

Economics and Business Review

Volume 12 (3) 2026

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How environmental media narratives shape the sustainability premium

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Abstract

This paper examines whether environmental narratives constitute an independent and state-dependent pricing channel in equity markets beyond conventional ESG scores and aggregate climate risk measures. Using more than 220 million US news articles, we construct indicators of environmental narrative sentiment and thematic intensity and analyse their effects on equal-weighted and value-weighted ESG portfolio premia. The empirical framework augments the Fama–French five-factor model with explicit climate risk and macroeconomic uncertainty controls and allows for delayed pricing effects. We find that environmental narratives, particularly attention-based measures, exert economically relevant effects on the equal-weighted sustainability premium, even after controlling for standard asset-pricing factors and climate-related risk indices, whereas the corresponding effects are substantially weaker in value-weighted portfolios. In contrast, aggregate ESG and climate risk measures display

Keywords

- sustainability premium
- ESG
- environmental narratives
- investor sentiment
- media attention
- factor models
- climate risk
- asset pricing

Suggested citation: Nagy, A. Z., Steiner, B., & Csapi, V. (2026). How environmental media narratives shape the sustainability premium. *Economics and Business Review*, 12(3), 67–99. <https://doi.org/10.18559/ebr.2026.3.2962>



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weak and unstable explanatory power once narratives are accounted for. The effects differ substantially across portfolio weighting schemes, while the lagged specifications provide more limited evidence of persistent delayed effects.

JEL codes: G12, G14, Q54, M14.

Article received 27 January 2026, accepted 1 September 2026.

This research is supported by EU special programme devoted (Grant number: TKP2021-NKTA-19) and National Research, Development, and Innovation Fund of Hungary (Grant number: TKP2021-NKTA).

Introduction

Empirical evidence on ESG-related asset pricing remains mixed, unstable over time, and often contradictory. A prominent theoretical explanation for negative sustainability premia is provided by Pástor et al. (2021), who show that strong investor preferences for green assets can lower their expected returns, leading to negative abnormal performance for high-ESG portfolios. Consistent with this mechanism, existing studies document weak, heterogeneous, or vanishing ESG premia (Alessi et al., 2021; Alves et al., 2025; Bolton & Kacperczyk, 2021).

These findings suggest that sustainability-related pricing effects cannot be adequately captured by static ESG scores alone. While ESG metrics reflect slowly evolving firm characteristics, climate-related risk is inherently dynamic and shaped by information flows and investor attention, implying that sustainability-related pricing effects are state-dependent rather than continuous.

Behavioural finance theories provide an additional explanation for why sustainability-related pricing effects may vary over time and across informational environments. Under conditions of limited investor attention and heuristic information processing, environmental narratives may influence asset prices not only through their informational content but also through their salience and visibility in the media environment. In this context, investor attention and investor sentiment represent conceptually distinct transmission mechanisms. Attention-based effects reflect the relative prominence and visibility of environmental narratives, whereas sentiment-based effects capture the emotional tone and valence of environmental news coverage. This distinction is particularly relevant in ESG-related asset pricing, where investors are exposed to complex, uncertain, and highly narrative-driven information flows (Chen, 2017; Choi & Choi, 2019; Mangee, 2021).

This view is consistent with attention-based asset pricing and equilibrium models of sustainable investing. In the context of climate risk, equilibrium forces imply that sustainability-related pricing effects are inherently time-varying. Periods of heightened climate concern may trigger short-lived repricing, even if long-run expected returns ultimately reflect lower risk premia for green assets (Pástor et al., 2021).

Importantly, this equilibrium-based explanation is not inconsistent with evidence of short-term positive price reactions to ESG-related news. A large body of sentiment-based studies documents that favourable ESG news and media coverage generate temporary increases in investor optimism and short-run price appreciation, particularly when investor attention is high (López-Cabarcos et al., 2019; Naughton et al., 2019; Xu et al., 2022). These effects are often asymmetric and transitory, displaying limited persistence once sentiment fades and prices revert toward fundamentals (Serafeim, 2020; Yousaf et al., 2024). As a result, narrative-driven demand may temporarily push high-ESG assets above their fundamental values, while in the long run, equilibrium forces dominate, leading to lower expected returns and negative sustainability premia.

Despite these insights, the existing empirical literature remains largely focused on aggregate ESG ratings or climate risk indices, paying limited attention to the role of specific environmental narratives and their temporal dynamics. In particular, three gaps remain: the lack of thematic differentiation across environmental narratives, the limited distinction between sentiment- and attention-based narrative channels, and the insufficient empirical separation of narrative-based information from explicit climate and macroeconomic risk indicators.

This study addresses these gaps by examining how environmental narratives embedded in media coverage are associated with sustainability premia in equity markets, and whether these effects persist after controlling for standard asset pricing factors and explicit climate- and macroeconomic risk measures. Using more than 220 million US news articles from the GDELT database, the analysis constructs narrative-based indicators capturing both sentiment and thematic intensity, and evaluates their impact on equal-weighted and value-weighted ESG portfolios within a Fama–French five-factor framework augmented with lag structures and risk controls.

The results show that environmental narrative measures retain robust and economically meaningful explanatory power for sustainability premia beyond traditional market factors and aggregate risk indices. Moreover, narrative effects differ systematically between equal-weighted and value-weighted portfolios, highlighting portfolio-weighting-related heterogeneity in narrative-driven repricing. Overall, the findings indicate that static ESG scores and aggregate climate-risk measures capture only part of the information relevant for sustainability-related asset pricing. Environmental narratives appear to provide additional information beyond these traditional measures.

This paper contributes to the literature in three important ways. Firstly, rather than treating environmental narratives as auxiliary sentiment controls or sources of noise, we conceptualise them as a time-varying conditioning information channel that may influence when and how ESG-related information becomes relevant for asset prices. Secondly, we explicitly disentangle narrative-based environmental indicators from conventional ESG scores and climate-risk measures, allowing us to assess their independent and joint roles in asset pricing. Thirdly, by focusing on the informational environment in which sustainability-related premia emerge, our approach helps reconcile the mixed empirical evidence on ESG premia by shifting the question from whether such premia exist to when they are priced. More specifically, our framework distinguishes between attention-driven narrative salience and sentiment-driven narrative tone, thereby allowing us to evaluate which informational channel is more relevant for sustainability-related asset pricing dynamics.

The remainder of the paper is organised as follows. Section 1 reviews the related literature. Section 2 describes the data and variables, including the construction of the sustainability premium and the environmental narrative indicators. Section 3 presents the empirical methodology. Section 4 reports the empirical results. The final sections discuss the findings, implications, limitations, and conclude.

1. Literature review

The sustainable-investing equilibrium framework of Pástor et al. (2021) predicts that strong investor demand for green assets may reduce their expected returns, providing a theoretical explanation for the frequently documented negative or unstable sustainability premium. The empirical evidence supports this mechanism, as studies document negative, weak, or unstable ESG premia across markets, including evidence of higher returns for carbon-intensive firms and substantial cross-sectional heterogeneity (Alessi et al., 2021 ; Alves et al., 2025; Bolton and Kacperczyk, 2021; Ciciretti et al., 2023).

Beyond their direct impact on asset prices, climate-related narratives influence financial markets through institutional settings, information asymmetries, and investor belief formation. Accordingly, narratives act as endogenous risk drivers whose relevance varies across time, market regimes, and institutional environments (Bhargava et al., 2023; Mangee, 2021).

Fahmy (2025) shows that climate policy announcements often trigger immediate market reactions that are later reversed once investors reassess their credibility. This pattern suggests that markets initially respond to narrative

salience rather than to verifiable changes in expected cash flows. Similar dynamics are observed in ESG disclosures, where aspirational statements often dominate investor perceptions despite weak alignment with realised sustainability performance (Cesarone et al., 2024; Ferro et al., 2025).

Climate-related news coverage significantly affects investor behaviour, with capital reallocations driven by media attention rather than fundamentals and stronger responses to negative coverage, particularly for high-emission firms facing reputational risk (Andreu et al., 2026; Guastella et al., 2022). Extensive literature shows that limited investor attention amplifies the impact of salient narratives and media signals, strengthening short-term price reactions, increasing return comovement, and weakening informational efficiency during periods of heightened uncertainty (Chen, 2017; Choi & Choi, 2019; Dong & Ni, 2014; Gao et al., 2018). These findings are also consistent with behavioural-finance theories emphasising limited investor attention, salience-driven information processing, and heuristic-based decision-making in financial markets (Da et al., 2011; Tetlock, 2007). In environments characterised by information overload and elevated uncertainty, investors may react more strongly to highly visible and widely disseminated narratives than to fundamental information itself. As a result, environmental narratives may affect asset prices not only through their informational content, but also through their ability to attract investor attention and shape short-term belief formation (Chen, 2017; Choi & Choi, 2019; Mangee, 2021).

Das and Yaghoubi (2025) show that negative climate sentiment reduces stock liquidity, particularly for firms exposed to regulatory risk or operating in information-opaque environments. This suggests that narratives affect not only prices but also trading conditions, increasing transaction costs and reinforcing market frictions. Dierckx et al. (2021) similarly show that narrative intensity extracted from news predicts fluctuations in market volatility, indicating that narratives serve as a transmission channel through which uncertainty propagates.

Ongan et al. (2025) demonstrate that ESG-related uncertainty differs from conventional macroeconomic uncertainty, reflecting ambiguity around regulation, disclosure standards, and policy credibility. This distinction is critical, as ESG uncertainty cannot be fully captured by traditional risk proxies. Instead, it represents a narrative-based uncertainty channel that interacts with investor expectations and policy credibility.

Baker et al. (2016) and Caldara and Iacoviello (2022), in turn, show that elevated economic policy and geopolitical uncertainty significantly alter market responses to news. Under such conditions, investors rely more heavily on heuristics and narratives, amplifying the pricing impact of climate-related information. Gaies (2025) further documents that climate news has time-varying predictive power for financial instability, with stronger effects during periods of macroeconomic stress.

Climate finance research further refines this view by distinguishing between physical and transition climate risks. Bua et al. (2024) and Salisu et al. (2023) show that transition risk—linked to regulation, policy uncertainty, and decarbonisation narratives—induces sharper and more short-lived price reactions than physical risk. Zhou and Ma (2025) and Li and Zhou (2026) similarly document asymmetric effects, where physical risks affect returns gradually, while transition risks generate episodic volatility driven by expectations and sentiment.

Beyond these contributions, the literature also emphasises limitations in ESG measurement. ESG ratings exhibit substantial disagreement across providers, reflecting differences in methodology, weighting schemes, and reliance on forward-looking disclosures (Cesarone et al., 2024; Ferro et al., 2025; Wołczek, 2025). This measurement noise further strengthens the role of narratives, as investors are forced to rely on imperfect signals when forming expectations about firms' sustainability profiles.

This equilibrium-based explanation is consistent with evidence of short-term positive price reactions to ESG-related news. Sentiment-based studies show that favourable ESG news and media coverage generate temporary increases in investor optimism and short-run price appreciation, particularly when investor attention is high (López-Cabarcos et al., 2019; Naughton et al., 2019; Xu et al., 2022). However, these effects are often asymmetric and transitory, with limited persistence once sentiment fades and prices revert toward fundamentals (Serafeim, 2020; Yousaf et al., 2024). As a result, narrative- and sentiment-driven demand may temporarily push high-ESG assets above their fundamental values. Climate and ESG risks affect asset prices through multiple channels, including physical and transition risks, narrative-driven belief updates, and amplification via uncertainty and attention constraints, which increase perceived risk even without new fundamental information. Importantly, investor sentiment and investor attention should not be treated as interchangeable concepts. Sentiment reflects the emotional tone and valence of information, whereas attention captures the relative salience and visibility of narratives within the broader informational environment. While sentiment-driven reactions may influence short-term optimism or pessimism, attention-based mechanisms determine which narratives become pricing-relevant for investors in the first place. This distinction is particularly important in ESG-related asset pricing, where media salience and information diffusion may amplify the pricing impact of environmental narratives independently of their emotional tone (Chen, 2017; Choi & Choi, 2019).

Accordingly, the emerging literature suggests that climate risk pricing cannot be adequately captured by static factor models. Instead, it requires an integrated framework that accounts for narrative diffusion, investor attention, and uncertainty dynamics. Combining physical and transition risk indicators with ESG-related uncertainty and macro-financial risk measures allows em-

pirical analyses to map the time-varying and narrative-driven nature of climate risk pricing.

Despite these advances, existing studies largely treat environmental narratives, media attention, and ESG-related information as either interchangeable proxies or additive explanatory variables. In contrast, we depart from this approach by treating environmental narratives as a conditioning information channel that shapes the pricing relevance of ESG characteristics and climate-related risks, rather than as standalone determinants of returns. In particular, relatively limited attention has been devoted to whether attention-based narrative salience or sentiment-based narrative tone constitutes the more relevant transmission channel in ESG-related asset pricing. Our framework addresses this gap by explicitly separating the investor-attention and investor-sentiment dimensions of environmental narratives within a unified empirical setting.

2. Data and variables

2.1. The sustainability premium

In this study, we examine the evolution of the sustainability premium between 2014 and 2025 for firms with a market capitalisation exceeding USD 1 billion. Our analysis is based on monthly data for 2,859 US companies obtained from the LSEG database. The dataset includes monthly closing prices, ESG ratings, and the number of shares outstanding, which allows for the computation of market capitalisation.

Following the methodology of Azevedo et al. (2021), we define the sustainability premium by applying a 180-day lag and ranking firms each month according to their ESG scores. Firms are sorted into portfolios based on the top 30% (High ESG) and bottom 30% (Low ESG) of the ESG score distribution. The sustainability premium is constructed as a long-short portfolio that is long in High ESG firms and short in Low ESG firms (firms without ESG ratings are excluded). Portfolios are formed using both equal-weighted and value-weighted methods and are rebalanced on a monthly basis. In the value-weighted portfolios, portfolio weights are proportional to firms' market capitalisations at the portfolio formation date.

The average equal-weighted sustainability premium is -0.56% , while the value-weighted premium amounts to -0.54% (see Figure 1). The estimated premiums exhibit substantial dispersion. Specifically, the equal-weighted premium ranges from -15.7% to 12.6% , whereas the value-weighted premium is confined to a narrower interval between -7.1% and 5.1% .

For the equal-weighted premium, the test statistic equals $t = -3.68$ ($p < 0.001$), while for the value-weighted premium, $t = -2.32$ ($p = 0.0215$). The results of the t -tests indicate a statistically significant negative mean in both cases (see Table 1).

Table 1. Descriptive statistics and significance tests of the sustainability premium

Statistic	Equally-weighted sustainability premium	Value-weighted sustainability premium
Mean	-0.5573	-0.5425
Median	-0.5848	-0.6522
Minimum	-15.69	-7.095
Maximum	12.59	5.067
Standard deviation	3.187	1.955
Skewness	-0.4058	-0.032
Excess kurtosis	3.823	0.6528
t -statistic	-3.680	-2.319
p -value	0.0003	0.0215
95% CI lower bound	-0.8334	-1.0315
95% CI upper bound	-0.2515	-0.0831

Note: The table reports descriptive statistics for the monthly equal-weighted and value-weighted sustainability premium, as well as the results of one-sample t -tests, for the period 2014–2025. All values are expressed in percentage terms. The null hypothesis of the t -tests is that the mean premium equals zero. Reported p -values correspond to two-sided tests.

Source: authors’ calculations.

The equal-weighted sustainability premium exhibits a negative Jensen’s alpha in the CAPM framework ($\alpha = -0.38$), which is statistically significant at the 10% level. Within the Fama–French three-factor model, the alpha remains negative ($\alpha = -0.56$) and becomes significant at the 1% level, while in the five-factor specification the magnitude of underperformance further increases ($\alpha = -0.65$; $p < 0.01$). These findings indicate that for equal-weighted portfolios, the sustainability premium remains persistently negative even after controlling for standard risk factors. For the equal-weighted High ESG portfolio, no statistically significant alpha is observed in any of the model specifications. In contrast, the Low ESG portfolio displays a positive and highly significant alpha in both the three-factor and five-factor models (FF3: $\alpha = 0.52$; FF5: $\alpha = 0.57$; $p < 0.01$). This pattern suggests that the equal-weighted sustainability premium is primarily driven by the systematic outperformance of firms with low ESG ratings.

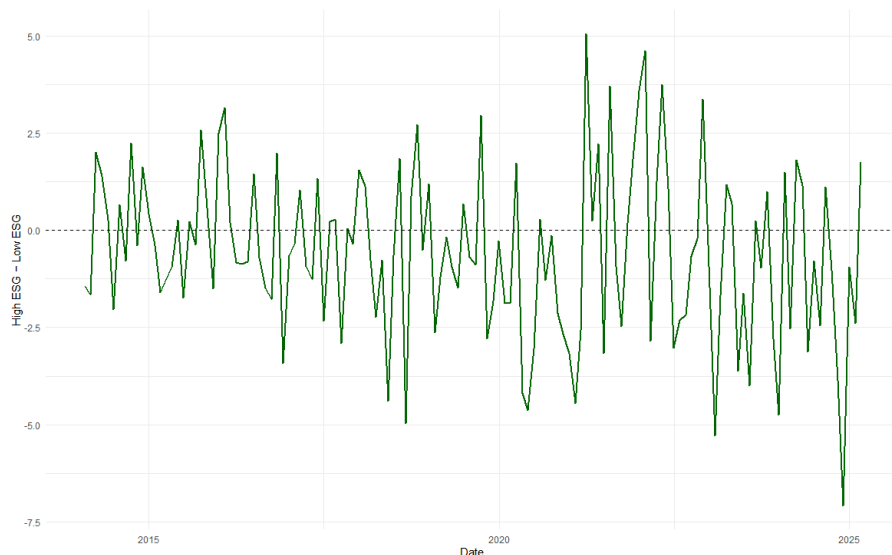


Figure 1. Time series of the value-weighted sustainability premium

Note: The figure shows the monthly evolution of the value-weighted sustainability premium between 2014 and 2025.

Source: authors' calculations.

For value-weighted portfolios, the results are qualitatively similar but less pronounced. The value-weighted low ESG portfolios exhibit positive alphas across all model specifications, which are statistically significant in the three- and five-factor models (FF3: $\alpha = 0.66$; $p < 0.10$; FF5: $\alpha = 0.76$; $p < 0.05$). By contrast, the value-weighted High ESG portfolios do not display statistically significant alphas in any of the models. Nevertheless, the value-weighted sustainability premium remains negative and statistically significant in the augmented factor models (FF3: $\alpha = -0.55$; $p < 0.10$; FF5: $\alpha = -0.7$; $p < 0.05$), indicating that the negative sign of the sustainability premium persists among larger-cap firms, albeit with weaker statistical power.

Figure 2 indicates that the sustainability premium did not generate persistently positive cumulative returns over the sample period. Both the equal-weighted and value-weighted long–short portfolios exhibited a declining cumulative performance, although the value-weighted premium displayed noticeably higher volatility, particularly during the 2020–2021 period. Overall, the results suggest that ESG-related excess returns were unstable and sensitive to changing market conditions.

Overall, the results indicate that the negative sustainability premium is mainly attributable to the positive alpha of low-ESG firms and remains robust to the inclusion of Fama–French risk factors for both equal-weighted and value-weighted portfolios (see Table 2).

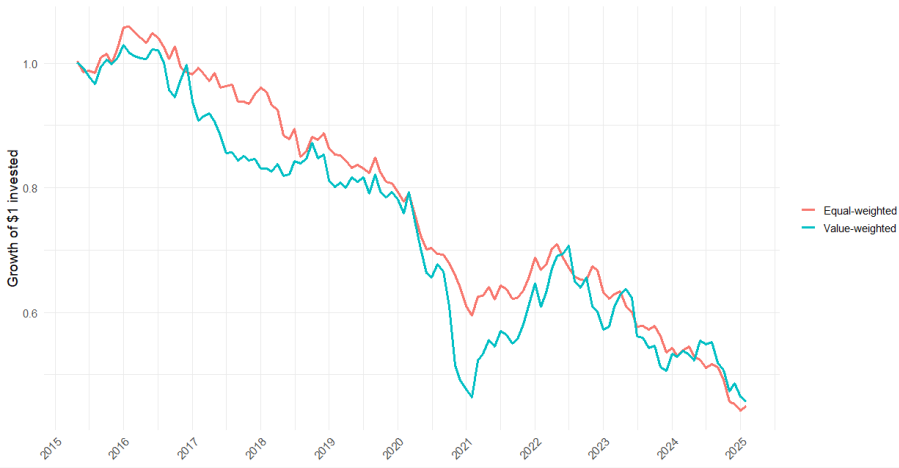


Figure 2. Cumulative performance of the equal-weighted and value-weighted sustainability premium portfolios

Note: The figure reports the cumulative performance of the equal-weighted and value-weighted sustainability premium portfolios between 2015 and 2025. The portfolios are constructed as long-short portfolios that are long in high-ESG firms and short in low-ESG firms, with monthly rebalancing.

Source: authors’ calculations.

Table 2. Factor alphas of ESG portfolios

Portfolio	Jensen’s Alpha	FF3 Alpha	FF5 Alpha
eq_High_ESG	−0.1441	−0.0366	−0.0821
eq_Low_ESG	0.2377	0.5196***	0.5693***
eq_sus_prem	−0.3818*	−0.5562***	−0.6514***
vw_High_ESG	0.1706	0.1049	0.0625
vw_Low_ESG	0.5337*	0.6559*	0.7562**
vw_sus_prem	−0.3631	−0.5510*	−0.6937**

Note: The table reports alphas for equal-weighted (eq_) and value-weighted (vw_) sustainability premiums estimated using Jensen’s CAPM as well as the Fama–French three- and five-factor models. The reported values are based on monthly excess returns over the period 2014–2025. p-values are derived from two-sided statistical tests, with the null hypothesis that $\alpha = 0$ (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Source: authors’ calculations.

2.2. Environmental news variables

The environmental news variables are derived from the GDELT (Global Database of Events, Language, and Tone) database. In our analysis, we pro-

cess approximately 220 million news articles related to the United States and identify coverage linked to 22 distinct environmental (ENV) topics, including climate change, fossil fuels, renewable energy sources, and biodiversity-related issues. For each environmental topic, we construct two complementary indicators, resulting in a total of 44 environmental news variables.

The environmental narrative variables are constructed from monthly article-level observations extracted from the GDELT Global Knowledge Graph database. We first restrict the sample to US-related news items by requiring the LOCATIONS field to contain “United States”. For each month, we compute the total number of US-related articles, which serves as the denominator for the TopicShare measure. Environmental news items are identified using GDELT theme codes, where a news article is assigned to a given ENV topic if the corresponding theme appears in the THEMES field as a complete semi-colon-separated entry.

For each environmental topic and month, we calculate two indicators. First, AvgTone is defined as the monthly average of GDELT’s Tone metric for US-related news items associated with the given topic. This measure captures the average sentiment of environmental news coverage. Positive values indicate more favourable or constructive framing, whereas negative values reflect more alarming, adverse, or conflict-oriented coverage.

Second, TopicShare measures the relative media prominence of each environmental topic. It is calculated as the number of US-related articles associated with a given ENV topic divided by the total number of US-related news articles in the same month. TopicShare therefore proxies the intensity of media and investor attention devoted to a specific environmental narrative, independently of the sentiment conveyed in the news.

The data are compiled at a monthly frequency and cover the period from 1 December 2014 to 30 April 2025. The joint use of the two indicators allows us to separately examine the sentiment-driven and attention-based channels through which environmental news may affect financial variables. Descriptive statistics for the AvgTone and TopicShare variables are reported in Appendix Tables A1 and A2.

We additionally examine the correlation structure of the ENV variables to assess potential multicollinearity and identify broader thematic narrative clusters. The AvgTone variables generally exhibit weak-to-moderate correlations, suggesting that sentiment dynamics contain substantial topic-specific information. At the same time, several economically meaningful clusters emerge, particularly among fossil fuel narratives (e.g., COAL, NATURALGAS, OIL), climate-related narratives (e.g., CLIMATECHANGE, DEFORESTATION, FORESTRY), and renewable-energy narratives (e.g., SOLAR, WINDPOWER). TopicShare variables display stronger correlations overall, indicating that media attention cycles tend to jointly amplify the salience of related environmental topics. The strongest correlations are primarily observed within

conceptually related narrative groups, such as climate-transition themes and fossil-fuel-related coverage.

To reduce dimensionality and improve the economic interpretability of the environmental narrative variables, we construct five broader thematic narrative categories based on the correlation structure and conceptual similarity of the underlying GDELT topics. Rather than relying on purely statistical dimension-reduction techniques such as principal component analysis (PCA), we aggregate the variables using simple arithmetic averages in order to preserve the economic meaning and interpretability of the resulting indicators.

The five aggregated narrative categories are constructed based on the conceptual similarity and empirical correlation structure of the underlying environmental topics. The fossil fuel and traditional energy category includes narratives related to coal, natural gas, and oil (ENV_COAL, ENV_NATURALGAS, ENV_OIL). The renewable and transition-technology category captures narratives associated with wind power, solar energy, biofuels, geothermal energy, hydropower, green-transition topics, and carbon-capture technologies (ENV_WINDPOWER, ENV_SOLAR, ENV_BIOFUEL, ENV_GEOTHERMAL, ENV_HYDRO, ENV_GREEN, ENV CARBONCAPTURE). The climate-risk category consists of narratives related to climate change, deforestation, and forestry (ENV_CLIMATECHANGE, ENV_DEFORESTATION, ENV_FORESTRY). The resource-extraction category includes mining- and metals-related narratives (ENV_MINING, ENV_METALS), while the biodiversity and ecological-damage category captures narratives associated with endangered species, species extinction, poaching, overfishing, fishery-related issues, and waterways (ENV_SPECIESENDANGERED, ENV_SPECIESEXTINCT, ENV_POACHING, ENV_OVERFISH, ENV_FISHERY, ENV_WATERWAYS).

We first examine the within-block correlation structure of the underlying environmental narratives. The results indicate that correlations are generally stronger within thematic groups than across groups, supporting the conceptual validity of the aggregated narrative blocks. The strongest and most coherent within-block correlations appear in the fossil-fuel, climate-risk, and resource-extraction categories, suggesting that these narratives are characterised by relatively stable common informational dynamics.

For the AvgTone variables, the fossil-fuel narratives (ENV_COAL_AvgTone, ENV_NATURALGAS_AvgTone, ENV_OIL_AvgTone) display moderate-to-strong positive correlations ($\rho \approx 0.50$ – 0.54), indicating that media sentiment regarding fossil-fuel-related topics tends to move together over time. Similarly, climate-risk narratives related to climate change, deforestation, and forestry exhibit moderate correlations ($\rho \approx 0.37$ – 0.54), suggesting the presence of a broader environmental-degradation sentiment factor. Resource-extraction narratives (ENV_MINING_AvgTone and ENV_METALS_AvgTone) also show relatively strong correlation ($\rho \approx 0.56$).

In contrast, renewable-energy and biodiversity-related AvgTone narratives appear to be substantially more heterogeneous. Although some renewable-energy narratives, such as wind and solar energy, exhibit moderate positive correlations, many thematic pairs display weak or even negative relationships. Biodiversity-related narratives show particularly weak internal correlations, implying that these topics do not form a unified media-sentiment cluster.

The TopicShare variables display a noticeably more coherent correlation structure than the AvgTone variables. This suggests that media attention cycles tend to move more consistently together within environmental narrative groups than media sentiment itself. Stronger within-block correlations are particularly evident in the renewable-transition narratives, fossil-fuel narratives, and resource-extraction narratives. For example, the correlation between ENV_MINING_TopicShare and ENV_METALS_TopicShare reaches approximately $\rho \approx 0.68$, while climate-transition-related narratives such as ENV_GREEN_TopicShare, ENV_WINDPOWER_TopicShare, and ENV CARBONCAPTURE_TopicShare also exhibit relatively strong positive correlations.

After constructing the five aggregated narrative dimensions, we further examine the correlation structure of the aggregated TopicShare and AvgTone indicators. The correlations between the aggregated TopicShare blocks are generally moderate and economically interpretable, while remaining below levels typically associated with severe multicollinearity. The strongest relationships emerge between renewable and climate-risk narratives, as well as between resource-extraction and biodiversity narratives, reflecting economically meaningful thematic overlap.

The aggregated AvgTone indicators display substantially weaker cross-block correlations, suggesting that sentiment dynamics remain relatively topic-specific even after aggregation. This finding indicates that the AvgTone variables capture differentiated narrative sentiment channels rather than a single underlying environmental-sentiment factor.

Finally, we examine the stationarity properties of the aggregated narrative variables using Augmented Dickey–Fuller (ADF) tests with AIC-based lag selection. All aggregated TopicShare variables are found to be stationary at the 5% significance level. Among the aggregated AvgTone variables, the Fossil, Renewable, ClimateRisk, and Biodiversity blocks are also stationary, while the ResourceExtraction_AvgTone variable appears non-stationary. Consequently, this variable is included in first-difference form in the subsequent regression analyses.

3. Methodology

The empirical analysis is based on monthly data covering the period from December 2014 to April 2025. The dependent variables are the equal-weighted and value-weighted sustainability premiums, denoted by eq_sus_prem and vw_sus_prem , respectively. The explanatory variables are GDELT-based environmental narrative indicators aggregated into five economically interpretable thematic blocks. For each block, we construct both TopicShare and AvgTone indicators. TopicShare captures the relative intensity of media attention, while AvgTone measures the average sentiment of news coverage.

Prior to estimation, the time-series properties of the variables are examined using Augmented Dickey–Fuller (ADF) tests with AIC-based lag selection. All aggregated TopicShare variables are stationary in levels. Among the aggregated AvgTone indicators, Fossil_AvgTone, Renewable_AvgTone, ClimateRisk_AvgTone, and Biodiversity_AvgTone are stationary in levels, while ResourceExtraction_AvgTone is non-stationary and is therefore included in first differences. Non-stationary macroeconomic risk variables are also included in first differences.

The empirical analysis proceeds in three steps. First, we estimate regressions using the five aggregated environmental narrative blocks separately for TopicShare and AvgTone measures. In order to distinguish delayed and immediate pricing effects, the models are estimated using both one-month lagged and contemporaneous narrative variables. Second, we augment the baseline specifications with Fama–French three-factor and five-factor controls. Third, we extend the FF5 specification by adding climate-specific, ESG-uncertainty, and macroeconomic risk controls.

For the aggregated narrative-block models, the baseline specification is:

$$sus_prem_t^{(k)} = \alpha^{(k)} + \delta^{(k)'} NB_{t-h} + \varepsilon_t^{(k)} \quad (1)$$

where $sus_prem_t^{(k)}$ denotes the sustainability premium, with $k = eq$ for the equal-weighted portfolio and $k = vw$ for the value-weighted portfolio. NB_{t-h} is the vector of the five aggregated environmental narrative blocks, where $h = 0$ refers to contemporaneous effects and $h = 1$ refers to one-month lagged effects.

The FF3-augmented specification is:

$$sus_prem_t^{(k)} = \alpha^{(k)} + \beta^{(k)'} FF3_t + \delta^{(k)'} NB_{t-h} + \varepsilon_t^{(k)} \quad (2)$$

where $FF3_t$ includes Mkt_RF_t , SMB_t , and HML_t .

The FF5-augmented specification is:

$$sus_prem_t^{(k)} = \alpha^{(k)} + \beta^{(k)'} FF5_t + \delta^{(k)'} NB_{t-h} + \varepsilon_t^{(k)} \quad (3)$$

where $FF5_t$ includes Mkt_RF_t , SMB_t , HML_t , RMW_t , and CMA_t .

The vector NB consists of the five thematic environmental narrative blocks: Fossil, Renewable, ClimateRisk, ResourceExtraction, and Biodiversity. The models are estimated separately for TopicShare and AvgTone indicators. In the AvgTone specifications, ResourceExtraction_AvgTone is included in first-difference form because it is non-stationary in levels.

The FF3 and FF5 frameworks are employed because they represent standard benchmark asset-pricing models capable of controlling for broad systematic risk exposures related to market, size, value, profitability, and investment factors. Augmenting these benchmark specifications with environmental narrative variables allows us to assess whether narrative effects contain incremental explanatory power beyond conventional risk-factor structures.

We explicitly assess the robustness of the effects of environmental narratives on sustainability premiums by controlling for climate-related and macroeconomic risk factors. The objective is to test whether the estimated effects of the narrative variables persist after accounting for broader risk channels that may potentially influence the dynamics of sustainability premiums.

We capture the risk dimension using indicators grouped into three categories. The first group relates to climate-specific risks and includes a measure of transition climate risk, the Transition Risk Indicator (*TRI*), and a proxy for physical climate risk, the Physical Risk Indicator (*PRI*) (Bua et al., 2024). The second group captures ESG-related uncertainty and is represented by the U.S. ESG Uncertainty Index (*ESGUI*) (Ongan et al., 2025). The third group encompasses macroeconomic and geopolitical uncertainty, measured by economic policy uncertainty (*EPU*) (Baker et al., 2016), financial market volatility (*VIX*), and the geopolitical risk indicator (*GPR*) (Caldara and Iacoviello, 2022). The stationarity of the risk-related time series is examined using Augmented Dickey–Fuller (*ADF*) tests. The results indicate that several variables (specifically *EPU*, *VIX*, and *GPR*) are non-stationary in levels; therefore, these variables are included in the regressions in first differences. Accordingly, the subsequent analysis employs ΔEPU , ΔVIX , and ΔGPR . To ensure comparability across the different risk indicators, all explanatory variables are standardised. The time series are transformed using z-score normalisation, so that coefficients reflect one-standard-deviation changes. The model with climate-risk controls is specified as:

$$sus_prem_t^{(k)} = \alpha^{(k)} + \beta^{(k)'} FF5_t + \delta^{(k)'} NB_t + \gamma_1^{(k)} TRI_t^z + \gamma_2^{(k)} PRI_t^z + \varepsilon_t^{(k)} \quad (4)$$

The model with ESG uncertainty is:

$$sus_prem_t^{(k)} = \alpha^{(k)} + \beta^{(k)'} FF5_t + \delta^{(k)'} NB_t + \gamma_1^{(k)} ESGUI_t^z + \varepsilon_t^{(k)} \quad (5)$$

The model with macroeconomic and geopolitical risk controls is:

$$sus_prem_t^{(k)} = \alpha^{(k)} + \beta^{(k)'} FF5_t + \delta^{(k)'} NB_t + \gamma_1^{(k)} \Delta EPU_t^z + \gamma_2^{(k)} \Delta VIX_t^z + \gamma_3^{(k)} \Delta GPR_t^z + \varepsilon_t^{(k)} \tag{6}$$

where x^z denotes the standardised form of variable x , and Δ denotes the first-difference operator.

All regressions are estimated using OLS. Residual diagnostics indicated no evidence of severe multicollinearity in the multivariate narrative specifications, as assessed using variance inflation factors (VIFs). Given the monthly frequency of the data and the potential presence of heteroskedasticity and low-order autocorrelation, Newey–West heteroskedasticity- and autocorrelation-consistent standard errors are used throughout, with a lag length of one month.

4. Results

The empirical results indicate that environmental narratives are associated with sustainability premia in a heterogeneous manner, with substantial differ-

Table 3. Contemporaneous topicshare narratives and the equal-weighted sustainability premium

Variable	Base Model	FF3 + Narratives	FF5 + Narratives
Fossil narratives	146.93** (60.76)	128.14*** (34.22)	108.51*** (32.72)
Renewable narratives	339.33 (347.58)	273.96 (169.66)	297.91** (142.91)
Climate-risk narratives	−35.44 (99.25)	−125.42* (69.37)	−136.69** (54.18)
Resource-extraction narratives	−47.17 (317.01)	−343.09** (154.51)	−276.92* (161.67)
Biodiversity narratives	−433.98 (1340.57)	1084.29 (838.21)	1149.35 (774.12)

Note: The table reports OLS regression results for the equal-weighted sustainability premium. Environmental narratives are measured using aggregated TopicShare indicators. Standard errors in parentheses are Newey–West heteroskedasticity- and autocorrelation-consistent with one lag. FF3 and FF5 refer to the Fama–French three-factor and five-factor models, respectively. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Source: authors’ calculations.

ences across narrative categories and between attention-based (TopicShare) and sentiment-based (AvgTone) indicators. Table 3 reports the contemporaneous effects of aggregated TopicShare narrative blocks on the equal-weighted sustainability premium.

The most robust result emerges for fossil-fuel-related narratives. The Fossil TopicShare variable exhibits a positive and statistically significant relationship across all model specifications, including the FF3 and FF5 frameworks. The coefficient remains economically large and statistically strong even after controlling for standard asset-pricing factors, suggesting that increased media attention devoted to fossil-fuel-related environmental narratives is associated with higher contemporaneous sustainability premia.

The largest spikes in fossil-fuel narrative intensity coincide with major energy and climate-related events. The December 2015 spike coincides with the adoption of the Paris Agreement, while the exceptionally large March 2022 spike and the subsequent April 2022 peak coincide with Russia's invasion of Ukraine, the resulting European energy-security debate, and the EU's decision to prohibit Russian coal imports. The January 2016 spike also coincides with the US announcement of a moratorium on new coal leases on federal lands. Figure 3 illustrates these episodes using the standardised monthly Fossil TopicShare series.

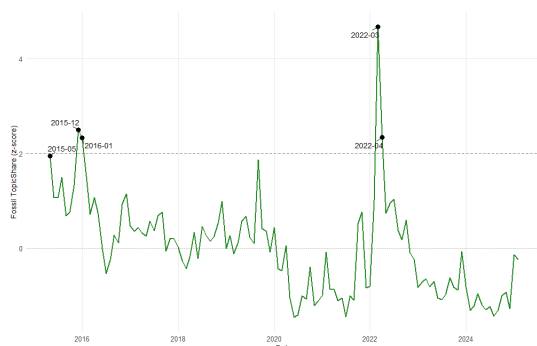


Figure 3. Standardised Fossil–Fuel narrative intensity and major spikes

Note: The figure shows the standardised monthly Fossil TopicShare series. Labels identify the five largest monthly observations over the sample period. The dashed horizontal line indicates a z-score of 2.

Source: authors' calculations based on GDELT data.

Renewable-energy narratives display a weaker and less consistent relationship. While the baseline and FF3 specifications do not yield statistically significant coefficients, the FF5 specification produces a positive and significant coefficient at the 5% level. This result suggests that renewable-energy-related media attention may contain incremental explanatory power once profitability and investment-related risk factors are controlled for.

In contrast, climate-risk narratives are negatively associated with the sustainability premium in the factor-controlled models. The coefficients become statistically significant in both the FF3 and FF5 specifications, indicating that increases in media attention devoted to climate-risk-related narratives are associated with lower contemporaneous sustainability premia. A similar negative relationship is observed for resource-extraction narratives, particularly in the FF3 model. These findings suggest that different environmental narratives are associated with sustainability premia in markedly different ways, with fossil-fuel-related narratives exhibiting positive effects and climate-risk and resource-extraction narratives exhibiting negative effects.

By comparison, biodiversity-related narratives do not exhibit robust explanatory power in the equal-weighted specifications. Although the estimated coefficients vary substantially across models, they remain statistically insignificant, suggesting that biodiversity-related media attention does not exhibit an independent statistical association with contemporaneous sustainability-premium dynamics in these specifications.

Table 4 presents the corresponding results for aggregated AvgTone narrative blocks. Overall, the sentiment-based indicators exhibit weaker and less consistent explanatory power than the TopicShare measures. This pattern is

Table 4. Contemporaneous AvgTone narratives and the equal-weighted sustainability premium

Variable	Base Model	FF3 + Narratives	FF5 + Narratives
Fossil narratives	-1.14 (0.77)	-0.34 (0.46)	-0.02 (0.43)
Renewable narratives	2.37 (2.03)	-0.23 (0.82)	-0.28 (0.77)
Climate-risk narratives	0.20 (0.61)	0.53* (0.31)	0.16 (0.24)
Resource-extraction narratives	0.74 (0.66)	0.84* (0.43)	0.64* (0.37)
Biodiversity narratives	-1.06 (1.04)	-1.59*** (0.51)	-1.06** (0.47)

Note: The table reports OLS regression results for the equal-weighted sustainability premium. Environmental narratives are measured using aggregated AvgTone indicators. Resource-extraction sentiment is included in first differences due to non-stationarity in levels. Standard errors in parentheses are Newey–West heteroskedasticity- and autocorrelation-consistent with one lag. FF3 and FF5 refer to the Fama–French three-factor and five-factor models, respectively. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Source: authors' calculations.

consistent with media attention intensity being more closely associated with sustainability premia than the tone of environmental coverage itself.

Among the AvgTone variables, the strongest and most robust effect is observed for biodiversity-related narratives. The Biodiversity AvgTone coefficient is negative and statistically significant in both the FF3 and FF5 specifications, implying that increasingly negative biodiversity-related media sentiment is associated with higher sustainability premia. Resource-extraction sentiment also exhibits weak positive effects in the factor-controlled specifications, although the statistical significance remains only marginal. Climate-risk sentiment is weakly significant only in the FF3 specification, while fossil-fuel and renewable-energy sentiment indicators do not display robust explanatory power across the models.

Overall, the results indicate that aggregated TopicShare variables provide substantially stronger and more stable explanatory power for sustainability premia than AvgTone indicators. This pattern is consistent with the possibility that media salience and investor attention are more closely associated with sustainability premia than the emotional tone of environmental news coverage. However, the analysis does not directly identify investor attention as the mechanism underlying these associations.

The corresponding value-weighted portfolio results are reported in Appendix Tables A3 and A4. Overall, the value-weighted specifications provide little evidence that environmental narratives systematically affect sustainability premia once conventional risk factors are taken into account. In the TopicShare regressions (Appendix Table A4), most narrative blocks lose statistical significance once FF controls are introduced. Similarly, the AvgTone regressions (Appendix Table A3) produce no consistently significant coefficients across specifications. Overall, environmental narrative effects are substantially stronger in equal-weighted than in value-weighted portfolios.

To examine this difference more directly, we analyzed the spread between the equal- and value-weighted sustainability premia and additionally tested whether the relationship between environmental narratives and the EW-VW spread varies with the Fama–French SMB factor. The narrative variables do not significantly explain the EW-VW spread directly, and SMB itself does not show a robust direct relationship with the spread. However, the interaction analysis reveals significant effects for fossil-fuel TopicShare ($\beta = -102.02$, $p = 0.007$) and resource-extraction TopicShare ($\beta = -256.10$, $p = 0.025$), while the renewable-energy TopicShare interaction is marginally significant ($\beta = -284.34$, $p = 0.052$). The resource-extraction AvgTone interaction is also marginally significant ($\beta = -0.82$, $p = 0.084$). These results provide evidence that the difference between equal- and value-weighted portfolios may vary with size-related market conditions, although the pattern is not systematic across all narrative measures. Since SMB is a market-level size factor rather than a direct measure of firm size, these findings should be interpreted as

supplementary evidence of size-related heterogeneity rather than as direct identification of firm size as the underlying mechanism. Detailed results are reported in Appendix Table A6.

Additional lagged specifications were estimated to examine whether environmental narratives affect sustainability premia with delayed dynamics. Overall, the lagged effects proved substantially weaker and less robust than the contemporaneous relationships. Only fossil-fuel-related TopicShare narratives retained some explanatory power for the equal-weighted sustainability premium, while most other lagged TopicShare and AvgTone variables lost statistical significance once FF controls were included. These findings indicate that the observed association between environmental narratives and sustainability premia is concentrated in the contemporaneous period rather than in persistent delayed adjustments. This pattern is consistent with relatively rapid incorporation of narrative-related information, although the underlying information-diffusion mechanism is not directly tested.

Robustness tests were conducted by augmenting the FF5 specifications with climate-related and macroeconomic risk indicators, including transition climate risk (TRI), physical climate risk (PRI), ESG-related uncertainty (ESGUI), and macroeconomic uncertainty measures (ΔEPU , ΔVIX , ΔGPR). The results are reported in Table 5.

Overall, the explanatory power of the additional risk-control variables remained limited once the aggregated environmental narrative variables and FF5 factors were included simultaneously in the models. Importantly, however, the estimated effects of the environmental narrative variables remained relatively stable across the alternative specifications for the equal-weighted sustainability premium. Fossil-fuel-related narratives retained positive and statistically significant coefficients across all risk-control models, while climate-risk narratives continued to display negative and economically meaningful effects with marginal or near-conventional levels of statistical significance. These findings suggest that the explanatory power of environmental narratives is not subsumed by broader climate-related or macroeconomic risk conditions.

By contrast, the additional risk indicators themselves exhibited only weak and inconsistent effects. Neither transition climate risk (TRI) nor physical climate risk (PRI) demonstrated robust statistical significance in the equal-weighted specifications. ESG-related uncertainty (ESGUI) displayed at most weak marginal significance, while the macroeconomic uncertainty variables remained statistically insignificant throughout the specifications.

The value-weighted specifications yielded substantially weaker and statistically insignificant narrative effects once the additional risk controls were introduced.

The results indicate that aggregated environmental narratives retain incremental explanatory power for ESG-related asset pricing beyond broader climate-risk, ESG-uncertainty, and macroeconomic-risk measures.

Table 5. Robustness of environmental narrative effects with climate and macroeconomic risk controls

Variable	FF5 + TRI/PRI	FF5 + ESGUI	FF5 + Macro risk
Fossil narratives	72.53*	76.23**	72.63*
	(40.22)	(38.27)	(37.89)
Climate-risk narratives	−113.06*	−117.25*	−108.43*
	(59.51)	(59.75)	(63.72)
TRI_z	0.084		
	(0.090)		
PRI_z	−0.002		
	(0.146)		
ESGUI_z		−0.144*	
		(0.077)	
ΔEPU_z			0.020
			(0.086)
ΔVIX_z			−0.155
			(0.173)
ΔGPR_z			−0.086
			(0.074)
Narrative controls	Yes	Yes	Yes
FF5 factors	Yes	Yes	Yes

Note: The table reports robustness regressions for the equal-weighted sustainability premium. All specifications include the Fama–French five-factor model and aggregated environmental narrative variables. Additional controls include transition climate risk (TRI), physical climate risk (PRI), ESG-related uncertainty (ESGUI), and macroeconomic and geopolitical uncertainty measures (ΔEPU , ΔVIX , ΔGPR). Standard errors in parentheses are Newey–West heteroskedasticity- and autocorrelation-consistent with one lag. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Source: authors' calculations.

To further examine the differences between the FF3 and FF5 specifications, we re-estimated the models by adding the profitability (RMW) and investment (CMA) factors separately to the FF3 specification. The results indicate that the differences between FF3 and FF5 cannot be attributed uniformly to either additional factor. For the equal-weighted TopicShare specifications, the fossil-fuel narrative effect remains positive and statistically significant after adding either RMW or CMA separately, supporting the robustness of this result. The climate-risk effect becomes significant when RMW is added, while the resource-extraction effect remains significant with RMW but weakens after the inclusion of CMA. For AvgTone, the negative biodiversity effect re-

mains significant in both decomposed specifications. Overall, the decomposition suggests that the main narrative effects are not mechanically driven by the additional profitability and investment factors included in FF5, although individual narrative coefficients exhibit some sensitivity to these controls. Detailed results are reported in Appendix Table A5.

The differences observed across model specifications indicate that the association between environmental narratives and sustainability premia varies across portfolio weighting schemes, factor controls, and time horizons. Firstly, TopicShare variables generally exhibit stronger and more stable associations with the sustainability premium than AvgTone indicators. This pattern is consistent with the possibility that media salience and investor attention are more closely related to sustainability-premium dynamics than the emotional tone of environmental coverage, although the present analysis does not directly identify attention as the underlying mechanism. Secondly, the stronger effects observed in equal-weighted portfolios indicate heterogeneity across portfolio weighting schemes. Although the SMB interaction results provide supplementary evidence of size-related heterogeneity, they do not allow us to identify firm size or investor attention as the underlying mechanism. Thirdly, the weakening of several coefficients after introducing FF controls suggests that part of the narrative effects overlaps with conventional systematic risk exposures, although several environmental narrative variables retain incremental explanatory power beyond standard factor structures. Finally, the relatively weak lagged effects indicate that the observed relationships are concentrated in the contemporaneous period rather than in persistent delayed adjustments. This pattern is consistent with relatively rapid incorporation of narrative-related information, but the underlying information-diffusion mechanism is not directly tested.

5. Discussion

Our results suggest that environmental narratives are associated with sustainability premia beyond conventional ESG scores and climate-risk measures. While equilibrium-based models predict lower expected returns for high-ESG assets due to investor preferences (Pástor et al., 2021), our results show that environmental narrative variables retain explanatory power for sustainability premia even after controlling for standard risk factors and explicit climate and macroeconomic uncertainty measures.

A particularly important finding is that attention-based environmental narrative measures exhibit stronger and more stable explanatory power than sentiment-based indicators. While AvgTone variables produce weaker and less

robust effects across specifications, TopicShare-based measures remain economically and statistically relevant after controlling for standard asset-pricing factors and broader climate-risk indicators. This pattern is consistent with the possibility that media salience and investor attention are more closely associated with sustainability-related pricing than the emotional tone of environmental coverage itself. However, the present analysis does not directly test the underlying attention or information-processing mechanism.

The pricing associations also differ substantially across environmental topics. The strongest effects are observed for fossil-fuel, climate-risk, and resource-extraction narratives, while broader environmental themes display weaker and less consistent relationships. The positive association observed for fossil-fuel-related narratives may reflect heightened investor awareness of future transition costs, regulatory pressures, and decarbonisation risks, which may be reflected in differences in the relative pricing of high- and low-ESG firms. This pattern suggests that narratives with more direct implications for future cash flows, risk perceptions, and firm valuations may be more relevant for sustainability-related pricing.

These findings are broadly consistent with prior studies documenting that climate-related news, investor attention, and ESG-related media salience affect financial-market dynamics beyond traditional risk factors (Andreu et al., 2026; López-Cabarcos et al., 2019; Naughton et al., 2019; Vu et al., 2025; Xu et al., 2022). They extend this literature by indicating that environmental narratives do not operate as a homogeneous information channel. Instead, pricing associations differ across thematic categories and between attention-based and sentiment-based measures. The stronger results for narrative salience suggest that the visibility of environmental information may be relevant for understanding when sustainability-related information becomes reflected in equity-market pricing, although this interpretation remains consistent with an attention-based explanation rather than a directly identified mechanism.

The stronger effects observed in equal-weighted portfolios indicate heterogeneity across portfolio weighting schemes. Additional interactions between SMB and selected TopicShare narratives provide supplementary evidence of size-related heterogeneity, although SMB is a market-level factor rather than a direct measure of firm size and therefore does not identify firm size as the underlying mechanism. The relatively weak lagged effects further indicate that the observed associations are concentrated in the contemporaneous period rather than in persistent delayed adjustments. This pattern is consistent with relatively rapid incorporation of narrative-related information, although the underlying information-diffusion mechanism is not directly tested.

Taken together, the findings suggest that environmental narratives may provide a time-varying conditioning dimension in the relationship between sustainability-related information and asset prices, rather than representing an independently identified unconditional risk factor.

Several practical implications emerge from the results. Sustainability-related pricing dynamics appear sensitive to changes in narrative salience and media attention, with the strength of these associations varying across portfolio weighting schemes and market conditions. This suggests that observed ESG-related investment performance may be associated not only with firm-level sustainability characteristics but also with the intensity and visibility of environmental narratives within the broader informational environment (Andreu et al., 2026; Vu et al., 2025).

For firms, environmental communication and media exposure may be associated with market valuation beyond underlying ESG fundamentals, highlighting the importance of credible and transparent sustainability-related disclosure practices. Firms operating in transition-sensitive or environmentally controversial industries may be particularly exposed to narrative-driven re-pricing dynamics (Ferro et al., 2025; Guastella et al., 2022).

From a policy perspective, the findings highlight the relevance of information quality, disclosure consistency, and climate-related reporting standards. If the observed associations between sustainability premia and narrative salience reflect differences in the information environment, unstable or highly fragmented information environments may amplify pricing volatility, increase uncertainty surrounding ESG investments, and strengthen greenwashing-related concerns in financial markets (Baker et al., 2016; Caldara & Iacoviello, 2022; Ongan et al., 2025).

The analysis relies on media-based narrative measures and focuses on US large- and mid-cap firms at monthly frequency, which may limit the generalisability of the findings across markets, frequencies, and institutional environments. In addition, the analysis does not directly measure investor attention, information diffusion, or belief formation. These mechanisms should therefore be regarded as plausible interpretations of the observed relationships rather than directly identified channels. Future research could employ firm-level measures of attention and narrative exposure, higher-frequency data, and cross-country comparative analyses to distinguish among these possible mechanisms.

Conclusions

This study examined whether environmental narratives are associated with sustainability premia beyond conventional ESG scores and climate-risk measures. Using GDELT-based environmental narrative indicators and ESG long-short portfolios, the analysis shows that environmental narrative measures retain economically meaningful explanatory power for sustainability premia

after controlling for standard asset-pricing factors and broader climate-related uncertainty measures.

The findings indicate that the prominence of environmental narratives in the media is more consistently associated with sustainability premia than the emotional tone of environmental coverage. This pattern is consistent with a potentially important role for media salience and investor attention in sustainability-related pricing, although the analysis does not directly identify these factors as causal mechanisms. The stronger effects observed in equal-weighted portfolios further indicate heterogeneity across portfolio weighting schemes, while the additional analysis provides supplementary evidence of size-related heterogeneity without directly identifying firm size as the underlying mechanism.

Overall, the results suggest that variation in ESG premia is related not only to conventional risk factors and sustainability characteristics, but also to the broader information environment in which environmental information becomes relevant to investors. The pricing associations vary substantially across environmental topics, with the strongest effects observed for fossil-fuel-related narratives, while broader climate-risk proxies exhibit comparatively weak explanatory power. The relatively weak lagged effects indicate that the observed relationships are concentrated in the contemporaneous period rather than in persistent delayed adjustments.

Several limitations remain. The analysis relies on aggregated media-based indicators and focuses on US large- and mid-cap firms at monthly frequency, which may limit the generalisability of the findings across markets and institutional settings. In addition, the analysis does not directly measure investor attention, information diffusion, or belief formation. Future research could therefore employ firm-level measures of attention and narrative exposure, higher-frequency data, and cross-country comparative analyses to distinguish among these possible mechanisms.

Appendix. Supplementary tables

Table A1. Descriptive statistics of media tone (AvgTone) by environmental topic

Variable (AvgTone)	Mean	SD	Min	Max	N
BIOFUEL	0.277859	0.27236	−0.64025	0.966986	125
CARBONCAPTURE	0.521524	0.328584	−0.35599	1.227313	125
CLIMATECHANGE	−1.06547	0.309518	−1.98022	−0.38311	125
COAL	−1.0229	0.300368	−2.71234	−0.42557	125
DEFORESTATION	−1.55497	0.497425	−3.53382	−0.68679	125
FISHERY	−0.86626	0.242074	−1.49961	−0.20357	125
FORESTRY	−1.07709	0.870944	−3.70404	0.333634	125
GEO THERMAL	0.526514	0.575297	−4.05352	1.751084	125
GREEN	0.528565	0.191479	−0.02945	0.964831	125
HYDRO	−0.47723	0.525926	−3.12989	0.437174	125
METALS	0.010142	0.316993	−1.56227	0.559663	125
MINING	−0.5702	0.274331	−1.50737	−0.07183	125
NATURALGAS	−0.37912	0.398247	−1.83706	0.354406	125
NUCLEARPOWER	−0.73074	0.515131	−2.5962	0.442739	125
OIL	−1.38563	0.357681	−2.58583	−0.72408	125
OVERFISH	−1.42053	0.421036	−2.80872	−0.07415	125
POACHING	−1.64476	0.58581	−3.35957	−0.05778	125
SOLAR	0.301545	0.192308	−0.29584	0.744045	125
SPECIESENDANGERED	−1.59414	0.319018	−2.72157	−0.67672	125
SPECIESEXTINCT	−0.89119	0.615602	−3.27505	1.423234	125
WATERWAYS	−1.43688	0.534402	−3.80831	−0.20087	125
WINDPOWER	0.042181	0.350237	−1.89947	0.634095	125

Source: authors' calculations.

Table A2. Descriptive statistics of topic share by environmental topic

Variable (TopicShare)	Mean	SD	Min	Max	N
BIOFUEL	0.001627	0.000382	0.000912	0.003028	125
CARBONCAPTURE	0.00083	0.000607	4.8×10^{-5}	0.002436	125
CLIMATECHANGE	0.023786	0.008074	0.011115	0.047596	125
COAL	0.0074	0.001725	0.004028	0.013296	125
DEFORESTATION	0.000839	0.000451	0.000394	0.003716	125
FISHERY	0.002507	0.000352	0.001628	0.003301	125
FORESTRY	0.002182	0.000945	0.001073	0.005872	125
GEOHERMAL	0.000737	0.000274	0.000297	0.003073	125
GREEN	0.008289	0.00208	0.004413	0.017641	125
HYDRO	0.001398	0.000339	0.000693	0.002884	125
METALS	0.00452	0.000697	0.002967	0.007956	125
MINING	0.009685	0.001438	0.006046	0.014585	125
NATURALGAS	0.01007	0.002279	0.005312	0.021024	125
NUCLEARPOWER	0.001069	0.000341	0.000488	0.002111	125
OIL	0.033909	0.00796	0.022463	0.066929	125
OVERFISH	0.000288	0.000106	0.000136	0.000814	125
POACHING	0.000823	0.000442	0.000387	0.003359	125
SOLAR	0.009749	0.002706	0.005463	0.026673	125
SPECIESENDANGERED	0.001818	0.000334	0.001115	0.003004	125
SPECIESEXTINCT	8.4×10^{-5}	4.5×10^{-5}	3.5×10^{-5}	0.00028	125
WATERWAYS	0.003146	0.000833	0.001585	0.007237	125
WINDPOWER	0.002334	0.000544	0.001206	0.005331	125

Source: authors' calculations.

Table A3. Contemporaneous AvgTone narratives and the value-weighted sustainability premium

Variable	Base Model	FF3 + Narratives	FF5 + Narratives
Fossil narratives	−1.61 (1.28)	−0.68 (1.01)	−0.56 (1.02)
Renewable narratives	2.05 (2.69)	−0.60 (1.72)	−0.20 (1.58)
Climate-risk narratives	0.65 (0.92)	0.98 (0.76)	0.53 (0.62)
Resource-extraction narratives	0.68 (1.07)	1.00 (0.84)	0.46 (0.92)
Biodiversity narratives	−0.80 (2.04)	−1.32 (1.47)	−0.53 (1.37)

Note: The table reports OLS regression results for the value-weighted sustainability premium. Environmental narratives are measured using aggregated AvgTone indicators. Resource-extraction sentiment is included in first differences due to non-stationarity in levels. Standard errors in parentheses are Newey–West heteroskedasticity- and autocorrelation-consistent with one lag. FF3 and FF5 refer to the Fama–French three-factor and five-factor models, respectively. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Source: authors' calculations.

Table A4. Contemporaneous TopicShare narratives and the value-weighted sustainability premium

Variable	Base Model	FF3 + Narratives	FF5 + Narratives
Fossil narratives	187.82* (110.30)	167.97 (113.84)	173.57 (120.37)
Renewable narratives	542.88 (638.01)	461.21 (614.53)	492.61 (621.03)
Climate-risk narratives	−73.72 (183.24)	−146.63 (186.05)	−180.02 (172.18)
Resource-extraction narratives	−17.93 (559.13)	−298.15 (536.55)	−308.12 (510.75)
Biodiversity narratives	−894.88 (2017.69)	381.24 (2120.16)	263.96 (1985.83)

Note: The table reports OLS regression results for the value-weighted sustainability premium. Environmental narratives are measured using aggregated TopicShare indicators. Standard errors in parentheses are Newey–West heteroskedasticity- and autocorrelation-consistent with one lag. FF3 and FF5 refer to the Fama–French three-factor and five-factor models, respectively. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Source: authors' calculations.

Table A5. Decomposition of narrative effects across FF3, FF3 + RMW, FF3 + CMA, and FF5 specifications

Portfolio	Narrative	Variable	FF3	FF3 + RMW	FF3 + CMA	FF5
Equal-weighted	TopicShare	Fossil	128.14***	139.66***	92.82**	108.51***
Equal-weighted	TopicShare	Renewable	273.96	286.74*	287.44*	297.91**
Equal-weighted	TopicShare	Climate-risk	−125.42*	−144.49**	−117.35*	−136.69**
Equal-weighted	TopicShare	Resource-extraction	−343.09**	−375.68**	−230.95	−276.92*
Equal-weighted	TopicShare	Biodiversity	1084.29	976.82	1277.77	1149.35
Value-weighted	TopicShare	Fossil	167.97	190.73*	141.60	173.57
Value-weighted	TopicShare	Renewable	461.21	486.46	471.26	492.61
Value-weighted	TopicShare	Climate-risk	−146.63	−184.32	−140.61	−180.02
Value-weighted	TopicShare	Resource-extraction	−298.15	−362.54	−214.44	−308.12
Value-weighted	TopicShare	Biodiversity	381.24	168.90	525.66	263.96
Equal-weighted	AvgTone	Fossil	−0.34	−0.38	0.03	−0.02
Equal-weighted	AvgTone	Renewable	−0.23	0.05	−0.57	−0.28
Equal-weighted	AvgTone	Climate-risk	0.53*	0.38	0.30	0.16
Equal-weighted	AvgTone	Resource-extraction	0.84*	0.56	0.91**	0.64*
Equal-weighted	AvgTone	Biodiversity	−1.59***	−1.28***	−1.36***	−1.06**
Value-weighted	AvgTone	Fossil	−0.68	−0.77	−0.43	−0.56
Value-weighted	AvgTone	Renewable	−0.60	−0.01	−0.82	−0.20
Value-weighted	AvgTone	Climate-risk	0.98	0.66	0.83	0.53
Value-weighted	AvgTone	Resource-extraction	1.00	0.41	1.05	0.46
Value-weighted	AvgTone	Biodiversity	−1.32	−0.66	−1.17	−0.53

Note: The table reports OLS regression results for the equal-weighted and value-weighted sustainability premia. Environmental narratives are measured using aggregated TopicShare and AvgTone indicators. Statistical inference is based on Newey–West heteroskedasticity- and autocorrelation-consistent standard errors with one lag. FF3 and FF5 refer to the Fama–French three-factor and five-factor models, respectively. FF3 + RMW and FF3 + CMA augment the FF3 specification separately with the profitability (RMW) and investment (CMA) factors. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Source: authors' calculations.

Table A6. Environmental narratives and the equal-weighted versus value-weighted sustainability premium spread

Panel A. Direct narrative effects

Narrative	TopicShare β	p -value	AvgTone β	p -value
Fossil	−53.699	0.578	0.243	0.774
Renewable	−70.884	0.852	−0.087	0.955
Climate risk	26.144	0.835	−0.303	0.610
Resource extraction	−73.218	0.827	0.021	0.980
Biodiversity	317.482	0.818	−0.414	0.734

Panel B. SMB × narrative interaction effects

Narrative	TopicShare × SMB β	p -value	AvgTone × SMB β	p -value
Fossil	−102.023***	0.007	−0.261	0.364
Renewable	−284.343*	0.052	0.438	0.487
Climate risk	45.515	0.391	0.334	0.213
Resource extraction	−256.097**	0.025	−0.821*	0.084
Biodiversity	−322.589	0.611	−0.409	0.267

Note: The dependent variable is the difference between the equal-weighted and value-weighted sustainability premia (EW-VW spread). Panel A reports the coefficients of the environmental narrative variables from regressions including the Fama–French five factors (Mkt-RF, SMB, HML, RMW, and CMA) as controls. Panel B reports the interaction coefficients between SMB and the respective environmental narrative variable. Models are estimated using OLS with Newey–West heteroskedasticity- and autocorrelation-consistent standard errors with one lag. N = 118 in all specifications. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Source: authors’ calculations.

References

Alessi, L., Ossola, E., & Panzica, R. (2021). What greenium matters in the stock market? The role of greenhouse gas emissions and environmental disclosures. *Journal of Financial Stability*, 54, 100869. <https://doi.org/10.1016/j.jfs.2021.100869>

Alves, R., Krüger, P., & van Dijk, M. (2025). Drawing up the bill: Are ESG ratings related to stock returns around the world? *Journal of Corporate Finance*, 93, 102768. <https://doi.org/10.1016/j.jcorpfin.2025.102768>

Andreu, L., de Mingo-López, D. V., Matallín-Sáez, J. C., & Sarto, J. L. (2026). Media attention to climate change and investor flows in US equity mutual funds. *Business Strategy and the Environment*, 35(5), 6555–6576. <https://doi.org/10.1002/bse.70458>

- Azevedo, V., Kaserer, C., & Campos, L. M. S. (2021). Investor sentiment and the time-varying sustainability premium. *Journal of Asset Management*, 22(7), 600–621. <https://doi.org/10.1057/s41260-021-00233-1>
- Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *Quarterly Journal of Economics*, 131(4), 1593–1636. <https://doi.org/10.1093/qje/qjw024>
- Bhargava, R., Lou, X., Ozik, G., Sadka, R., & Whitmore, T. (2023). Quantifying narratives and their impact on financial markets. *Journal of Portfolio Management*, 49(5), 82–95. <https://doi.org/10.3905/jpm.2023.1.472>
- Bolton, P., & Kacperczyk, M. T. (2021). Do investors care about carbon risk? *Journal of Financial Economics*, 142(2), 517–549. <https://doi.org/10.1016/j.jfineco.2021.05.008>
- Bua, G., Kapp, D., Ramella, F., & Rognone, L. (2024). Transition versus physical climate risk pricing in European financial markets: A text-based approach. *European Journal of Finance*, 30(17), 2076–2110. <https://doi.org/10.1080/1351847X.2024.2355103>
- Caldara, D., & Iacoviello, M. (2022). Measuring geopolitical risk. *American Economic Review*, 112(4), 1194–1225. <https://doi.org/10.1257/aer.20191823>
- Cesarone, F., Martino, M. L., Ricca, F., & Scozzari, A. (2024). Managing ESG ratings disagreement in sustainable portfolio selection. *Computers & Operations Research*, 170, 106766. <https://doi.org/10.1016/j.cor.2024.106766>
- Chen, T. (2017). Investor attention and global stock returns. *Journal of Behavioral Finance*, 18(3), 358–372. <https://doi.org/10.1080/15427560.2017.1331235>
- Choi, S., & Choi, W. Y. (2019). Effects of limited attention on investors' trading behavior. *Pacific-Basin Finance Journal*, 56, 273–289. <https://doi.org/10.1016/j.pacfin.2019.06.007>
- Ciciretti, R., Dalò, A., & Dam, L. (2023). The contributions of betas versus characteristics to the ESG premium. *Journal of Empirical Finance*, 71, 104–124. <https://doi.org/10.1016/j.jempfin.2023.01.004>
- Da, Z., Engelberg, J., & Gao, P. (2011). In search of attention. *Journal of Finance*, 66(5), 1461–1499. <https://doi.org/10.1111/j.1540-6261.2011.01679.x>
- Das, K. K., & Yaghoubi, M. (2025). Climate sentiment-induced stock liquidity. *International Journal of Managerial Finance*, 21(5), 1414–1436. <https://doi.org/10.1108/IJMF-04-2025-0187>
- Dierckx, T., Davis, J., & Schoutens, W. (2021). Quantifying news narratives to predict movements in market risk. In Y. Malevergne & D. Sornette (Eds.), *Data science for economics and finance* (pp. 265–285). Springer. https://doi.org/10.1007/978-3-030-66891-4_12
- Dong, Y., & Ni, C. (2014). Does limited attention constrain investors' acquisition of firm-specific information? *Journal of Business Finance & Accounting*, 41(9–10), 1361–1392. <https://doi.org/10.1111/jbfa.12098>
- Fahmy, H. (2025). Empty pledges and powerless conventions: How transition climate risks are disrupting financial markets? *International Review of Financial Analysis*, 105, 104384. <https://doi.org/10.1016/j.irfa.2025.104384>
- Ferro, A., Marazzina, D., & Stocco, D. (2025). Uncovering ESG ratings: The imbalance of aspirational and performance features. *Corporate Social Responsibility and Environmental Management*, 32(5), 5895–5917. <https://doi.org/10.1002/csr.70007>

- Gaies, B. (2025). Exploring the time-varying predictability of global financial instability over the last two decades: The influence of climate change news. *Journal of Economic Studies*, 52(5), 904–918. <https://doi.org/10.1108/JES-01-2024-0031>
- Gao, Y., Wang, Y., Wang, C., & Liu, C. (2018). Internet attention and information asymmetry: Evidence from Qihoo 360 search data on the Chinese stock market. *Physica A: Statistical Mechanics and Its Applications*, 510, 802–811. <https://doi.org/10.1016/j.physa.2018.07.016>
- Guastella, G., Mazzarano, M., Pareglio, S., & Xepapadeas, A. (2022). Climate reputation risk and abnormal returns. *International Review of Financial Analysis*, 84, 102365. <https://doi.org/10.1016/j.irfa.2022.102365>
- Li, Y., & Zhou, B. (2026). Research on the impact of extreme climate on financial asset price: Based on the DSGE model. *International Review of Economics & Finance*, 105, 104817. <https://doi.org/10.1016/j.iref.2025.104817>
- López-Cabarcos, M. Á., Pérez-Pico, A. M., & López-Pérez, M. L. (2019). Does social network sentiment influence S&P 500 environmental & socially responsible index? *Sustainability*, 11(2), 320. <https://doi.org/10.3390/su11020320>
- Mangee, N. (2021). *How novelty and narratives drive the stock market*. Cambridge University Press.
- Naughton, J. P., Wang, C., & Yeung, I. (2019). Investor sentiment for corporate social performance. *Accounting Review*, 94(4), 401–420. <https://doi.org/10.2308/accr-52303>
- Ongan, S., Göçer, İ., & Işık, C. (2025). Introducing the new ESG-based sustainability uncertainty index (ESGUI). *Sustainable Development*, 33(3), 4457–4467. <https://doi.org/10.1002/sd.3351>
- Pástor, L., Stambaugh, R. F., & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics*, 142(2), 550–571. <https://doi.org/10.1016/j.jfineco.2020.12.011>
- Salisu, A. A., Ndako, U. B., & Vo, X. V. (2023). Transition and physical climate risk. *Resources Policy*, 81, 103383. <https://doi.org/10.1016/j.resourpol.2023.103383>
- Serafeim, G. (2020). Public sentiment and the price of corporate sustainability. *Financial Analysts Journal*, 76(2), 26–46. <https://doi.org/10.1080/0015198X.2020.1723390>
- Tetlock, P. C. (2007). Giving content to investor sentiment: The role of media in the stock market. *Journal of Finance*, 62(3), 1139–1168. <https://doi.org/10.1111/j.1540-6261.2007.01232.x>
- Vu, T. N., Lehkonen, H., Junttila, J. P., & Lucey, B. (2025). ESG investment performance and global attention. *North American Journal of Economics and Finance*, 75, 102287. <https://doi.org/10.1016/j.najef.2024.102287>
- Wołczek, P. (2025). Using ML to analyze ESG ratings to support the investors' decision-making process. *Procedia Computer Science*, 270, 5037–5046. <https://doi.org/10.1016/j.procs.2025.09.630>
- Xu, X., Chen, Y., Zhao, J., & Wang, J. (2022). The effect of ESG news on the Chinese stock market. *Journal of Global Information Management*, 30(1), 1–21. <https://doi.org/10.4018/JGIM.313916>
- Yousaf, I., Bejaoui, A., Ali, S., & Li, Y. (2024). Demystifying the dynamic relationship between news sentiment index and ESG stocks: Evidence from time-frequency

wavelet analysis. *International Review of Financial Analysis*, 96, 103698. <https://doi.org/10.1016/j.irfa.2024.103698>

Zhou, M., & Ma, Y. (2025). Physical vs. transition climate risks: Asymmetric effects on stock return predictability. *International Review of Financial Analysis*, 104, 104266. <https://doi.org/10.1016/j.irfa.2025.104266>

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