

Climate Change Exposure

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Measurements Comparison

Article	Source	Method
Sautner et al., 2023; Li et al., 2024	Earnings call	Textual analysis, ML
Berkman et al., 2024	10-K/10-Q	Textual analysis
杜剑等, 2023	Annual Report	Textual analysis
Engle et al., 2020	Newspaper	Textual analysis
Matsumura et al., 2014; Engle et al., 2020	MSCI, Bloomberg...	CCI; ESG ratings; CO2 emissions; environmental disclosure quality
Huynh et al., 2023...	SHELDUS, NOAA	Disaster region, Extreme Weather

Textual Analysis and Earnings call

- Climate change exposure(Sautner et al., 2023)
 - Machine learning keyword discovery algorithm to identify climate change bigrams related to **opportunity, physical, and regulatory** shocks.
 - Capturing the attention devoted to climate change topics by call participants.

$$CCExposure_{i,t} = \frac{1}{B_{i,t}} \sum_b^{B_{i,t}} (1[b \in \mathbb{C}]),$$

- weigh bigram's representativeness.

$$CCExposure_{i,t}^{TFIDF} = \frac{1}{B_{i,t}} \sum_b^{B_{i,t}} \left(1[b \in \mathbb{C}] \times \log \left(\frac{N_{\mathbb{T}}}{f_{b,\mathbb{T}}} \right) \right),$$

Textual Analysis and Earnings call

- Corporate climate risk(Li et al., 2024)
 - Textual analysis of **physical and transition climate risks** using dictionaries and verbs.
 - Climate-related dictionaries different to Sautner et al., 2023
 - human supervision and iterative testing.
 - More transparent and less sensitive to initial inputs.
 - Focus on how firms respond to transition risk, priced in equity markets

Textual Analysis, newspaper, 10-K

- WSJ Climate Change News Index(Engle et al., 2020)
 - Climate Change Vocabulary: NASA, IPCC, EPA
 - TF-IDF: reflect the importance of each term in the context of the article.
 - Cosine Similarity: the alignment of terms used in the journal with those in the CCV.
- Firm-specific climate risk(Berkman et al., 2024)
 - 10-K: SEC requires all listed companies to disclose material climate risk information; covers all listed firms.
 - Conference call: ignore time-invariant characteristics.

Pricing climate change

Premium	Description	References
Positive	Higher climate risk have higher expected stock returns.	Oesterreich et al., 2015 Trinks et al., 2022
Negative	Higher climate risk have lower expected stock returns. (increased concern or market inefficiency)	Pastor et al., 2021
No	No additional information	Gørgen et al., 2020 Dai et al., 2020

Question

- Conference calls: participants' attention, short-term risks
- 10-K, ESG report: greenwashing, self-select to disclose information
- New source?
- Climate risk and regulation?