in media can trigger behavioral biases among investors, leading to systematic and predictable patterns in commodity prices. We demonstrate that this factor is distinct from news sentiment (with low cross-sectional and time-series correlations) and offers significant, new explanatory power for understanding commodity futures returns.

Data and Methodology

Data and Factor Construction

This study uses futures data for 26 commodities from January 1998 to February 2020 from Barchart (formerly CRB). The key variable, media emotion intensity, is constructed using the Thomson Reuters MarketPsych (TRMI) database, which analyzes content from thousands of financial news outlets in real-time. This database calculates an "EmotionVsFact" index for each asset, quantifying the excess proportion of emotional over factual content, scaled by the total amount of media coverage ("buzz"). A higher value of this index indicates a greater intensity of emotional content relative to factual content in the news for a specific commodity. The benchmark factors include basis, momentum, and basis-momentum, following the Boons and Prado (2019) methodology.

Portfolio Strategy

The core of the methodology involves a long-short portfolio strategy. At the end of each month, 26 commodities are ranked based on their media emotion intensity value from the preceding month. A portfolio is then formed by taking an equal-weighted long position in the four commodities with the highest intensity ("High4") and an equal-weighted short position in the four with the lowest intensity ("Low4"). The performance of this "High4-Low4" portfolio is tracked over the following month.

Empirical Results

The key finding is that media emotion intensity is a powerful and robust predictor of future commodity returns. Table 1 on the next page reports the performance of the High4-Low4 portfolio strategy and compares it to portfolios built on other established factors. The media emotion intensity portfolio delivers a statistically and economically significant annualized return of 13.51% (t-statistic = 2.89), outperforming established benchmarks such as momentum (9.57%) and basis-momentum (12.50%). The premium of media emotion intensity survives a set of robustness checks:

- Transaction Costs: The net annualized return after transaction costs is 13.00% (t-statistic = 2.79).
- Portfolio Construction: The effect is persistent when using different portfolio sizes (*e.g.*, High6-Low6, High8-Low8).
- Spanning Tests: In time-series spanning tests, the "alpha" (abnormal return) of the emotion intensity portfolio remains statistically significant at around 10%, even when benchmarked against

a model including six key factors (average, basis, momentum, basis-momentum, hedging pressure, and value). The low R-squared values in these tests (around 0.34) confirm that the premium is not explained by existing benchmarks.

In contrast, portfolios based solely on traditional news sentiment fail to generate statistically significant returns, underscoring the unique and incremental informational value provided by the emotion intensity factor.

Table 1

Performance of Long-Short Portfolios Sorted by Media and Benchmark Factors (Nearby Returns, 1998-2020)

Sorting Factor	Portfolio	Ave. Ret.	t-statistic
Emotion Intensity	**High4 - Low4**	**13.51%**	**2.89**
Basis-momentum	High4 - Low4	12.50%	2.66
Momentum	High4 - Low4	9.57%	1.76
Media Coverage	Low4 - High4	9.16%	2.76
News Sentiment	High4 - Low4	5.60%	1.11
Basis	Low4 - High4	5.49%	1.16

Notes: This table reports the average annualized nearby returns and Newey-West corrected t-statistics for long-short portfolios. Each month, four commodities with the highest signal values are bought (High4) and four with the lowest are sold (Low4). For Media Coverage and Basis, the strategy is reversed (Low4-High4). The results for Emotion Intensity are both statistically and economically significant.

When and Why Does Emotion Intensity Matter?

Cross-Sectional Predictability

To confirm the factor's robustness beyond portfolio sorts, this study uses Fama-MacBeth cross-sectional regressions. The cross-sectional analysis demonstrates that the media emotion intensity factor commands a positive and statistically significant premium, robust to controls for other media-related factors (coverage and sentiment) and established commodity benchmarks. This holds even after including other media factors (coverage and sentiment), and the key commodity benchmarks in the model. This confirms that emotion intensity has cross-sectional predictive power at both the portfolio and individual asset levels.

The Moderating Role of Investor Attention

The premium generated by media emotion intensity is not uniform. It is concentrated in specific, economically intuitive environments. A double-sorting analysis reveals that investor attention, proxied by media coverage levels, significantly moderates the effect of media emotion intensity on returns.

As shown in Table 2, the effect is most powerful for commodities that receive little media attention (low coverage). In this group, the emotion intensity strategy generates a remarkable 12.70% annualized return. Conversely, for commodities already under the media spotlight (high coverage), the strategy's return is statistically close to zero. This is consistent with the limited attention theory. When information is scarce, the emotional framing of the available news has a significant impact on investor judgment. When information is abundant, the effect of emotion is diluted. Similarly, this study finds that the premium is significantly stronger for commodities in backwardation and for those with high return momentum.

Table 2
The Moderating Effect of Media Coverage on the Emotion Intensity Premium

	Single Sort (High - Low)	Double Sort: Conditional on Media Coverage	
		Low Media Coverage	High Media Coverage
Emotion Intensity Premium	6.04%	**12.70%**	**0.01%**
(t-statistic)	*(2.10)*	*(3.39)*	*(0.00)*

Notes: This table reports the annualized return premium of a portfolio that is long on high emotion intensity commodities and short on low emotion intensity commodities. The "Double Sort" columns show the premium is statistically significant only for commodities with low media coverage.

Predicting Trader Behavior and Future Sentiment

Our research identifies a key mechanism linking media emotion intensity to commodity market outcomes, highlighting predictive power for trader behavior and subsequent market sentiment.

- Predicting Trader Behavior: Using Commitment of Traders (CFTC) data, the study finds that media emotion intensity significantly predicts the trading behavior of market participants in the *next* month. Specifically, it precedes an increase in net long positions by non-commercial traders (speculators) and an increase in net short positions by commercial traders (hedgers).

- Predicting Future Sentiment: The study also shows that media emotion intensity in month *t* is a significant predictor of the news sentiment in month *t*+1. Since contemporaneous news sentiment is known to affect returns, emotion intensity acts as a leading indicator.

Validation

To test whether media emotion intensity is a consistent risk premium, this research conducts LASSO (Least Absolute Shrinkage and Selection Operator) regression, a machine learning technique designed to select the most important predictive variables from a large set (following Feng *et al*., 2020). The study tests the emotion intensity factor against all other benchmarks across 200 randomized sub-samples. Across three different LASSO models, the emotion intensity factor is the most frequently selected predictor, appearing in the set of relevant factors up to 100% of the time in the standard LASSO technique. This provides strong evidence that media emotion intensity is a primary driver of returns, not a redundant signal.

Conclusion

This paper introduces media emotion intensity, the ratio of emotional to factual content in news, as a novel and significant predictor of commodity futures returns. It is a distinct factor from news sentiment and media coverage with significant and robust explanatory power.

The key findings are as follows:

1. A long-short portfolio sorted on media emotion intensity generates an economically and statistically significant premium of over 13% per year, outperforming established benchmarks.

2. This premium is robust to transaction costs and is not explained by existing factors, as confirmed by spanning tests, Fama-MacBeth regressions, and its top ranking in LASSO factor selection models.

3. The effect is strongest for commodities with low media coverage, suggesting it is an important signal when investor attention is limited.

4. The media emotion intensity signal forecasts future news sentiment and the resulting positioning of both speculative and commercial traders.

For investors, incorporating the media emotion intensity factor into asset allocation and risk management models can significantly improve predictive accuracy and enhance portfolio performance. For policymakers, understanding the influence of emotional media content on market behavior is important for maintaining stability. The study suggests that in commodity trading, it is not just what is reported that matters, but how it is reported.

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