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Climate change news risk and advertising spending

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ABSTRACT

We examine the effect of climate change news risk on corporate advertising spending. Using a novel measure of media-driven climate risk matched to firm-level advertising data, we find a robust negative relationship between climate news risk and advertising spending. Mechanism tests show that financial constraints mediate this relationship. The effect is stronger for firms with low stock market liquidity and high cash-flow volatility. We also find that domestic firms reduce their advertising spending relative to their multinational counterparts, which aligns with the idea that international operations provide diversification and stronger cash flow benefits that enhance firms' resilience to the effects of domestic climate risk shocks. The results remain consistent across different advertising measures, and after correcting for selection bias with a Heckman two-step method. We address endogeneity concerns through instrumental variable estimation. Our findings support the risk management hypothesis that firms proactively adjust their financial policies to mitigate the negative effects of rising climate risk exposure.

1. Introduction

A growing body of research highlights the significant influence of climate risk on corporate decision-making and broader economic outcomes.¹ Within this area, studies show that climate risk impacts various corporate investment decisions, including working capital (Ahmad et al., 2023), capital expenditure (Agoraki et al., 2024; Rao et al., 2022), trade credit (Liu et al., 2025), and human capital investments (Cao et al., 2024). Despite this extensive evidence, little attention has been paid to the impact of climate risk on corporate advertising spending. This study addresses this gap by asking whether firms adjust their advertising expenditure in response to rising climate risk.

We answer this important question by estimating the impact of climate change news risk² (thereafter, Climate risk) on advertising spending. This investigation is crucial for several reasons. First, advertising is a strategic investment in building brand capital,

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¹ This includes sales, labour productivity, capital structure, mergers and acquisitions, supply chain relationships, dividend payout, cash holdings, and corporate investment decisions (see: Addoum et al., 2023; Agoraki et al., 2024; Bose et al., 2021; Chang et al., 2024; Nguyen and Phan, 2020; Rao et al., 2022).

² We use the Climate Change Concern Index, a media-based proxy for climate change news risk. The News-based measures have been employed in several influential studies on climate finance. (see Ardia et al., 2023; Benkraiem et al., 2025; Huynh and Xia, 2021; Ma et al., 2024).

corporate reputation, and firm value³. Second, advertising spending influences competitive dynamics and interactions among firms within the product and capital markets (Chemmanur and Yan, 2009; Le et al., 2023; Liang, 2024; Telser, 1964). Third, advertising is discretionary and within managers' control, allowing them to adjust the advertising budget (Erickson and Jacobson, 1992; Mayer, 2021). Therefore, understanding whether and how managers adjust corporate advertising spending in response to rising climate risk is crucial.

Our empirical investigation is grounded in the risk management theory (Godfrey et al., 2009), which predicts that managers implement precautionary risk management strategies to mitigate the negative effects of climate risk on the firm. The salience of climate risk signals a higher likelihood of stricter regulations and increased public awareness, which may result in higher environmental litigation and abatement costs (Ardia et al., 2023; Bolton and Kacperczyk, 2023; Starks, 2023). It also heightens the risk of financial distress (Chang et al., 2024; Feng et al., 2024). Therefore, we hypothesize that firms reduce their advertising spending as a precautionary risk management strategy.

We empirically test this hypothesis by selecting our sample from the U.S. market for several reasons. First, the discussion of climate change risk receives extensive media attention in the U.S. because it is a major source of partisan divide. This indicates that media-driven climate risk measures from the U.S. market serve as a reasonable and reliable proxy for climate news risk. Second, advertising expenditures by U.S. firms are substantial and readily accessible in the Compustat database, allowing us to calculate various measures of advertising spending. Additionally, some U.S. firms have international operations, which we proxy for using evidence of international sales or foreign tax payments, allowing us to examine how climate risk differently impacts advertising spending among firms depending on their level of international business exposure.

We analyze a dataset of 20,606 firm-year observations from 2,869 unique U.S.-listed and headquartered firms, covering the period from 2003 to 2023. We measure advertising expenditure using the approach of Fich et al. (2024) and Chemmanur and Yan (2009) and use the Media Climate Change Concern Index (MCCC) by Ardia et al. (2023) as a proxy for climate change news risk. Additionally, we apply firm-fixed effect and include one year lagged independent and control variables in our regression to preclude reverse causality. Consistent with the risk management hypothesis, we find evidence of a negative relationship between climate risk and corporate advertising spending.

We reinforce our findings with several robustness checks. First, we account for two crisis periods: the 2007–2008 financial crisis and the 2020 COVID-19 pandemic, to ensure these events do not bias our estimates, as they may cause firms to reduce their advertising spending. Second, we re-estimate the baseline model using the natural logarithm of unscaled advertising expenditure, advertising expenditure scaled by total assets, and excess advertising spending. Third, we employ the Heckman correction technique and two-stage least squares (2SLS) instrumental-variable regression to address potential endogeneity arising from selection bias, omitted variables, and reverse causality. We extend the 2SLS analysis by conducting two placebo tests to strengthen the validity of our instrument and overall conclusions. After addressing these plausible concerns, our results remain consistent with the baseline findings, supporting the idea that managers reduce advertising spending under high climate change risk.

Next, we demonstrate increased financial constraints as a key economic mechanism driving our result. We then conduct cross-sectional tests to identify firm-level characteristics where our results are most significant. Our analysis indicates a stronger effect in firms with low stock market liquidity, consistent with the well-established relationship between stock liquidity and corporate investment decisions (Amihud and Levi, 2023). Additionally, we evaluate the impact of a firm's international business operations, evidenced by foreign sales or foreign tax payments. Our findings show that firms without international operations (local firms) significantly reduce their advertising spending compared to those with international operations (multinationals). This result highlights the influence of international operational diversification in enhancing financial flexibility and improving the firm's resilience to rising local climate change risks, aligning with prior literature on multinationality (Gu, 2017; Kim et al., 2021).

Next, we examine whether firms' ex-ante liquidity constraints can serve as a precautionary motive to reduce advertising spending when facing high climate risk. We find that the negative effect of climate risk on advertising spending is stronger for firms with limited ex-ante corporate liquidity. This finding indicates that liquidity-constrained firms are more likely to reduce advertising as an internal response to increased climate risk, consistent with the literature on corporate cash holdings behavior (Fernandes and Papadimitriou, 2025; Javadi et al., 2023).

This study contributes to the literature on the economic consequences of climate risk. Prior research links climate risk to various corporate policies, including capital structure (Ginglinger and Moreau, 2023; Nguyen and Phan, 2020), dividend policy (Balachandran and Nguyen, 2018; Zhu and Hou, 2022), acquisitions (Bose et al., 2021), and cash holdings (Fernandes and Papadimitriou, 2025; Javadi et al., 2023). It also influences credit line usage (Brown et al., 2021), executive compensation (Hossain et al., 2023), debt structure (Jiang et al., 2025), credit spreads (He et al., 2025), cost of equity (Cepni et al., 2024), and financing choices (Ren et al., 2025). Recent studies highlight its effects on corporate investment efficiency (Agoraki et al., 2024), working capital (Ahmad et al., 2023), realized stock and commodities market volatility (Bonato et al., 2023a,b; Karmakar et al., 2023), human capital investments (Cao et al., 2024), bank lending behaviour (Aslan et al., 2022), economic policy uncertainty (Sheng et al., 2022a), and overall economic activity (Sheng et al., 2022b). Our study expands the existing literature by demonstrating how firms adjust their advertising spending in response to heightened climate risk.

Second, this study contributes to the broader media and finance literature, which shows that media coverage influences asset pricing and corporate decisions (Baloria et al., 2025; Bushee et al., 2010; Engelberg and Parsons, 2011; Fang and Peress, 2009; Fang

³ (See: Bar and Haviv, 2023; Buil et al., 2013; Larkin, 2013; Nejadmalayeri et al., 2013; Song and Xian, 2024; Belo et al., 2014; Fee et al., 2009; Grullon et al., 2004; White and Miles, 1996).

et al., 2014; Hossain and Javakhadze, 2020; Liu and McConnell, 2013; Peress, 2014). Another strand of literature in this direction indicates that the media acts as an effective external corporate monitor (An et al., 2020; Dyck and Zingales, 2002; Heese et al., 2022; Kuhnen and Niessen, 2012; Liu and McConnell, 2013; Miller, 2006; Qi et al., 2014). Recent findings document the effect of media-based climate risk on firms. For example, Huynh and Xia (2021) and Benkraiem et al. (2025) examine the impact of media-based climate risk on the corporate bond market. Ardia et al. (2023) show that green firms outperform brown firms when concerns about climate change increase unexpectedly. Faccini et al. (2023) investigate whether stock returns reflect climate news risks. Ma et al. (2024) analyze how climate news risk affects the financial market. We extend this emerging literature by demonstrating that media-driven climate risk also influences firms' advertising spending.

Finally, our findings contribute to the literature on precautionary responses to climate risk. Prior studies show that firms may respond to climate risk by increasing their cash holdings (Fernandes and Papadimitriou, 2025; Javadi et al., 2023). Our findings complement this literature by demonstrating that ex-ante financial flexibility affects firms' advertising spending behavior under rising climate risk exposure. These findings highlight an internal adjustment margin that complements the precautionary cash-holding motive in response to climate risk exposure (Fernandes and Papadimitriou, 2025; Gounopoulos and Zhang, 2024; Javadi et al., 2023). Additionally, our study contributes to the literature on the drivers of advertising investment (Cui et al., 2023; Fee et al., 2012), by demonstrating that climate risk is a key factor in firms' decisions regarding advertising spending.

The rest of this paper follows this structure: Section two develops the theoretical framework and hypotheses, Section three introduces the data and explains the empirical strategy, Section four presents the results and discussion, and Section five concludes the study.

2. Theoretical framework and hypothesis development

2.1. Climate risk and advertising spending

We draw on the Risk management theory (RMH) to explain the link between climate risk and advertising spending. RMH posits that firms reduce discretionary expenditures to mitigate downside risk and preserve operational flexibility (Godfrey et al., 2009). Advertising, while valuable for corporate reputation and product market competition, is a discretionary expenditure within managerial control (Erickson and Jacobson, 1992; Mayer, 2021).

High climate risk draws the attention of institutional investors and regulators on how corporate operations affect the environment and society (Gantchev et al., 2022; Hartzmark and Sussman, 2019; Krueger et al., 2020). Firms may respond to operational disruption by implementing precautionary strategies to hedge associated risks (Fernandes and Papadimitriou, 2025; Matsumura et al., 2024). The literature further documents several corporate responses to climate change risk, including increasing cash buffers (Fernandes and Papadimitriou, 2025; Gounopoulos and Zhang, 2024; Javadi et al., 2023), adjusting capital structure (Ginglinger and Moreau, 2023), and modifying business plans and realignment of business models (Huang et al., 2022).

Additionally, climate risk increases financing costs and credit risk (Berkman et al., 2024; Capasso et al., 2020; Matsumura et al., 2024), which may lead firms to reduce discretionary spending. Building on this idea, we argue that firms respond to climate risk by reducing advertising spending as a precautionary measure, consistent with risk management theory. We propose the following hypothesis:

H1: Ceteris paribus, firms reduce advertising spending in response to climate risk, consistent with precautionary risk management behavior.

Having established the theoretical and empirical link between climate risk and advertising spending, we next explore the financial constraint as a plausible economic channel for the link.

2.2. Economic channel linking climate risk to advertising

2.2.1. Financial constraint channel

Climate risk increases firms' cost of capital and exacerbates financing frictions, thereby weakening their ability to access external funding (Bartram et al., 2022; Jiang et al., 2025). Investors increasingly demand risk premiums for firms with higher climate risk exposure, reflecting expectations of future regulatory cost, stranded asset risks, and earnings volatility (Bolton and Kacperczyk, 2023; Fard et al., 2020; Javadi and Masum, 2021). At the same time, exposure to climate risk elevates reputational and litigation threats (Karpoff et al., 2005; Ozkan et al., 2022), further constraining capital availability.

These constraints limit managerial flexibility, causing firms to adopt more conservative financial policies. Consistent with RMT, managers may respond by reducing discretionary spending to maintain corporate liquidity, thus reducing the impact of climate-related shocks. This precautionary behavior is likely to be stronger among financially constrained firms, for which external capital is more expensive or harder to access. We argue that climate risk increases financial constraints leading to firms significantly cutting advertising spending as a precautionary risk management response. We propose as follows:

H2: Ceteris paribus, financial constraint mediates the negative relationship between climate risk and corporate advertising spending.

After developing our main and sub-hypotheses linking climate risk and advertising spending, we compile several datasets and construct variables to test the hypotheses in the next section.

3. Data, variable description, summary statistics, and empirical strategy

3.1. Data and sample

We draw our sample from U.S.-listed firms with accounting data in CRSP databases from 2003 to 2023. The proxy for climate news risk is the Media Climate Change Concern dataset by [Ardia et al. \(2023\)](#), with data available from 2003 onward. Hence, we begin our data collection from this year. Following the literature, our empirical analysis considers observations with available data (non-missing values) on advertising expenditure ([Chemmanur and Yan, 2009, 2017](#); [Grullon et al., 2004](#); [Jiang et al., 2024](#)). We exclude financial firms (SIC 6000–6999) and utility firms (SIC 4900–4999) due to the distinct regulatory standards applicable to these industries. We also exclude firms with a negative book value of equity to avoid issues related to distress risk. We further restrict our sample to firms with non-missing total assets and key control variables data. We winsorize all continuous variables at the 1st and 99th percentiles to exclude the effect of outliers. After filtering, our sample comprises 2,869 U.S.-listed and headquartered firms with 20,606 firm-year observations from 2003 to 2023.

3.2. Key variable definition and measurement

3.2.1. Advertising spending

We follow a well-established stream of literature in finance and accounting, using disclosed and audited advertising expenditure scaled by sales as a reasonable proxy for advertising spending ([Chemmanur and Yan, 2009](#); [Chemmanur and Yan, 2019](#); [Fich et al., 2024](#); [Jiang et al., 2024](#); [Le et al., 2023](#)). We also employ the natural logarithm of the dollar value of advertising expenditure (*ADV2*) and the dollar value of advertising expenditure scaled by total assets (*ADV3*) as alternative measures of advertising spending.

We adopt advertising expenditures disclosed in firms' accounting statements rather than estimates provided by commercial advertising providers, as these estimates are unaudited. The disclosed advertising expenditures, as reported in the Compustat database, provide firm-reported, GAAP-compliant data in firms' financial statements, which are subject to auditing standards, enabling investors to verify the information they obtain from different sources ([Le et al., 2023](#); [Liang, 2024](#)). The choice of disclosed advertising spending ensures internal consistency with other financial variables we employ in our empirical analysis, further enhancing empirical reliability and consistency. Finally, Compustat's disclosed advertising measure is widely used in the finance literature ([Chemmanur and Yan, 2009](#); [Fee et al., 2009](#); [Fich et al., 2024](#); [Grullon et al., 2004](#)) and is accessible via WRDS, thereby promoting transparency, replicability, and comparability with existing studies.

In extended robustness checks, we employ additional measures of advertising expenditure by considering excess advertising spending as the firm's annual deviation from the industry median (*ADV4*) and mean (*ADV5*), based on its Fama & French 12-industry classification. These measures help us evaluate how a firm's advertising spending aligns with typical industry spending. The use of industry median and mean advertising expenditures as benchmarks is grounded in the existing literature which demonstrates a connection between advertising and product market competition ([Cui et al., 2023](#); [Le et al., 2023](#); [Telser, 1964](#)). Firms tend to optimize their advertising spending to stay competitive ([Cui et al., 2023](#); [White and Miles, 1996](#)). However, beyond an optimal level, advertising returns usually decrease ([Erickson and Jacobson, 1992](#); [Telser, 1964](#); [White and Miles, 1996](#)). This evidence further supports the use of industry median and average industry advertising as alternative proxies for advertising spending.

3.2.2. Climate change news risk

Transition and physical climate risk represent two distinct but interconnected dimensions of climate risk. Transition risk arises from the economic, regulatory, and technological shifts associated with the transition towards a low-carbon economy ([Stroebel and Wurgler, 2021](#)). Firms may face higher costs or reduced demand due to carbon pricing, emissions regulations, or shifting investor and consumer preferences ([Bolton and Kacperczyk, 2023](#); [Campiglio et al., 2023](#)). In contrast, physical climate risk stems from the direct environmental impacts of climate change, such as extreme weather events (e.g., floods, hurricanes, wildfires) and long-term shifts in climate patterns (e.g., rising sea levels, chronic drought) ([Alok et al., 2020](#); [Baldauf et al., 2020](#)). While transition risk primarily affects firms through policy and market channels, physical risk disrupts operations and damages physical assets ([Bolton and Kacperczyk, 2021](#); [Venturini, 2022](#)).

The role of media in disseminating information, and shaping financial markets is well-established in the literature ([Ben-Rephael et al., 2017](#); [Ben-Rephael et al., 2021](#); [Bushee et al., 2010](#); [Gao et al., 2020](#); [Peress, 2014](#); [Tetlock, 2014](#)). The media also play a significant role as an instrument for raising public consciousness about environmental concerns ([Boykoff and Boykoff, 2007](#); [Carmichael and Brulle, 2018](#); [El Ouadghiri et al., 2021](#); [Hase et al., 2021](#); [Schmidt et al., 2013](#)). Since media coverage of climate news influences investors' sentiment ([Engle et al., 2020](#)), it can raise the attention of both investors and the public to climate risk ([Ben-Rephael et al., 2017](#); [Faccini et al., 2023](#); [Schmidt et al., 2013](#)).

We use the Climate Change Media Concern (MCCC) index⁴ by [Ardia et al. \(2023\)](#) as a reasonable proxy for climate news risk following prior empirical literature ([Ardia et al., 2023](#); [Benkraiem et al., 2025](#); [Huynh and Xia, 2021](#); [Ma et al., 2024](#)). The MCCC Index is an innovative measure of climate change news risk, constructed using textual analysis of climate change coverage in ten major American newspapers and two prominent newswires. The dataset includes four thematic categories that indicate transition and

⁴ See [Ardia et al., 2023](#) for detailed construction

physical risk dimensions. Specifically, the Business Impact and Societal Debate categories serve as proxies for transition risks, while the Environmental Impact category reflects physical risks; additionally, the Research category integrates elements of both risk types. (Ardia et al., 2023; Benkraiem et al., 2025).

3.2.3. Control variables

Following the literature on climate risk and advertising, we include firm-level control variables in our regression model (Azar et al., 2021; Grullon et al., 2006; Jiang et al., 2024). Firm size (Size) is the natural logarithm of the total assets. Larger firms attract more media attention, and they generate higher operational pollution. We also include leverage (Lev) as the sum of long-term and current debts over total assets, which controls for credit constraints. We incorporate Return on Assets (RoA) as the ratio of income before depreciation and amortization to total assets. Previous studies indicate that firms facing high climate exposure hold more cash (Javadi et al., 2023); therefore, we control for cash holdings (Cash), which is the ratio of cash and cash equivalents to total assets. To account for a firm's investment, we include capital expenditure (CapEx), which is the ratio of capital expenditure to the total book value of assets.

We also control for asset tangibility (Tang), which is the ratio of property, plant, and equipment to total assets. The literature indicates that firms with more tangible assets have better access to capital to fund investment opportunities due to the tangible nature of their collateral (Almeida and Campello, 2007). To reduce the impact of outliers, we winsorize all continuous control variables at the 1st and 99th percentiles and cluster standard errors at the firm level. The literature also shows that acquisitions influence advertising spending (Fee et al., 2012). We further control for acquisition cost, as the ratio of the dollar amount spent on acquisition to total assets (ACQ). We include sales volatility (SalesVol), which is the five-year standard deviation of a firm's sales, to ensure our estimates reflect discretionary spending behavior. Additionally, we control for industry sales growth (IndSaleGrt) to account for industry-specific

Table 1a

Summary statistics This table presents the descriptive statistics of the main variables of interest, excluding those with missing advertising values, and key variables in the baseline regression for the period 2003–2022. We report the corresponding number of observations (Obs), Mean, Standard Deviation (S.D.), minimum(min), 25th percentile (p25), median (p50), 75th percentile (p75), and maximum (max) values. We define all these variables in Table A1 in the Appendix. All continuous variables are winsorized at the 1st and 99th percentiles and described in the Appendix.

	Obs	Mean	SD	Min	p25	Median	p75	Max
Dependent								
ADV \$bn	20,606	0.099	0.325	0.000	0.001	0.006	0.043	2.500
ADV1	20,606	0.030	0.050	0.000	0.004	0.012	0.034	0.349
ADV2	20,490	1.876	2.616	-4.269	0.000	1.887	3.768	7.824
ADV3	20,606	0.029	0.048	0.000	0.003	0.011	0.032	0.303
ADV_DEV1	20,606	-0.003	0.049	-0.072	-0.027	-0.017	0.002	0.321
ADV_DEV2	20,606	0.016	0.049	-0.030	-0.007	-0.001	0.019	0.341
Independent								
MCCC	20,606	1.163	0.468	0.499	0.815	1.172	1.452	2.189
MCCC_EI	20,606	1.028	0.368	0.493	0.704	1.070	1.250	1.799
MCCC_BI	20,606	1.161	0.504	0.479	0.805	1.060	1.401	2.318
MCCC_SD	20,606	1.111	0.498	0.393	0.728	1.031	1.492	2.095
MCCC_RE	20,606	0.982	0.304	0.459	0.779	0.971	1.175	1.605
Firm-level control								
Size	20,606	6.370	2.052	2.067	4.892	6.358	7.728	11.643
Lev	20,606	0.207	0.198	0.000	0.013	0.170	0.339	0.752
Cash	20,606	0.210	0.202	0.001	0.050	0.143	0.313	0.858
CapEx	20,606	0.041	0.041	0.001	0.014	0.027	0.051	0.223
RoA	20,606	0.080	0.165	-0.726	0.043	0.105	0.162	0.403
Tang	20,606	0.212	0.200	0.005	0.064	0.141	0.296	0.832
ACQ	20,606	0.027	0.065	-0.004	0.000	0.000	0.017	0.365
SalesVol	20,588	4.282	2.003	-0.512	2.896	4.305	5.679	8.993
IndSalesGrt	20,606	0.054	0.065	-0.147	0.024	0.059	0.086	0.230
Other variables								
SA_Index	20,606	-3.086	0.536	-3.957	-3.465	-3.184	-2.782	-1.513
CFL_Vol	20,606	0.060	0.078	0.003	0.016	0.032	0.070	0.465
Amihud_Illiq	18,581	0.316	0.832	0.000	0.007	0.035	0.178	5.478
IO	20,606	0.585	0.355	0.000	0.258	0.685	0.912	1.000
Macro-variables								
SGdpGrt	20,606	0.022	0.024	-0.053	0.011	0.023	0.038	0.075
SEPU	20,606	92.697	72.992	25.167	52.333	73.083	102.833	446.500
WTI	20,606	67.386	21.747	31.075	48.657	66.055	93.172	99.672
PCI	20,606	124,712	33.415	81.168	89.199	130.828	144.958	209.103
lnTemp	20,606	3.984	0.017	3.934	3.976	3.987	3.998	4.007

factors that may influence advertising spending.

We also include a measure of input cost shock using the natural logarithm of West Texas Intermediate Crude oil prices (WTI), given that energy is a significant cost input for most firms, which may influence discretionary spending on advertising. We control for state-level variables to account for macroeconomic changes that can affect advertising spending, primarily the State-Level Gross Domestic Product growth rate (SGdpGrt) and Economic Policy Uncertainty (SEPU).

3.3. Summary statistics

Table 1 (Panel 1a) reports the summary statistics for variables used in our empirical analysis, as fully described in Appendix 1A. We represent some of the characteristics of key variables employed in the study as follows. There are 20,606 firm-year observations, comprising 2854 unique U.S. firms identified by GVKEY within the CRSP database from 2003 to 2023, covering the period when the MCCC Data begins.

The average MCCC index is 1.163, with a standard deviation of 0.468. Regarding firm-level control variables, a typical firm in the sample has an average book value of assets of \$6.37 billion and a standard deviation of \$2.05 billion, indicating significant variation in the size of firms in our sample.

An average firm in our sample borrows 21 % of its total assets, with a standard deviation of 19.8 %. On average, firms hold 21 % of their assets in cash and cash equivalents, with a standard deviation of 2 %. The typical capital expenditure is 4.1 %, with a standard deviation of 4.1 %. The average firm reports an 8.0 % profitability, with a standard deviation of 16.5 %. The average tangibility of firm assets is approximately 21.2 % of total assets, with a standard deviation of 20 %, showing variation across firms. Additionally, an average firm spent 2.7 % of its total assets on acquisitions and has an average year-on-year industry sales growth of 5.4 %. Table 1b provides the correlation matrix, while Appendix A2 shows the sample distribution based on the Fama-French 12 industry classification.

3.4. Empirical methodology and identification strategy

3.4.1. Empirical methodology

We estimate advertising spending as a function of the climate risk and a set of control variables. Our regression model is similar to those of Peng et al. (2023) and D'Mello and Toscano (2020), using ordinary least squares (OLS) regression with firm fixed effects. To align temporal ordering and avoid post-treatment bias, we use one-year lagged values of both the climate-news risk (MCCC) and all firm-level controls in our regression. Our approach ensures that all explanatory variables are measured prior to the observed advertising behavior, thereby strengthening the causal interpretation of our results. We conduct a variance inflation factor to ensure our model does not suffer from multicollinearity. The result, as shown in Table 1, panel c, has a mean VIF of approximately 2.1, which is far below the threshold of 10 where multicollinearity could be a source of concern.

We estimate the OLS regression model specification (1) as follows.

$$ADV_{it} = \alpha_i + \beta \cdot MCCC_{t-1} + \gamma \cdot \mathbf{X}_{it-1} + \delta_i + \varepsilon_{it} \quad (1)$$

The subscripts i and t represent the firm and time (years). ADV_{it} is the key dependent variable, defined as either advertising expenditure scaled by total revenue (ADV1) or the natural logarithm of the dollar value of advertising expenditure (ADV2), following the literature. (Chemmanur and Yan, 2009; Fich et al., 2024; Jiang et al., 2024). The dependent variable, $MCCC_t$, is a media-based measure of climate risk. $\mathbf{X}_{it-1}$ is a vector of firm-level (Size, Lev, Cash, CapEx, RoA, Tang, ACQ, SaleVol, and IndSaleGrt) and macro-level control variables (WTI, SGdpGrt and SEPU). δ_i represents the firm-fixed effect, where ε_{it} is the error term.

4. Results

4.1. Climate news risk and advertising spending

We test the H1 hypothesis by examining whether climate risk influences advertising spending. We measure this effect using the regression specification shown in Eq. (1). Table 2, columns (1) to (3), presents the results of the regression analysis. In column (1), we display the regression results without controls, while column (2) includes firm-level control variables that predict advertising. Additionally, column (3) further incorporates macroeconomic control variables (WTI, SGdpGrt and SEPU). We cluster all standard errors at the firm level, and the regressions include firm fixed effects to account for unobserved heterogeneity across firms, following the approach of Peng et al. (2023).

As shown in Table 2, the regression coefficient for the key independent variable ($MCCC_{t-1}$) is negative and statistically significant across all regression specifications, supporting H1, which examines the impact of climate risk on advertising spending. For example, in column (3), the coefficient is significant at the 1 % level ($\beta = -0.0021$; t-stat = 2.41). Quantitatively, a one standard deviation increase in climate news risk corresponds to approximately a 2.0 % decline in advertising spending, calculated as $((0.0021 \cdot 0.468) / 0.05) \cdot 100$. These results support the hypothesis H1.

4.2. Robustness test

We next perform several robustness checks to validate our main findings by accounting for crisis periods, using alternative

Table 1b

Correlation analysis.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
(1) ADV \$bn	1.00																						
(2) ADV1	0.21*	1.00																					
	(0.00)																						
(3) ADV2	0.54*	0.36*	1.00																				
	(0.00)	(0.00)																					
(4) ADV3	0.16*	0.76*	0.39*	1.00																			
	(0.00)	(0.00)	(0.00)																				
(5) MCCC	0.07*	0.05*	0.13*	−0.02	1.00																		
	(0.00)	(0.00)	(0.00)	(0.02)																			
(6) Size	0.51*	−0.01	0.80*	−0.05*	0.19*	1.00																	
	(0.00)	(0.12)	(0.00)	(0.00)	(0.00)																		
(7) Lev	0.12*	−0.03*	0.29*	−0.08*	0.20*	0.39*	1.00																
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)																	
(8) Cash	−0.10*	0.16*	−0.23*	0.05*	−0.01	−0.28*	−0.41*	1.00															
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.07)	(0.00)																
(9) CapEx	0.01	−0.04*	0.11*	0.08*	−0.10*	0.06*	0.02*	−0.18*	1.00														
	(0.27)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)															
(10) RoA	0.13*	−0.19*	0.32*	0.01	−0.10*	0.37*	0.05*	−0.33*	0.21*	1.00													
	(0.00)	(0.00)	(0.00)	(0.41)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)														
(11) Tang	0.05*	−0.08*	0.16*	0.00	0.00	0.16*	0.28*	−0.37*	0.64*	0.21*	1.00												
	(0.00)	(0.00)	(0.00)	(0.68)	(0.61)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)													
(12) ACQ	−0.02*	−0.03*	0.03*	−0.06*	0.02	0.08*	0.12*	−0.12*	−0.11*	0.04*	−0.13*	1.00											
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)												
(13) SalesVol	0.45*	−0.03*	0.75*	0.01	0.15*	0.90*	0.32*	−0.28*	0.09*	0.38*	0.13*	0.07*	1.00										
	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)											
(14) IndSaleGrt	−0.01	0.02	−0.03*	0.00	0.03*	−0.03*	−0.03*	0.08*	0.00	−0.02*	−0.04*	0.04*	−0.03*	1.00									
	(0.09)	(0.02)	(0.00)	(0.64)	(0.00)	(0.00)	(0.00)	(0.00)	(0.64)	(0.01)	(0.00)	(0.00)	(0.00)										
(15) SA_Index	−0.27*	0.06*	−0.67*	0.05*	−0.33*	−0.86*	−0.33*	0.28*	−0.05*	−0.43*	−0.17*	−0.09*	−0.78*	0.06*	1.00								
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)									
(16) CFL_Vol	−0.12*	0.16*	−0.28*	0.10*	0.00	−0.40*	−0.15*	0.36*	−0.09*	−0.46*	−0.19*	−0.05*	−0.31*	0.05*	0.43*	1.00							
	(0.00)	(0.00)	(0.00)	(0.00)	(0.67)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)								
(17) Amihud_Illiq	−0.11*	−0.01	−0.41*	−0.02	−0.08*	−0.50*	−0.03*	−0.02	−0.11*	−0.33*	−0.04*	−0.09*	−0.44*	−0.03*	0.58*	0.26*	1.00						
	(0.00)	(0.15)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)							
(18) IO	0.07*	−0.06*	0.36*	−0.03*	−0.10*	0.46*	0.05*	−0.05*	0.07*	0.30*	0.01	0.09*	0.44*	−0.07*	−0.51*	−0.25*	−0.49*	1.00					
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
(19) SGdpGrt	−0.01	0.02*	0.00	0.01	0.03*	−0.02*	−0.03*	0.05*	0.04*	−0.02	−0.03*	0.03*	−0.02*	0.49*	0.03*	0.03*	−0.08*	−0.02*	1.00				
	(0.41)	(0.01)	(0.70)	(0.13)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)				
(20) SEPU	0.04*	0.05*	0.05*	0.00	0.31*	0.07*	0.09*	0.10*	−0.11*	−0.10*	−0.03*	−0.02*	0.04*	−0.08*	−0.12*	0.05*	0.02*	−0.02*	−0.32*	1.00			
	(0.00)	(0.00)	(0.00)	(0.72)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)				
(21) WTI	0.01	−0.01	0.01	0.00	0.14*	0.04*	−0.01	−0.02*	0.03*	0.02*	−0.01	0.02	0.08*	0.08*	−0.09*	−0.01	−0.03*	−0.07*	−0.05*	−0.13*	1.00		
	(0.47)	(0.07)	(0.06)	(0.61)	(0.00)	(0.00)	(0.10)	(0.00)	(0.00)	(0.00)	(0.32)	(0.02)	(0.00)	(0.00)	(0.00)	(0.07)	(0.00)	(0.00)	(0.00)	(0.00)			
(22) Temp	0.00	0.02*	0.00	0.01	0.07*	−0.02*	0.01	0.01	−0.01	−0.03*	−0.01	0.01	−0.03*	−0.02	0.05*	0.02	0.00	−0.05*	0.21*	−0.16*	−0.58*	1.00	
	(0.76)	(0.01)	(0.73)	(0.31)	(0.00)	(0.00)	(0.28)	(0.15)	(0.33)	(0.00)	(0.14)	(0.26)	(0.00)	(0.03)	(0.00)	(0.02)	(0.90)	(0.00)	(0.00)	(0.00)	(0.00)		
(23) LnSale	0.49*	−0.06*	0.82*	0.02*	0.13*	0.04*	0.34*	−0.36*	0.12*	0.48*	0.20*	0.06*	0.92*	−0.04*	−0.83*	−0.42*	−0.48*	0.47*	−0.02*	0.03*	0.04*	−0.02*	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

*p < 0.01

Table 1c
Variance inflation factor analysis.

Variable	VIF	1/VIF
<i>Size_{it-1}</i>	5.693	0.176
<i>SaleVol_{it-1}</i>	5.386	0.186
<i>Tang_{it-1}</i>	2.098	0.477
<i>CapEx_{it-1}</i>	1.830	0.547
<i>GdpGrt_{it-1}</i>	1.576	0.635
<i>Lev_{it-1}</i>	1.515	0.660
<i>Cash_{it-1}</i>	1.508	0.663
<i>SEPU_{it-1}</i>	1.383	0.723
<i>IndSalesGrt_{it-1}</i>	1.371	0.730
<i>RoA_{it-1}</i>	1.366	0.732
<i>MCCC_{c,t-1}</i>	1.280	0.781
<i>WTI_{it-1}</i>	1.111	0.900
<i>ACQ_{c,t-1}</i>	1.072	0.933
Mean VIF	2.091	

advertising measures, employing the heckman correction model, and 2SLS instrumental variable regressions.

4.2.1. Control for crisis period

We recognize that periods of crisis can disrupt economic activity and affect corporate advertising spending, which may bias our results. To address this concern, we control for two well-documented crisis periods in the literature: the 2007–2008 financial crisis (Duchin et al., 2010; Kahle and Stulz, 2013) and the COVID-19 crisis (Ataullah et al., 2022; Garel and Petit-Romec, 2021). By incorporating these crisis periods into our analysis, we aim to improve the robustness of our findings. We construct two dummy variables to capture the effects of these crisis periods. The first dummy variable, CRISIS_1, takes a value of 1 for 2007 and 2008,

Table 2

Climate change news risk and advertising spending: OLS regression. This table presents the results of the ordinary least squares regression based on the specifications below. $ADV_{it} = \alpha_i + \beta.MCCC_{t-1} + \gamma.X_{it-1} + \delta_i + \varepsilon_{it}$ (1) We index i and t as the firm and time (years). The dependent variable ADV_{it} is the dollar value of a firm's advertising expenditure scaled by sales ($ADV1$). The key independent variable is $MCCC_{t-1}$, which is the Media Climate Change Concern Index. X_{it-1} is a vector of firm-level controls (*Size*, *Lev*, *Cash*, *CapEx*, *RoA*, *Tang*, *ACQ*, *SaleVol*, *IndSalesGrt*) and macro-economic control variables (*WTI*, *SGdpGrt*, and *SEPU*). We list all variables in Appendix A1. δ_i represents the firm fixed effect, and ε_{it} represents the error term. We cluster standard errors at the firm level.

	Dep. Var = ADV_{it}		
	(1)	(2)	(3)
<i>MCCC_{t-1}</i>	−0.0022*** (0.0008)	−0.0022** (0.0009)	−0.0021** (0.0009)
<i>Size_{it-1}</i>		0.0014 (0.0010)	0.0014 (0.0010)
<i>Lev_{it-1}</i>		−0.0070** (0.0028)	−0.0072** (0.0028)
<i>Cash_{it-1}</i>		0.0191*** (0.0042)	0.0189*** (0.0042)
<i>CapEx_{it-1}</i>		0.0175 (0.0114)	0.0183 (0.0116)
<i>RoA_{it-1}</i>		−0.0215*** (0.0061)	−0.0216*** (0.0061)
<i>Tang_{it-1}</i>		0.0034 (0.0052)	0.0028 (0.0052)
<i>ACQ_{c,t-1}</i>		0.0058** (0.0027)	0.0057** (0.0027)
<i>SaleVol_{it-1}</i>		−0.0000 (0.0000)	−0.0000 (0.0000)
<i>IndSalesGrt_{it-1}</i>		0.0009 (0.0022)	0.0010 (0.0028)
<i>WTI_{it-1}</i>			−0.0000 (0.0000)
<i>SGdpGrt_{it-1}</i>			0.0044 (0.0100)
<i>SEPU_{it-1}</i>			0.0000 (0.0000)
Obs	20,130	20,130	20,130
Within- r^2	0.0016	0.0161	0.0165
Firm FE	YES	YES	YES

Table 3

Robustness check: control for crisis periods and alternative dependent variables. This table presents the results of the regression based on the specifications below. $ADV_{it} = \alpha_i + \beta \cdot MCCC_{t-1} + \gamma \cdot X_{it-1} + \delta_i + \varepsilon_{it}$ (2) We index i and t as the firm and time (years). The dependent variable ADV_{it} is either $ADV1$, $ADV2$, $ADV3$, $ADV4$, or $ADV5$ as described in the appendix for brevity. The key independent variable is $MCCC_{t-1}$, which is the Media Climate Change Concern Index. X_{it-1} is a vector of firm-level controls (*Size*, *Lev*, *Cash*, *CapEx*, *RoA*, *Tang*, *ACQ*, *SaleVol*, *IndSalesGrt*) and macro-economic control variables (*WTI*, *SGdpGrt*, and *SEPU*). We list all variables in this table in Appendix A1. δ_i represents the firm fixed effect, and ε_{it} represents the error term. We cluster standard errors at the firm level.

	Dep.Var = ADV_{it}				
	ADV1 (1)	ADV2 (2)	ADV3 (3)	ADV4 (4)	ADV5 (3)
$MCCC_{t-1}$	−0.0022** (0.0009)	−0.1293*** (0.0290)	−0.0021** (0.0010)	−0.0021** (0.0009)	−0.0021** (0.0009)
<i>Size_{t-1}</i>	0.0017* (0.0010)	0.6973*** (0.0306)	−0.0049*** (0.0012)	0.0016 (0.0010)	0.0016 (0.0010)
<i>Lev_{t-1}</i>	−0.0071** (0.0028)	−0.3685*** (0.0864)	−0.0090*** (0.0030)	−0.0070** (0.0028)	−0.0070** (0.0028)
<i>Cash_{t-1}</i>	0.0179*** (0.0041)	−0.0685 (0.1058)	0.0011 (0.0046)	0.0178*** (0.0041)	0.0178*** (0.0041)
<i>CapEx_{t-1}</i>	0.0161 (0.0117)	0.2873 (0.2732)	0.0120 (0.0144)	0.0172 (0.0116)	0.0172 (0.0116)
<i>RoA_{t-1}</i>	−0.0208*** (0.0059)	0.1096 (0.1180)	−0.0079 (0.0053)	−0.0208*** (0.0059)	−0.0208*** (0.0059)
<i>Tang_{t-1}</i>	0.0031 (0.0052)	0.1495 (0.1725)	0.0018 (0.0065)	0.0030 (0.0052)	0.0030 (0.0052)
<i>ACQ_{t-1}</i>	0.0054** (0.0027)	−0.0065 (0.0827)	0.0007 (0.0030)	0.0056** (0.0027)	0.0056** (0.0027)
<i>SaleVol_{t-1}</i>	−0.0004 (0.0005)	0.0384*** (0.0137)	0.0014*** (0.0004)	−0.0004 (0.0005)	−0.0004 (0.0005)
<i>IndSalesGrt_{t-1}</i>	0.0015 (0.0028)	0.2144** (0.0851)	0.0055** (0.0024)	0.0015 (0.0028)	0.0015 (0.0028)
<i>WTI_{t-1}</i>	−0.0000* (0.0000)	−0.0013*** (0.0003)	0.0000 (0.0000)	−0.0000* (0.0000)	−0.0000* (0.0000)
<i>SGdpGrt_{t-1}</i>	0.0070 (0.0104)	0.5073* (0.2918)	−0.0007 (0.0083)	0.0041 (0.0100)	0.0041 (0.0100)
<i>SEPU_{t-1}</i>	0.0000 (0.0000)	−0.0001 (0.0001)	−0.0000** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
<i>Crisis1</i>	0.0004 (0.0017)				
<i>Crisis2</i>	0.0010 (0.0007)				
<i>Obs</i>	20,130	20,018	20,130	20,130	20,130
<i>Within-r²</i>	0.0167	0.2654	0.0320	0.0165	0.0165
<i>Firm FE</i>	YES	YES	YES	YES	YES

representing the financial crisis period, and a value of zero otherwise. The second dummy variable, *CRISIS_2*, equals one for 2020, representing the COVID-19 crisis period, and zero for all other years.

We then re-estimate our regression model specification (1), including the crisis dummies, to account for the potential impact of these events. We present the results in Table 3, column 1. After controlling for the crisis periods, our findings remain consistent with the baseline results.

4.2.2. Alternative measures of advertising spending

We employ several alternative proxies for advertising spending as our dependent variable and estimate specification (1). We present the result in Table 3, columns (2) to (5). In Column (2), we employ the natural logarithm of unscaled advertising expenditure ($ADV2$). In Column (3), we use advertising expenditure scaled by the total book value of assets, following prior studies (Fich et al., 2024; Grullon et al., 2004). In columns (4) and (5), we use the scaled deviation of advertising spending from the industry median and mean advertising spending, respectively. The coefficients of the regression on $MCCC_t$ across the models are negative and significant at 5 % respectively, consistent with our baseline findings.

4.2.3. Heckman two-stage technique

Firms' decisions to disclose advertising spending may systematically vary with firm characteristics, which could bias our baseline estimates. To address potential selection bias from non-random reporting of advertising expenditures, we follow Barg et al. (2024) in applying Heckman's two-stage selection correction model (Heckman, 1979). The Heckman two-step procedure provides a reliable way to correct for sample selection bias caused by non-randomly chosen observations, which can lead to biased and inconsistent estimates if there are omitted variables that correlate with both the selection process and the outcome variable. The method produces an inverse Mills ratio as a correction term, included in the main regression to adjust for this bias.

In the first stage (selection equation), we estimate a probit model that predicts the likelihood of a firm reporting advertising

Table 4

Presents the Heckman two-step correction and two-stage instrumental variable regression. *ADV1* is advertising spending, and *PCI* is the Partisan Conflict Index. The key independent variable is *MCCC_{t-1}*, the Media Climate Change Concern Index. *GEXP* is the sum of selling, administrative, and general expenses, net of advertising expenditures, scaled by sales. $\mathbf{X}_{i,t-1}$ is a vector of firm-level controls (*Size*, *Lev*, *Cash*, *CapEx*, *RoA*, *Tang*, *ACQ*, *SaleVol*, *IndSalesGrt*) and Macro-economic control variables (*WTI*, *SGdpGrt*, and *SEPU*). We describe all variables in Appendix A1. δ_i represents the firm fixed effect, and ε_{it} represents the error term. We cluster standard errors at the firm level. Columns (1) and (2) present the first stage and the second stage regression results for the Heckman correction technique, while columns (3) to (6) show the 2SLS regression results and placebo tests. Heckman two-step correction and two-stage instrumental variable regression.

	Heckman		2SLS Regression			
	(1)	(2)	(3)	(4)	(5)	(6)
	First Stage	Second	First Stage	Second Stage	Second Stage (Placebo)	First-Stage (Placebo) GEXP
	ADV1	ADV1	MCCC	ADV1	ADV1	
<i>MCCC_{t-1}</i>		−0.002** (−0.001)		−0.0124** (0.0059)	−0.0087 (0.0214)	0.0001 (0.0000)
<i>PCI_{t-1}</i>			0.0018*** (0.0001)			
<i>Size_{t-1}</i>	−0.038*** (0.006)	0.003** (0.001)	0.2911*** (0.0113)	0.0047** (0.0021)	0.0038 (0.0062)	−0.0158*** (0.0038)
<i>Lev_{t-1}</i>	0.202*** (0.035)	−0.011*** (0.004)	0.4134*** (0.0427)	−0.0027 (0.0038)	−0.0037 (0.0094)	−0.0614*** (0.0138)
<i>Cash_{t-1}</i>	−0.405*** (0.034)	0.024*** (0.006)	0.0146 (0.0427)	0.0179*** (0.0042)	0.0054 (0.0059)	0.1741*** (0.0229)
<i>CapEx_{t-1}</i>	−0.030 (0.148)	0.014 (0.011)	−0.9714*** (0.1280)	0.0062 (0.0144)	0.0013 (0.0381)	0.3163*** (0.0528)
<i>RoA_{t-1}</i>	0.952*** (0.033)	−0.042*** (0.012)	−0.3404*** (0.0463)	−0.0248*** (0.0057)	−0.0169 (0.0112)	−0.8542*** (0.0498)
<i>Tang_{t-1}</i>	−0.846*** (0.038)	0.022** (0.009)	0.7039*** (0.0851)	0.0095 (0.0063)	−0.0107 (0.0142)	0.0272 (0.0287)
<i>ACQ_{t-1}</i>	−0.602*** (0.093)	0.017*** (0.006)	−0.4434*** (0.0397)	0.0007 (0.0040)	0.0023 (0.0124)	0.0340** (0.0173)
<i>SaleVol_{t-1}</i>	0.017*** (0.006)	−0.001 (0.001)	0.0000** (0.0000)	0.0000 (0.0000)	−0.0000 (0.0000)	0.0000 (0.0000)
<i>IndSalesGrt_{t-1}</i>	−0.742*** (0.083)	0.016** (0.007)	−0.1790*** (0.0419)	−0.0009 (0.0031)	0.0027 (0.0080)	0.0056 (0.0158)
<i>WTI_{t-1}</i>	0.002*** (0.000)	−0.000*** (0.000)	0.0015*** (0.0001)	−0.0000 (0.0000)	−0.0001 (0.0000)	−0.0001 (0.0001)
<i>SGdpGrt_{t-1}</i>	1.424*** (0.287)	−0.030 (0.018)	1.3118*** (0.1419)	0.0218 (0.0142)	0.0218 (0.0324)	0.0194 (0.0560)
<i>SEPU_{t-1}</i>	0.001*** (0.000)	−0.000*** (0.000)	0.0007*** (0.0001)	0.0000 (0.0000)	−0.0000 (0.0000)	0.0000 (0.0000)
<i>TQ_{t-1}</i>	0.056*** (0.004)					
<i>INVMR</i>		−0.058*** (0.008)				
<i>Estimation</i>	Probit	OLS + λ	OLS	OLS	OLS	OLS
<i>Firm FE</i>	NO	YES	YES	YES	YES	YES
<i>Obs</i>	50,734	20,191	20,130	20,130	4,132	18,946
<i>F-Stat</i>		14.77	241.9	4.213	1.991	29.05
<i>Within-r²</i>		0.0191	0.3326			0.3336
<i>UIT_KLLM</i>				148.531	10.864	
<i>WIT_CraigD</i>				454.431	32.856	
<i>WIT_KLPF</i>				236.490	13.888	
<i>Hansen J</i>				0.000	0.000	

spending, using all firms in the Compustat North America database with non-missing control variables. Results in column (1) of Table 4 show that firm characteristics such as size, leverage, cash holdings, return on assets, and asset tangibility are all statistically significant predictors at the 1 % level, confirming that selection into the sample is non-random. In the second stage (outcome equation), presented in column (2), we regress advertising spending (ADV1) on media-based climate risk (MCCC), controlling for the inverse Mills ratio (INVMR) generated from the first stage. The significant coefficient on the INVMR confirms the presence of selection bias and justifies the use of the Heckman correction method. We also include the complete set of control variables and firm-level Tobin's Q (TQ) to ensure robustness.

Table 4, column (2) presents the regression results that address the selection bias, revealing a strong and statistically significant negative relationship between climate risk and advertising spending. Specifically, the coefficient on MCCC is negative and significant at the 5 % level ($\beta = -0.002$; $t = -2.75$), indicating that after adjusting for selection bias, our main finding that firms reduce advertising when faced with increased climate risk remains robust and reliable.

4.2.4. Two-stage least squares instrumental variable analysis (2SLS)

Our baseline results show a negative association between climate risk and advertising spending. However, unobserved variables that change over time might influence both climate risk and advertising spending, and reverse causality could be present between them. We address these issues by performing a two-stage instrumental variable regression. For this, we identify a variable that directly correlates with media climate change concern (MCCC) but does not directly affect advertising, except through its correlation with MCCC.

We utilize the Partisan Conflict Index (PCI), developed by [Azzimonti \(2018\)](#), as an instrumental variable for media-driven climate change coverage (MCCC). The PCI measures the intensity of political disagreement between lawmakers across party lines, particularly around contentious policy issues. Such conflicts frequently attract media attention and generate widespread coverage ([Azzimonti, 2018; Wang, 2024](#)). The media covers politics, including climate politics. In the U.S., climate policy debates like those involving cap-and-trade legislation, the Clean Power Plan Act, carbon taxation, toxic waste regulation, and disaster relief funding are often polarized along party lines and receive extensive press coverage ([Broder and Krauss, 2010](#)). These politicized events, captured by the PCI, serve as exogenous shocks to media attention on climate risk, making the index a theoretically grounded and empirically relevant instrument for MCCC.

The authors compute the PCI as the ratio of newspaper articles covering political disagreements on government policy (both within and between parties) to the total number of news articles published during the same period ([Azzimonti, 2018; Peng et al., 2023](#)). Climate change issues, particularly climate legislation, have become a key source of legislative tension in the United States, where federal and state legislatures exhibit partisan disagreements ([Dotto & Oakes, 2019](#)). Since climate change issues are socio-political ([Thapa and Hillier, 2022; Venturini, 2022](#)), we argue that partisan conflict should have a positive and strong correlation with MCCC.

We apply a two-stage regression model to examine the relationship between climate risk and advertising spending as follows:

$$MCCC_{t-1} = \alpha_i + \beta_1 \cdot PCI_{t-1} + \gamma \cdot X_{i,t-1} + \delta_i + \varepsilon_{it} \quad (2a)$$

$$ADV1_{i,t} = \alpha_i + \beta_2 \cdot InstrumentedMCCC_{t-1} + \gamma \cdot X_{i,t-1} + \delta_i + \varepsilon_{it} \quad (2b)$$

We estimate the first stage of the regression using the regression specification (2a). We use PCI as an exogenous instrument to predict climate risk (MCCC) and retain the predicted values. Next, we run the second stage using the expected value of MCCC (InstrumentedMCCC) in the regression specification (2b).

We present the results in [Table 4](#), columns (3) and (4). In column (3), the coefficient of PCI is highly significant at the 1 % level ($\beta = 0.0018$, $t\text{-stat} = 15.38$), indicating a strong correlation between PCI and MCCC, which demonstrates strong predictive power for MCCC. We verify instrument relevance in the first stage using the partial F and partial R² for the endogenous regressor. The results confirm strong relevance. In column (4), the coefficient on InstrumentedMCCC is negative and statistically significant at the 5 % level ($\beta = -0.0124$; $t\text{-stat} = -2.10$), indicating a negative association between climate risk and future advertising spending.

We conduct further post-estimation validation tests to verify the instrument relevance and adherence to exclusion restriction criteria. The Kleibergen-Paap rk LM test strongly rejects the null hypothesis of under-identification ($\chi^2 = 148.531$, $p < 0.001$), confirming that the excluded instrument, the PCI, is correlated with the endogenous regressor. Both the Cragg–Donald F(454.431) and the heteroskedastic-robust Kleibergen-Paap rk Wald F-statistic (234.49) vastly exceed the Stock-Yogo critical value for a 10 % maximal IV critical value of 16.38 and remain well above the 25 % threshold (5.53), ruling out weak-instrument concerns. The Hansen J statistic is zero, indicating precise model identification. Overall, the result of the instrumental variable regression and post-estimation validity tests indicates a significant negative causal relationship between climate risk and advertising spending, consistent with the OLS regression results.

4.2.5. Falsification test

In the first falsification test, we re-estimate the second-stage IV regression using the instrumented MCCC values from the first-stage regression in Column (5), applying a subsample of technology firms, where exposure to climate-related transition risk is comparatively limited ([Hossain et al., 2023](#)). We identify technology firms following⁵ [Loughran and Ritter \(2004\)](#). If PCI influences advertising spending solely through media salience, we expect to see limited or no effects in the sub-sample of tech firms. As presented in column (5), the coefficient on MCCC is negative but insignificant ($\beta = -0.0087$, $t\text{-stat} = -0.41$), indicating no significant relationship between *instrumentedMCCC* and advertising spending among firms in the technology sector, consistent with the exclusion restriction.

In the second validation test for the exclusion restriction underlying our instrumental variable (IV) strategy, we re-estimate the first-stage regression by replacing the dependent variable (MCCC) with SG&A expenses excluding advertising expenditures, scaled by sales (GEXP), which has the same accounting line as advertising expenditures. If the instrument, PCI, has no significant effect on GEXP; this supports the exclusion restriction requirement for the instrument, indicating that PCI does not randomly predict firm-level variables, but only through the climate-news risk channel. We present the results of the exclusion restriction falsification test in column (6). The results indicate that PCI does not predict general expenses (GEXP), as evidenced by an insignificant coefficient on PCI ($\beta = 0.0001$, $t = 1.6$). The evidence indicates that PCI influences advertising spending solely through the MCCC, and the falsification tests reinforce this mechanism, supporting the validity of our instrument.

⁵ (see Appendix A2 for classification).

Table 5

Economic mechanism: financial constraint. This table presents the results of the regression following the specifications below. $ADV_{it} = \alpha_i + \beta.MCCC_{t-1} * SA_Index_{it-1} + \gamma.X_{it-1} + \delta_i + \varepsilon_{it}$ (3) We index i and t as the firm and time (years). The dependent variable ADV_{it} is the dollar value of a firm's advertising expenditure scaled by sales ($ADV1$). $MCCC_{t-1}$, which is the Media Climate Change Concern Index. SA_Index , a measure of financial constraint. X_{it-1} is a vector of firm-level (*Size, Lev, Cash, CapEx, RoA, Tang, ACQ, SaleVol, IndSalesGrt*) and macro-economic control variables (*WTI, SGdpGrt, and SEPU*) and macro-level control variables (*SGdpGrt and SEPU*). We list all variables in Appendix A1. δ_i represents the firm fixed effect, and ε_{it} represents the error term. We cluster standard errors at the firm level. For brevity, we do not report the coefficients on the control variables.

	Dep. Var = ADV_{it}		
	(1)	(2)	(3)
$MCCC_{t-1}$	−0.0148*** (0.0054)	−0.0164*** (0.0051)	−0.0152*** (0.0056)
SA_INDEX_{t-1}	0.0057* (0.0032)	0.0060 (0.0043)	0.0053 (0.0045)
$MCCC_{t-1} * SA_Index_{t-1}$	−0.0040*** (0.0015)	−0.0044*** (0.0015)	−0.0040** (0.0016)
Firm control	NO	YES	YES
Macro control	NO	NO	YES
Obs	20,130	20,130	20,130
Within_r2	0.0032	0.0177	0.0179
Firm FE	YES	YES	YES

Table 6

Sub-sample analysis. This table presents the results of the regression following the specifications below: $ADV_{it} = \alpha_i + \beta.MCCC_{t-1} + \gamma.X_{it-1} + \delta_i + \varepsilon_{it}$ We index i and t as the firm and time (years). The dependent variable ADV_{it} is the dollar value of a firm's advertising expenditure scaled by sales ($ADV1$). $MCCC_{t-1}$, is the Media Climate Change Concern Index. X_{it-1} is a vector of firm-level controls (*Size, Lev, Cash, CapEx, RoA, Tang, ACQ, SaleVol, IndSalesGrt*) and macro-economic control variables (*WTI, SGdpGrt, and SEPU*) and macro-level control variables (*SGdpGrt and SEPU*). We list all variables in Appendix A1. δ_i represents the firm fixed effect, and ε_{it} represents the error term. We cluster standard errors at the firm level. For brevity, we do not report the coefficients on the control variables.

	Dep. Var = ADV_{it}					
	Stock Illiquidity		Cashflow Volatility		International Operations	
	High (1)	Low (2)	High (3)	Low (4)	Yes (5)	No (6)
$MCCC_{t-1}$	−0.0046** (0.0018)	0.0009 (0.0011)	−0.0034** (0.0017)	−0.0003 (0.0009)	−0.0008 (0.0009)	−0.0049*** (0.0015)
Firm control	YES	YES	YES	YES	YES	YES
Macro control	YES	YES	YES	YES	YES	YES
Obs	8,900	9,041	9,783	9,935	11,065	8,719
Within-r ²	0.0213	0.0212	0.0261	0.0067	0.0114	0.0261
Firm FE	YES	YES	YES	YES	YES	YES

4.3. Economic channel test: financial constraint

We examine the plausible economic channel underlying the relationship between climate risk and advertising spending. We empirically test *H2*, which posits that financial constraints mediate the link between climate risk and advertising spending. We follow Bartram et al. (2022), D'Mello and Toscano (2020), and He and Qiu (2025) in employing the *SA Index* (Hadlock and Pierce, 2010) as a measure of financial constraint. We interact the *SA Index* with the climate risk measure (*MCCC*) and estimate the model specification (3). If financial constraint is a plausible mechanism for the result, we expect the coefficient of the interaction term ($MCCC_{t-1} * SA_Index_{it}$) to be negative and significant.

We present the result in Table 5. The coefficients of the interaction variable in columns (1) to (3) are statistically significant and negative, supporting the *H2* hypothesis. For example, in the complete model with all control variables and firm fixed effect, as presented in column (3), the coefficient of the interaction variable is negative and significant ($\beta = -0.0040$, t-stat = -2.94), with a larger

Table 7

Additional tests: the role of ex-ante corporate liquidity constraint and institutional pressure. This table shows the results of the regression based on the specifications below: $ADV_{it} = \alpha_i + \beta \cdot MCCC_{t-1} * MOD_{it-1} + \gamma \cdot X_{it} + \delta_i + \varepsilon_{it}$. We index i and t as the firm and time (years). The dependent variable ADV_{it} is the dollar value of a firm's advertising expenditure scaled by sales ($ADV1$). The key independent variable is $MCCC_t$, the Media Climate Change Concern Index. $MCCC_{t-1}$, MOD is either the variable $InvCash_{t-1}$, which is the negative of the natural logarithm of log cash holdings, such that higher values indicate lower internal liquidity, or $IO_{b,t-1}$, one year lagged institutional investor ownership. X_{it} is a vector of firm-level controls (*Size, Lev, Cash, CapEx, RoA, Tang, ACQ, SaleVol, IndSalesGrt*) and macroeconomic control variables (*WTI, SGdpGrt, and SEPU*). We list all variables in Appendix A1. δ_i represents the firm fixed effect, and ε_{it} represents the error term. We cluster standard errors at the firm level. For brevity, we did not report the coefficients on the control variables. *Note: We exclude the cash ratio from the control variable in the regression estimation in Column (1). For brevity, we do not report the coefficients on the control variables.*

	Dep. Var = ADV_{it}	
	ADV1 (1)	ADV1 (2)
$MCCC_{t-1}$	−0.0058*** (0.0018)	−0.0032* (0.0017)
$InvCash_{t-1}$	−0.0003 (0.0005)	
$MCCC_{t-1} * InvCash_{t-1}$	−0.0008** (0.0003)	
$IO_{i,t-1}$		−0.0037 (0.0041)
$MCCC_{t-1} * IO_{b,t-1}$		0.0019 (0.0021)
<i>Firm control</i>	YES	YES
<i>Macro control</i>	YES	YES
<i>Obs</i>	20,081	20,112
<i>Within-r^2</i>	0.0124	0.0162
<i>Firm FE</i>	YES	YES

effect size, indicating that financial constraint is a channel for the observed effect. We extend the mechanism test by conducting Sobel-Goodman's mediation test, which confirms the significant mediating effect of financial constraint.⁶

4.4. Cross-sectional test

This section explores various characteristics and boundaries under which our findings could be stronger. We analyze the role of stock market liquidity, cash flow volatility, and international operations.

4.4.1. Stock liquidity

We examine whether a firm's stock market liquidity moderates the relationship between climate risk and advertising spending. The literature documents a positive relationship between stock liquidity and investment (Amihud and Levi, 2023; Becker-Blease and Paul, 2006; Butler et al., 2005). This stream of literature suggests that lower stock liquidity increases a firm's cost of capital and hinders corporate investment. Moreover, Investors demand a higher premium for stock market trading friction (Fang et al., 2009; Hopenhayn and Werner, 1996). Climate risk exposure lowers stock market liquidity (Riordan and Nerlinger, 2022). Firms with lower stock liquidity experience a higher discount rate and cost of capital, consistent with the liquidity premium hypothesis (Butler et al., 2005; Hopenhayn and Werner, 1996). This evidence indicates that firms with lower stock liquidity should reduce discretionary spending more in response to high climate risk.

To empirically test this proposition, we employ the Amihud stock illiquidity measure (Amihud, 2002), following Roy et al. (2022) and Nadarajah et al. (2021) as a proxy for stock market illiquidity due to its accuracy in capturing stock illiquidity relative to other measures (Goyenko et al., 2009). We calculate stock illiquidity by dividing the daily absolute stock return value by the dollar volume and then averaging this ratio over the fiscal year for a given firm. We then estimate a sub-sample analysis based on firms with high Amihud Illiquidity (low liquidity) if the measure is above the sample's median ($AM_ILLIQ = 1$), and zero otherwise ($AM_ILLIQ = 0$). If our proposition is correct, we expect the negative relationship between climate risk and advertising spending to be stronger for the subsample of firms with higher stock illiquidity, as they are more likely to face a higher cost of capital, which can increase financial

⁶ The results are un-tabulated.

constraints and lead to a reduction in advertising spending.

We estimate the regression specification (1) based on the subsample analysis conditioned on the level of Amihud Illiquidity and present the results in Table 6, columns (1) and (2). Column (1) presents the regression results for firms with high stock illiquidity ($AM_ILLIQ = 1$), indicating a negative coefficient that is statistically significant at the 5 % level ($\beta = -0.0046$, $t\text{-stat} = -2.56$) and of greater magnitude. Column (2) displays the results for firms with low stock illiquidity ($AM_ILLIQ = 0$), showing that the regression coefficient is not significant at any level ($\beta = 0.0009$; $t\text{-stat} = 0.89$). Consistent with our prediction, the negative impact of climate risk on advertising spending is more pronounced among firms with high stock market illiquidity.

4.4.2. Cash flow volatility

Climate risk negatively impacts firms' sales, operations, and long-term financial performance, leading to increased volatility in operating cash flows (Addoum et al., 2020; Chauvin and Hirschey, 1993; Roth Tran, 2023). Higher cash flow volatility raises the risk of liquidity shortfalls and increases firms' dependence on costly external financing (Chava, 2014; Minton and Schrand, 1999). This situation may pressure firms to cut discretionary spending, including advertising, to maintain financial flexibility and hedge against earnings uncertainty. As a result, firms experiencing higher cash flow volatility are more likely to reduce discretionary expenditures in response to climate risk. Consistent with the risk management hypothesis, we expect the negative impact of climate risk on advertising spending to be stronger for firms with more volatile cash flows.

To empirically investigate the role of cash flow volatility in the relationship we observe, we estimate our baseline regression using subsample of firms with high cash flow volatility, where their operational cash flow is above the sample median ($CFLVOL = 1$), and subsample of firms with low cashflow volatility ($CFLVOL = 0$). We present the results in Table 6, columns (3) and (4). In column (3), the coefficient on MCCC for firms with highly volatile cash flows is significant at the 5 % level and of greater magnitude ($\beta = -0.0034$; $t\text{-stat} = -1.98$), indicating that firms with highly volatile cash flows tend to reduce advertising spending in response to climate change exposure. Conversely, the coefficient on MCCC for firms with lower cash flow volatility is insignificant ($\beta = -0.0003$; $t\text{-stat} = -0.34$), indicating that these firms do not significantly reduce advertising spending in response to high climate risk exposure.

4.4.3. International operations

Prior literature shows that firms with international operations generate higher foreign cash flows (Fee et al., 2009), indicating they are more likely to generate more sales per unit of advertising spending than their local counterpart. Multinational firms also have more experience in environmental sustainability strategies and hold more cash than local firms (Gu, 2017; Kim et al., 2021). These firms have more visibility, lower information asymmetry, better access to capital, and face fewer financial constraints than local firms. Furthermore, firms with international operations tend to pollute less than local firms, due to the fear of reputational damage (Eskeland and Harrison, 2003). Further, financial constraints can impact firms' financial policies, including advertising spending (Fee et al., 2009). Hence, we conjecture that the inverse relationship between climate risk and advertising spending should exhibit a heterogeneous effect on firms based on the presence of international operations, evidenced by either international sales or the payment of foreign taxes.

To confirm our conjecture, we first create subsamples of firms classified as multinational if they declare foreign tax or have foreign sales ($INTL = 1$), and local firms otherwise ($INTL = 0$). The results are shown in Table 6, columns (5) and (6). In column (5), the coefficient on MCCC for firms with international operations is insignificant ($\beta = -0.0008$; $t\text{-stat} = -0.90$), indicating that they are less

Table 8

Additional analysis: heterogeneity in media climate change news risk. This table presents the results of the ordinary least squares regression based on the specifications below. $ADV_{it} = \alpha_i + \beta \cdot MCCC_{t-1} + \gamma \cdot X_{it-1} + \delta_i + \varepsilon_{it}$. We index i and t as the firm and time (years). The dependent variable ADV_{it} is the dollar value of a firm's advertising expenditure scaled by sales (ADV_{it}). The key dependent variable is $MCCC_{t-1}$, consisting of the different sub-components ($MCCC_{EI}$, $MCCC_{SD}$, $MCCC_{RE}$, $MCCC_{BI}$). X_{it} is a vector of firm-level controls (*Size*, *Lev*, *Cash*, *CapEx*, *RoA*, *Tang*, *ACQ*, *SaleVol*, *IndSalesGrt*) and macroeconomic control variables (*WTI*, *SGdpGrt*, and *SEPU*). We list all variables in Appendix A1. δ_i represents the firm fixed effect, and ε_{it} represents the error term. We cluster standard errors at the firm level. For brevity, we did not report the coefficients on the control variables. For brevity, we do not report the coefficients on the control variables.

	Dep.Var = ADV			
	(1)	(2)	(3)	(4)
MCCC_BI_{t-1}	-0.0023** (0.0010)			
MCCC_EI_{t-1}		-0.0020** (0.0009)		
MCCC_SD_{t-1}			-0.0021** (0.0008)	
MCCC_RE_{t-1}				-0.0022*
<i>Firm control</i>	YES	YES	YES	YES
<i>Macro control</i>	YES	YES	YES	YES
<i>Obs</i>	20,130	20,130	20,130	20,130
<i>Within-r²</i>	0.0164	0.0167	0.0165	0.0174
<i>Firm FE</i>	YES	YES	YES	YES

likely to significantly reduce advertising spending in response to high domestic climate risk exposure. Conversely, the coefficient on MCCC for local firms (INTL = 0) is statistically significant at the 1 % level ($\beta = -0.0049$; $t\text{-stat} = -3.20$), indicating a larger effect size, and suggests that local firms cut their advertising spending more aggressively when facing higher climate change risk.

4.5. Additional tests

4.5.1. Role of ex-ante corporate liquidity constraint

The precautionary risk management motive indicates that firms may respond to climate risk by increasing liquidity buffers (Javadi et al., 2023; Fernandes and Papadimitriou, 2025). However, how firms adjust their financial policies in response to climate risk could depend on their pre-existing level of cash holdings.

To examine this heterogeneity, we capture the moderating effect of ex-ante corporate liquidity constraints by interacting climate risk with the negative of log cash holdings (InvCash_{t-1}), so higher values reflect lower internal liquidity. A significant and negative interaction term indicates that firms with weaker ex-ante cash positions react more strongly to climate risk by reducing advertising spending, consistent with precautionary risk management behavior. We re-estimate specification (3) by interacting the climate risk variable (MCCC_{t-1}) with (InvCash_{t-1}). We exclude cash holdings from the control variables.

Table 7 column (1) shows the results. The coefficient on the interaction term ($\text{MCCC}_{t-1} * \text{InvCash}_{t-1}$) is negative and significant at the 5 % level ($\beta = -0.0008$, $t\text{-stat} = -2.36$). These findings indicate that as firms become more cash-constrained (i.e., higher InvCash_{t-1} values), the negative impact of climate risk on advertising spending intensifies. In other words, firms with less financial flexibility tend to cut back on advertising spending more sharply in response to increased climate risk, aligning with the precautionary approach to risk management.

4.5.2. Ruling out alternative theoretical explanation: impression management argument

While we pivot our central hypothesis to risk management theory, we empirically examine the impression management argument, which suggests that firms may increase advertising in response to rising climate risk as a way to build legitimacy or manage stakeholder impressions (Bansal and Clelland, 2004; Suchman, 1995). Under this perspective, advertising serves to shape stakeholder perceptions, deflect attention from poor environmental performance, or signal responsiveness to climate concerns. The literature indicates that firms are more susceptible to environmental risk and institutional pressure due to the nature of their business and the industry in which they operate (Fard et al., 2020).

Moreover, climate news risk may increase public awareness and market understanding of the negative environmental externalities of firms, thereby increasing institutional and market-wide pressure (Engle et al., 2020; Hossain et al., 2024; Huynh & Xia, 2021). To mitigate the negative media attention and associated reputational damage, such firms may counter negative media narratives by increasing advertising expenditures. We employ high institutional investor ownership as a proxy for firms facing high legitimacy and institutional pressure.

We examine whether high institutional investor pressure influences firms to increase advertising spending rather than reduce it. An increase in advertising spending under high climate risk indicates that firms employ impression management strategies to influence the perceptions of their stakeholders. We obtain annual institutional investor data from the S&P Capital IQ database. We replace firms with missing data with zero, following the literature (Ferreira and Matos, 2008) and winsorize at the first and ninetieth percentiles. We regress advertising spending on the interaction term ($\text{MCCC}_{t-1} * \text{IO}_{it-1}$), which captures corporate advertising behavior in response to climate risk and institutional pressure.

We present the result in Table 7, column (2). We find an insignificant positive coefficient ($\beta = 0.0019$; $t = 0.91$) for the interaction term. This result is inconsistent with the explanation of impression management theory, indicating that despite higher pressure from institutional investors on firms, their responses to climate risk are not through a significant increase in advertising spending to manage stakeholder perception, which rules out the impression management argument.

4.5.3. Heterogeneity in media-based climate change news risk

The Media Climate Change Concern (MCCC) encompasses four categories: Environmental, Business Impact, Societal Debate, and Cross-cutting (Research). The Business Impact and Societal Debate categories serve as proxies for transition risks. The Environmental Impact category indicates physical risks, while the research category (Cross-cutting) integrates elements of both risk types. (Ardia et al., 2023; Benkraiem et al., 2025).

We evaluate the heterogeneity of MCCC by estimating equation (1) using disaggregated MCCC components. Table 8, columns (1)–(4), presents the results. The Business Impact column (1) shows a negative and statistically significant coefficient at the 5 % level ($\beta = -0.0023$; $t = -2.38$). Environmental impact, which captures physical climate risk (2), is also negative and significant at 5 % ($\beta = -0.002$; $t = -2.29$), indicating sensitivity to physical risk. Societal Debate Impact, reflecting transition risk (3), is negative and significant at 5 % ($\beta = -0.0021$; $t = -2.52$). Research Impact, representing cross-cutting climate concerns (4), has a negative effect with marginal significance at the 10 % level ($\beta = -0.0022$; $t = -1.87$).

5. Conclusion

This study examines the impact of climate change news risk on corporate advertising spending. It provides empirical evidence that increased awareness of climate risk, reflected in media coverage of climate change-related issues, motivates firms to cut their advertising expenses as a strategic risk management measure. The primary mechanism is through financial constraints. This effect is

more pronounced for firms with low stock market liquidity, those facing greater cash flow volatility, and firms without international sales. The findings support the risk management hypothesis and offer new insights into the relationship between climate risk and strategic resource allocation.

In further analyses, we find that the negative relationship between climate risk and advertising expenditure is significantly stronger among firms with low ex-ante cash holdings. This pattern supports the interpretation that liquidity constraints intensify precautionary cutbacks in advertising spending, highlighting the role of financial flexibility in shaping corporate responses to climate risk. Our findings indicate that reductions in advertising represent a complementary margin of adjustment to the precautionary cash-holding motive documented in prior literature (Fernandes and Papadimitriou, 2025; Gounopoulos and Zhang, 2024). These findings underscore the importance of firms' specific conditions in mitigating environmental risk, offering novel insights into how climate risk impacts corporate financial policies.

Furthermore, our findings have significant implications for investors, regulators, and policymakers, as they offer a deeper understanding of how climate change risk affects firm behavior. Given the increasing importance of environmental factors in shaping corporate strategies, future research could extend our findings by examining the long-term effects of reduced advertising spending on firm performance and the potential for firms to adjust their risk management strategies as climate change risks intensify.

CRedit authorship contribution statement

Olakunle Olaboopo: Writing – review & editing, Software, Methodology, Formal analysis, Data curation, Conceptualization.
Evans O. Boamah: Writing – review & editing, Resources.

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Appendix

Table A1

Variable definitions.

Variable name	Description
<i>MCCC</i>	Media Climate Change Concern (<i>MCCC</i>) measures Climate Change News Risk. The <i>MCCC</i> Index is computed from climate change-related news reported by ten widely circulated U.S. newspapers and two major newswires. It categorizes this information into four distinct clusters. (Environmental, Societal Debate, Business Impact, and Research. Source: (Ardia et al., 2023). https://sentometrics-research.com/download/mccc/
<i>MCCC_EI</i>	The Environmental Impact cluster (<i>MCCC_EI</i>) of the Media Climate Change Concern (<i>MCCC</i>).Source: (Ardia et al., 2023)
<i>MCCC_SD</i>	The societal debate cluster (<i>MCCC_SD</i>) of the Media Climate Change Concern (<i>MCCC</i>). Source: (Ardia et al., 2023)
<i>MCCC_BI</i>	The business impact cluster (<i>MCCC_BI</i>) of the Media Climate Change Concern (<i>MCCC</i>) Source: (Ardia et al., 2023)
<i>MCCC_RE</i>	Research Cluster (<i>MCCC_RE</i>) of the Media Climate Change Concern (<i>MCCC</i>). Source: (Ardia et al., 2023)
<i>ADV1</i>	Advertising Spending (<i>ADV1</i>) represents the dollar value of advertising expenditure a firm discloses in its annual financial reports, scaled by the firm's sales for the same year, in billions of dollars. Source: (Chemmanur and Yan, 2017).
<i>ADV2</i>	Advertising Spending (<i>ADV2</i>) is the natural logarithm of the dollar value of advertising expenditure disclosed in a firm's annual financial reports in year <i>t</i> . Source: (Chemmanur and Yan, 2017).
<i>ADV3</i>	Advertising Spending (<i>ADV3</i>) is the dollar value of advertising expenditure in a firm's annual financial reports, scaled by the firm's total book value of assets in the same year. Source:(Chemmanur and Yan, 2017).
<i>ADV4</i>	Excess Median Advertising Spending (<i>ADV4</i>) represents the deviation of a firm's advertising spending from the median advertising spending within its Fama–French industry classification code and year <i>t</i> . Source: Author constructed
<i>ADV5</i>	Excess Average Advertising spending (<i>ADV5</i>) represents the deviation of a firm's advertising spending from the average within its Fama–French industry 12 classification codes and year <i>t</i> . Source: Author constructed.
<i>Size</i>	For firm <i>i</i> at the end of year <i>t</i> , <i>Size</i> is the natural logarithm of the total assets measured in US\$ millions. Source: Compustat CRSP
<i>Lev</i>	For firm <i>i</i> at the end of year <i>t</i> , leverage (<i>Lev</i>) is the ratio of the total book value of debt to the total book value of assets. Source: CRSP
<i>RoA</i>	For firm <i>i</i> at the end of year <i>t</i> , <i>RoA</i> is the return on assets, computed as the ratio of pre-tax earnings to total assets. Source: CRSP.
<i>Cash</i>	For a firm, at the end of year <i>t</i> , <i>Cash</i> (<i>Cash</i>) refers to the ratio of cash and cash equivalents to total book value of assets in a fiscal year <i>i</i> . Source: CRSP
<i>CapEx</i>	For firm <i>i</i> at the end of year <i>t</i> , capital expenditure (<i>CapEx</i>) represents the dollar value of capital expenditure scaled by the firm's total assets. Source: CRSP.
<i>Tang</i>	For firm <i>i</i> at the end of year <i>t</i> , Tangibility (<i>Tang</i>) is the net property, plant, and equipment value scaled by the firm's book value of assets. Source: CRSP.
<i>ACQ</i>	For firm <i>i</i> in year <i>t</i> , the Acquisition cost(<i>ACQ</i>) is the total amount spent on cash acquisition, scaled by the total book value of assets. CRSP.

(continued on next page)

Table A1 (continued)

Variable name	Description
<i>IndSalesGrt</i>	For firm <i>i</i> at the end of year <i>t</i> , industry sales growth is the year-on-year industry sales growth based on Fama and French's twelve industry classification. CRSP
<i>LnTemp</i>	Temperature in Fahrenheit (<i>LnTemp</i>) is the natural logarithm of the average temperature in the United States.
<i>CFL_Vol</i>	For firm <i>i</i> at the end of year <i>t</i> , cash flow volatility (<i>CFL_Vol</i>) is the five-year standard deviation of a firm's operating cash flow, scaled by sales. Compustat
<i>SalesVol</i>	For firm <i>i</i> at the end of year <i>t</i> , sales volatility (<i>SalesVol</i>) is defined as the five-year standard deviation of the natural logarithm of a firm's annual sales. Compustat
<i>Amihud_Illiq</i>	For firm <i>i</i> at the end of year <i>t</i> , stock market liquidity (<i>Amihud_Illiq</i>) measures a firm's stock illiquidity proxied by the Amihud illiquidity measure. Source:(Amihud, 2002)
<i>TQ</i>	Tobin's Q (<i>TQ</i>) measures a firm's growth opportunity. For firm <i>i</i> at the end of year <i>t</i> , <i>TQ</i> is the Market value of equity plus total assets, net of the book value of equity, scaled by the total book value of assets at the end of year <i>i</i> . Source: Compustat
<i>InvCash</i>	Corporate liquidity constraint (<i>InvCash</i>) is the computed as -1 multiplied by the natural logarithm of cash and cash equivalents. Source: Author constructed
<i>SA_Index</i>	For firm <i>i</i> at the end of year <i>t</i> , the <i>SA_Index</i> is a proxy for financial constraint, as defined by Hadlock and Pierce (2010). $SA_Index = -0.737 * Size + 0.043 * Size^2 - 0.040 * Age$, where <i>Size</i> equals the log of inflation-adjusted Compustat item at (in 2004 dollars), and <i>Age</i> is the number of years the firm is listed on Compustat. In calculating the index, we follow Hadlock and Pierce and cap <i>Age</i> at 37 years (D'Mello and Toscano, 2020)

U.S macro-level factors

<i>WTI</i>	A measure of input cost shock computed as the natural logarithm of West Texas Intermediate Crude oil spot prices: Source Federal Reserve Bank of St. Louis https://fred.stlouisfed.org/graph/?g=hM0r
<i>PCI</i>	The Partisan Conflict Index (<i>PCI</i>) represents the degree of political polarization. Source: (Azzimonti, 2018)
<i>SGdpGrt</i>	State-level Gross Domestic Product Growth rate(<i>GdpGrt</i>) is the year-on-year state-level growth rate in Gross Domestic Product https://apps.bea.gov/regional/downloadzip.htm
<i>SEPU</i>	State-level Economic Policy Uncertainty(<i>EPU</i>). Source: (Baker et al., 2022) https://www.policyuncertainty.com/state_epu.html

Appendix A2

Distribution of the sample based on the fama-French 12 industry classification

https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html.

S/N	Fama French Industries	Freq	Percent
1	Consumer non-durables	1971	9.57
2	Consumer durables	792	3.84
3	Manufacturing	1983	9.62
4	Energy	138	0.67
5	Chemicals	448	2.17
6	Business Equipment	5330	25.87
7	Telecommunications	830	4.03
9	Shops	3856	18.71
10	Healthcare	2464	11.96
12	Others	2794	13.56
	Total	20,606	100.00

Appendix A3

Tech firm's classification using the standard industry classification, following Loughran and Ritter (2004).

S/N	Firm business description	SIC Code
1	Computer hardware	3571, 3572, 3575, 3577, 3578
2	Communications equipment	3661, 3663, 3669
3	Electronics	3671, 3672, 3674, 3675, 3677, 3678, 3679
4	Measuring and control devices	3823, 3825, 3826, 3827, 3829
5	Navigation instruments	3812
6	Measuring and control device	3823, 3825, 3826, 3827, 3829
7	Telephone equipment	3841, 3845
8	Communication Services	4899
9	Software and related services	7371, 7372, 7373, 7374, 7375, 7378, 7379

Data availability

The authors do not have permission to share data.

References

- Addoum, J.M., Ng, D.T., Ortiz-Bobea, A., 2020. Temperature shocks and establishment sales. *The Review of Financial Studies* 33 (3), 1331–1366.
- Agoraki, K.K., Giaka, M., Konstantios, D., Negkakakis, I., 2024. The relationship between firm-level climate change exposure, financial integration, cost of capital and investment efficiency. *J. Int. Money Financ.* 141, 102994.
- Ahmad, M.F., Aktas, N., Croci, E., 2023. Climate risk and deployment of corporate resources to working capital. *Econ. Lett.* 224, 111002.
- Almeida, H., Campello, M., 2007. Financial constraints, asset tangibility, and corporate investment. *The Review of Financial Studies* 20 (5), 1429–1460.
- Alok, S., Kumar, N., Wermers, R., 2020. Do fund managers misestimate climatic disaster risk. *Rev. Financ. Stud.* 33 (3), 1146–1183.
- Amihud, Y., 2002. Illiquidity and stock returns: cross-section and time-series effects. *J. Financ. Mark.* 5 (1), 31–56.
- Amihud, Y., Levi, S., 2023. The effect of stock liquidity on the firm's investment and production. *Rev. Financ. Stud.* 36 (3), 1094–1147.
- An, Z., Chen, C., Naiker, V., Wang, J., 2020. Does media coverage deter firms from withholding bad news? Evidence from stock price crash risk. *Finance* 64, 101664.
- Ardia, D., Bluteau, K., Boudt, K., Inghelbrecht, K., 2023. Climate change concerns and the performance of green vs. brown stocks. *Manag. Sci.* 69 (12), 7607–7632.
- Aslan, C., Bulut, E., Cepni, O., Yilmaz, M.H., 2022. Does climate change affect bank lending behavior? *Econ. Lett.* 220, 110859.
- Ataullah, A., Le, H., Wood, G., 2022. Institutional investor heterogeneity and corporate response to the Covid-19 pandemic. *Br. J. Manag.* 33 (2), 634–656.
- Azar, J., Duro, M., Kadach, I., Ormazabal, G., 2021. The big three and corporate carbon emissions around the world. *J. Financ. Econ.* 142 (2), 674–696.
- Azzimonti, M., 2018. Partisan conflict and private investment. *J. Monet. Econ.* 93, 114–131.
- Baker, S.R., Davis, S.J., Levy, J.A., 2022. State-level economic policy uncertainty. *J. Monet. Econ.* 132, 81–99.
- Balachandran, B., Nguyen, J.H., 2018. Does carbon risk matter in firm dividend policy? evidence from a quasi-natural experiment in an imputation environment. *J. Bank. Financ.* 96, 249–267.
- Baldauf, M., Garlappi, L., Yannelis, C., 2020. Does climate change affect real estate prices? Only if you believe in it. *Rev. Financ. Stud.* 33 (3), 1256–1295.
- Baloria, V.P., Lo, A.K., Shu, S., 2025. Media exposure and corporate labor investment decisions. *Account. Rev.* 1–27.
- Bansal, P., Clelland, I., 2004. Talking trash: Legitimacy, impression management, and unsystematic risk in the context of the natural environment. *Acad. Manag. J.* 47 (1), 93–103.
- Bar, R.N., Haviv, A., 2023. Brand Building to Deter Entry and its Impact on Brand Value. *Manag. Sci.* 69 (9), 5418–5438.
- Barg, J.A., Drobetz, W., El Ghoul, S., Guedhami, O., Schröder, H., 2024. Institutional dual ownership and voluntary greenhouse gas emission disclosure. *Finance* 89, 102671.
- Bartram, S.M., Hou, K., Kim, S., 2022. Real effects of climate policy: Financial constraints and spillovers. *J. Financ. Econ.* 143 (2), 668–696.
- Becker-Blease, J.R., Paul, D.L., 2006. Stock liquidity and investment opportunities: evidence from index additions. *Financ. Manag.* 35 (3), 35–51.
- Belo, F., Lin, X., Vitorino, M.A., 2014. Brand capital and firm value. *Rev. Econ. Dyn.* 17 (1), 150–169.
- Ben-Rephael, A., Da, Z., Israelsen, R.D., 2017. It depends on where you search: institutional investor attention and underreaction to news. *Rev. Financ. Stud.* 30 (9), 3009–3047.
- Ben-Rephael, A., Carlin, B.I., Da, Z., Israelsen, R.D., 2021. Information consumption and asset pricing. *J. Financ.* 76 (1), 357–394.
- Benkraiem, R., Dimic, N., Piljak, V., Swinkels, L., Vulcanovic, M., 2025. Media-based climate risks and international corporate bond market. *J. Int. Money Financ.* 151, 103260.
- Berkman, H., Jona, J., Soderstrom, N., 2024. Firm-specific climate risk and market valuation. *Acc. Organ. Soc.* 112, 101547.
- Bolton, P., & Kacperczyk, M. (2021). Global pricing of carbon-transition risk.
- Bolton, P., Kacperczyk, M., 2023. Global pricing of carbon-transition risk. *J. Financ.* 78 (6), 3677–3754.
- Bonato, M., Cepni, O., Gupta, R., Pierdzioch, C., 2023a. Climate risks and realized volatility of major commodity currency exchange rates. *J. Financ. Mark.* 62, 100760.
- Bonato, M., Cepni, O., Gupta, R., Pierdzioch, C., 2023b. Climate risks and state-level stock market realized volatility. *J. Financ. Mark.* 66, 100854.
- Bose, S., Minnick, K., Shams, S., 2021. Does carbon risk matter for corporate acquisition decisions? *Finance* 70, 102058.
- Boykoff, M.T., Boykoff, J.M., 2007. Climate change and journalistic norms: a case-study of US mass-media coverage. *Geoforum* 38 (6), 1190–1204.
- Broder, J.M., Krauss, C., 2010. Advocates of climate bill scale down their goals. *The New York Times*, p. 27.
- Brown, J.R., Gustafson, M.T., Ivanov, I.T., 2021. Weathering cash flow shocks. *J. Financ.* 76 (4), 1731–1772.
- Buil, I., De Chernatony, L., Martínez, E., 2013. Examining the role of advertising and sales promotions in brand equity creation. *J. Bus. Res.* 66 (1), 115–122.
- Bushee, B.J., Core, J.E., Guay, W., Hamm, S.J., 2010. The role of the business press as an information intermediary. *J. Account. Res.* 48 (1), 1–19.
- Butler, A.W., Grullon, G., Weston, J.P., 2005. Stock market liquidity and the cost of issuing equity. *J. Financ. Quant. Anal.* 40 (2), 331–348.
- Campigoglio, E., Daumas, L., Monnin, P., von Jagow, A., 2023. Climate-related risks in financial assets. *J. Econ. Surv.* 37 (3), 950–992.
- Cao, Z., Chen, S.X., Lee, E., Xie, S., 2024. Weathering the storm: Unravelling the influence of climate change risk exposure on firms' human capital investment. *Br. J. Manag.*
- Capasso, G., Gianfrate, G., Spinelli, M., 2020. Climate change and credit risk. *J. Clean. Prod.* 266, 121634.
- Carmichael, J.T., Brulle, R.J., 2018. Media use and climate change concern. *Int. J. Media Cult. Polit.* 14 (2).
- Cepni, O., Şensoy, A., Yilmaz, M.H., 2024. Climate change exposure and cost of equity. *Energy Econ.* 130, 107288.
- Chang, Y., He, W., Mi, L., 2024. Climate risk and payout flexibility around the world. *Journal of Banking & Finance* 107233.
- Chauvin, K.W., Hirschey, M., 1993. Advertising, R&D expenditures and the market value of the firm. *Financ. Manag.* 128–140.
- Chava, S., 2014. Environmental externalities and cost of capital. *Management Science* 60 (9), 2223–2247.
- Chemmanur, T., Yan, A., 2009. Product market advertising and new equity issues. *J. Financ. Econ.* 92 (1), 40–65.
- Chemmanur, T.J., Yan, A., 2019. Advertising, attention, and stock returns. *Q. J. Financ.* 9 (03), 1950009.
- Cui, X., Ji, X., Meng, W., Song, Q., 2023. Product market competition and corporate advertising expenditure: evidence from a natural experiment. *Res. Int. Bus. Financ.* 64, 101849.
- D'Mello, R., Toscano, F., 2020. Economic policy uncertainty and short-term financing: the case of trade credit. *Finance* 64, 101686.
- Dotto, V., Oakes, A.R., 2019. The environment, a bipartisan issue?: Partisanship polarization and climate change policies in the United States. *Br. J. Am. Legal Stud.* 8 (3), 483–506.
- Duchin, R., Ozbas, O., Sensoy, B.A., 2010. Costly external finance, corporate investment, and the subprime mortgage credit crisis. *J. Financ. Econ.* 97 (3), 418–435.
- Dyck, A., & Zingales, L. (2002). The corporate governance role of the media. In: *National Bureau of Economic Research Cambridge, Mass., USA*.
- El Ouadghiri, I., Guesmi, K., Peillex, J., Ziegler, A., 2021. Public attention to environmental issues and stock market returns. *Ecol. Econ.* 180, 106836.
- Engelberg, J.E., Parsons, C.A., 2011. The causal impact of media in financial markets. *J. Financ.* 66 (1), 67–97.
- Engle, R.F., Giglio, S., Kelly, B., Lee, H., Stroebel, J., 2020. Hedging climate change news. *Rev. Financ. Stud.* 33 (3), 1184–1216.
- Erickson, G., Jacobson, R., 1992. Gaining comparative advantage through discretionary expenditures: the returns to R&D and advertising. *Manag. Sci.* 38 (9), 1264–1279.
- Eskeland, G.S., Harrison, A.E., 2003. Moving to greener pastures? Multinationals and the pollution haven hypothesis. *J. Dev. Econ.* 70 (1), 1–23.
- Faccini, R., Matin, R., Skiadopoulos, G., 2023. Dissecting climate risks: are they reflected in stock prices? *J. Bank. Financ.* 106948.
- Fang, L., Peress, J., 2009. Media coverage and the cross-section of stock returns. *J. Financ.* 64 (5), 2023–2052.
- Fang, L.H., Peress, J., Zheng, L., 2014. Does media coverage of stocks affect mutual funds' trading and performance? *Rev. Financ. Stud.* 27 (12), 3441–3466.

- Fang, V.W., Noe, T.H., Tice, S., 2009. Stock market liquidity and firm value. *J. Financ. Econ.* 94 (1), 150–169.
- Fard, A., Javadi, S., Kim, I., 2020. Environmental regulation and the cost of bank loans: International evidence. *J. Financ. Stab.* 51, 100797.
- Fee, C.E., Hadlock, C.J., Pierce, J.R., 2009. Investment, financing constraints, and internal capital markets: evidence from the advertising expenditures of multinational firms. *Rev. Financ. Stud.* 22 (6), 2361–2392.
- Fee, C.E., Hadlock, C.J., Pierce, J.R., 2012. What happens in acquisitions?: evidence from brand ownership changes and advertising investment. *Finance* 18 (3), 584–597.
- Feng, F., Han, L., Jin, J., Li, Y., 2024. Climate change exposure and bankruptcy risk. *British Journal of Management*.
- Fernandes, F.D.S., Papadimitriou, F.I., 2025. The effect of climate risk on firm cash holdings: evidence from the euro area. *Eur. J. Financ.* 1–29.
- Ferreira, M.A., Matos, P., 2008. The colors of investors' money: the role of institutional investors around the world. *J. Financ. Econ.* 88 (3), 499–533.
- Fich, E.M., Starks, L.T., Tran, A.L., 2024. Target firm advertising and firm value. *Manag. Sci.*
- Gantchev, N., Giannetti, M., Li, R., 2022. Does money talk? Divestitures and corporate environmental and social policies. *Eur. Financ. Rev.* 26 (6), 1469–1508.
- Gao, H., Wang, J., Wang, Y., Wu, C., Dong, X., 2020. Media coverage and the cost of debt. *J. Financ. Quant. Anal.* 55 (2), 429–471.
- Garel, A., Petit-Romec, A., 2021. Investor rewards to environmental responsibility: evidence from the COVID-19 crisis. *Finance* 68, 101948.
- Ginglinger, E., Moreau, Q., 2023. Climate risk and capital structure. *Manag. Sci.* 69 (12), 7492–7516.
- Godfrey, P.C., Merrill, C.B., Hansen, J.M., 2009. The relationship between corporate social responsibility and shareholder value: an empirical test of the risk management hypothesis. *Strateg. Manag. J.* 30 (4), 425–445.
- Gounopoulos, D., Zhang, Y., 2024. Temperature trend and corporate cash holdings. *Financ. Manag.* 53 (3), 471–499.
- Goyenko, R.Y., Holden, C.W., Trzcinka, C.A., 2009. Do liquidity measures measure liquidity? *J. Financ. Econ.* 92 (2), 153–181.
- Grullon, G., Kanatas, G., Kumar, P., 2006. The impact of capital structure on advertising competition: an empirical study. *J. Bus.* 79 (6), 3101–3124.
- Grullon, G., Kanatas, G., Weston, J.P., 2004. Advertising, breadth of ownership, and liquidity. *Rev. Financ. Stud.* 17 (2), 439–461.
- Gu, T., 2017. US multinationals and cash holdings. *J. Financ. Econ.* 125 (2), 344–368.
- Hadlock, C.J., Pierce, J.R., 2010. New evidence on measuring financial constraints: moving beyond the KZ index. *Rev. Financ. Stud.* 23 (5), 1909–1940.
- Hartzmark, S.M., Sussman, A.B., 2019. Do investors value sustainability? a natural experiment examining ranking and fund flows. *J. Financ.* 74 (6), 2789–2837.
- Hase, V., Mahl, D., Schäfer, M.S., Keller, T.R., 2021. Climate change in news media across the globe: an automated analysis of issue attention and themes in climate change coverage in 10 countries (2006–2018). *Glob. Environ. Chang.* 70, 102353.
- He, F., Ren, X., Wang, Y., Lei, X., 2025. Climate risk and corporate bond credit spread. *J. Int. Money Financ.* 103297.
- He, Q., Qiu, J., 2025. Environmental enforcement actions and corporate green innovation. *Finance* 91, 102711.
- Heckman, J.J., 1979. Sample selection bias as a specification error. *Econometrica* 153–161.
- Heese, J., Pérez-Cavazos, G., Peter, C.D., 2022. When the local newspaper leaves town: the effects of local newspaper closures on corporate misconduct. *J. Financ. Econ.* 145 (2), 445–463.
- Hopenhayn, H.A., Werner, I.M., 1996. Information, liquidity, and asset trading in a random matching game. *J. Econ. Theory* 68 (2), 349–379.
- Hossain, A., Masum, A.-A., Benkraiem, R., 2024. Long-term institutional investors and climate change news Beta. *Finance* 89, 102693.
- Hossain, A., Masum, A.A., Saadi, S., Benkraiem, R., Das, N., 2023. Firm-level climate change risk and CEO equity incentives. *Br. J. Manag.* 34 (3), 1387–1419.
- Hossain, M.M., Javakhadze, D., 2020. Corporate media connections and merger outcomes. *Finance* 65, 101736.
- Huang, H.H., Kerstein, J., Wang, C., Wu, F., 2022. Firm climate risk, risk management, and bank loan financing. *Strateg. Manag. J.* 43 (13), 2849–2880.
- Huynh, T.D., Xia, Y., 2021. Climate change news risk and corporate bond returns. *J. Financ. Quant. Anal.* 56 (6), 1985–2009.
- Javadi, S., Masum, A.-A., 2021. The impact of climate change on the cost of bank loans. *Finance* 69, 102019.
- Javadi, S., Masum, A.A., Aram, M., Rao, R.P., 2023. Climate change and corporate cash holdings: Global evidence. *Financ. Manag.* 52 (2), 253–295.
- Jiang, C., Li, Y., Zhang, X., Zhao, Y., 2025. Climate risk and corporate debt decision. *J. Int. Money Financ.* 151, 103261.
- Jiang, F., Shen, Y., Xia, X., 2024. The spillover effect of advertising on the capital market: evidence from financial constraints. *Finance* 84, 102529.
- Kahle, K.M., Stulz, R.M., 2013. Access to capital, investment, and the financial crisis. *J. Financ. Econ.* 110 (2), 280–299.
- Karmakar, S., Gupta, R., Cepni, O., Rognone, L., 2023. Climate risks and predictability of the trading volume of gold: evidence from an INGARCH model. *Resour. Policy* 82, 103438.
- Karpoff, J.M., Lott, J., John, R., Wehrly, E.W., 2005. The reputational penalties for environmental violations: Empirical evidence. *J. Law Econ.* 48 (2), 653–675.
- Kim, I., Pantzalis, C., Zhang, Z., 2021. Multinationality and the value of green innovation. *Finance* 69, 101996.
- Krueger, P., Sautner, Z., Starks, L.T., 2020. The importance of climate risks for institutional investors. *Rev. Financ. Stud.* 33 (3), 1067–1111.
- Kuhnen, C.M., Niessen, A., 2012. Public opinion and executive compensation. *Manag. Sci.* 58 (7), 1249–1272.
- Larkin, Y., 2013. Brand perception, cash flow stability, and financial policy. *J. Financ. Econ.* 110 (1), 232–253.
- Le, H., Gregoriou, A., Nguyen, T., 2023. Advertising, product market competition and stock returns. *Rev. Quant. Financ. Acc.* 60 (4), 1605–1628.
- Liang, C., 2024. Advertising rivalry and discretionary disclosure. *J. Account. Econ.* 77 (1), 101611.
- Liu, B., McConnell, J.J., 2013. The role of the media in corporate governance: do the media influence managers' capital allocation decisions? *J. Financ. Econ.* 110 (1), 1–17.
- Liu, Y., Dong, H., Wang, Y., 2025. In the same boat: climate risk and hidden debt in the supply chain. *J. Int. Money Financ.* 103299.
- Loughran, T., Ritter, J., 2004. Why has IPO underpricing changed over time? *Financ. Manag.* 5–37.
- Ma, D., Zhang, Y., Ji, Q., Zhao, W.-L., Zhai, P., 2024. Heterogeneous impacts of climate change news on China's financial markets. *Int. Rev. Financ. Anal.* 91, 103007.
- Matsumura, E.M., Prakash, R., Vera-Muñoz, S.C., 2024. Climate-risk materiality and firm risk. *Rev. Acc. Stud.* 29 (1), 33–74.
- Mayer, E.J., 2021. Advertising, investor attention, and stock prices: evidence from a natural experiment. *Financ. Manag.* 50 (1), 281–314.
- Miller, G.S., 2006. The press as a watchdog for accounting fraud. *J. Account. Res.* 44 (5), 1001–1033.
- Minton, B.A., Schrand, C., 1999. The impact of cash flow volatility on discretionary investment and the costs of debt and equity financing. *Journal of financial economics* 54 (3), 423–460.
- Nadarajah, S., Duong, H.N., Ali, S., Liu, B., Huang, A., 2021. Stock liquidity and default risk around the world. *J. Financ. Mark.* 55, 100597.
- Nejadmalayeri, A., Mathur, I., Singh, M., 2013. Product market advertising and corporate bonds. *Finance* 19, 78–94.
- Nguyen, J.H., Phan, H.V., 2020. Carbon risk and corporate capital structure. *Finance* 64, 101713.
- Ozkan, A., Temiz, H., Yildiz, Y., 2022. Climate risk, corporate social responsibility, and firm performance. *Br. J. Manag.*
- Peng, D., Colak, G., Shen, J., 2023. Lean against the wind: the effect of policy uncertainty on a firm's corporate social responsibility strategy. *Finance* 79, 102376.
- Peress, J., 2014. The media and the diffusion of information in financial markets: evidence from newspaper strikes. *J. Financ.* 69 (5), 2007–2043.
- Qi, B., Yang, R., Tian, G., 2014. Can media deter management from manipulating earnings? evidence from China. *Rev. Quant. Financ. Acc.* 42, 571–597.
- Rao, S., Koirala, S., Thapa, C., Neupane, S., 2022. When rain matters! Investments and value relevance. *Finance* 73, 101827.
- Ren, X., Li, W., Duan, K., Urquhart, A., 2025. Carbon risk and debt financing: an international perspective. *J. Int. Money Financ.* 103294.
- Riordan, R., & Nerlinger, M. (2022). *Carbon Liquidity*. Available at SSRN 3938563.
- Roth Tran, B., 2023. Sellin' in the rain: Weather, climate, and retail sales. *Management Science* 69 (12), 7423–7447.
- Roy, P.P., Rao, S., Zhu, M., 2022. Mandatory CSR expenditure and stock market liquidity. *Finance* 72, 102158.
- Schmidt, A., Ivanova, A., Schäfer, M.S., 2013. Media attention for climate change around the world: a comparative analysis of newspaper coverage in 27 countries. *Glob. Environ. Chang.* 23 (5), 1233–1248.
- Sheng, X., Gupta, R., Cepni, O., 2022a. Persistence of state-level uncertainty of the United States: the role of climate risks. *Econ. Lett.* 215, 110500.
- Sheng, X., Gupta, R., Cepni, O., 2022b. The effects of climate risks on economic activity in a panel of US states: the role of uncertainty. *Econ. Lett.* 213, 110374.
- Stroebel, J., & Wurgler, J. (2021). What do you think about climate finance? In (Vol. 142, pp. 487–498): Elsevier.
- Song, Y., Xian, R., 2024. Institutional investors' corporate site visits and firm-level climate change risk disclosure. *International Review of Financial Analysis* 93, 103145.

- Starks, L.T., 2023. Presidential address: Sustainable finance and ESG issues—Value versus values. *The Journal of Finance* 78 (4), 1837–1872.
- Suchman, M.C., 1995. Managing legitimacy: Strategic and institutional approaches. *Acad. Manag. Rev.* 20 (3), 571–610.
- Telser, L.G., 1964. Advertising and competition. *J. Polit. Econ.* 72 (6), 537–562.
- Tetlock, P.C., 2014. Information transmission in finance. *Annu. Rev. Financ. Econ.* 6 (1), 365–384.
- Thapa, C., & Hillier, D. (2022). Financial Market Perception and Climate Political Leadership.**
- Venturini, A., 2022. Climate change, risk factors and stock returns: a review of the literature. *Int. Rev. Financ. Anal.* 79, 101934.
- Wang, L., 2024. Partisan conflict and corporate credit spreads: the role of political connection. *Finance* 84, 102526.
- White, J.B., Miles, M.P., 1996. The financial implications of advertising as an investment. *J. Advert. Res.* 36, 43–54.
- Zhu, B., Hou, R., 2022. Carbon risk and dividend policy: evidence from China. *Int. Rev. Financ. Anal.* 84, 102360.