

CHAZEN INSTITUTE RESEARCH BRIEF

Is Physical Climate Risk Priced? Evidence From Regional Variation In Exposure to Heat Stress

KEY TAKEAWAYS

- ✓ Among the many risks climate change poses, heat stress exposure stands out quantitatively as the most significant contributor to economic damages and affects companies' cash flows and their expected default frequency.
- ✓ Municipalities in locations with higher heat stress exposure find access to bond markets more expensive. This is important because these municipalities need capital to invest in climate-risk abatement projects.
- ✓ Higher yields are associated with increased exposure to heat stress for sub-investment grade corporate bonds, with little effect for investment grade corporate bond spreads.

Climate change is expected to have severe implications to the global economy through more frequent natural disasters and rising temperatures. According to new research, the increasing frequency of heat waves proves to be the most significant economic cost affecting asset prices and the cost of borrowing.

The paper from the National Bureau of Economic Research, "[Is Physical Climate Risk Priced? Evidence from Regional Variation in Exposure to Heat Stress](#)," explores how exposure to physical risks, especially heat stress, affects the cost of capital for municipalities, corporations, and equity assets. The study was co-authored by **Chazen Senior Scholar Suresh Sundaresan of Columbia Business School**, Viral Acharya of New York University's Stern School of Business, Tuomas Tomunen of Boston College's Carroll School of Management, and Timothy Johnson of the University of Illinois's Gies School of Business.

Research

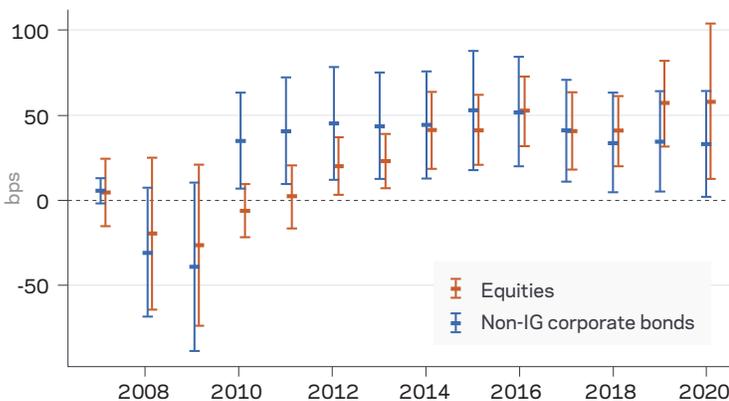
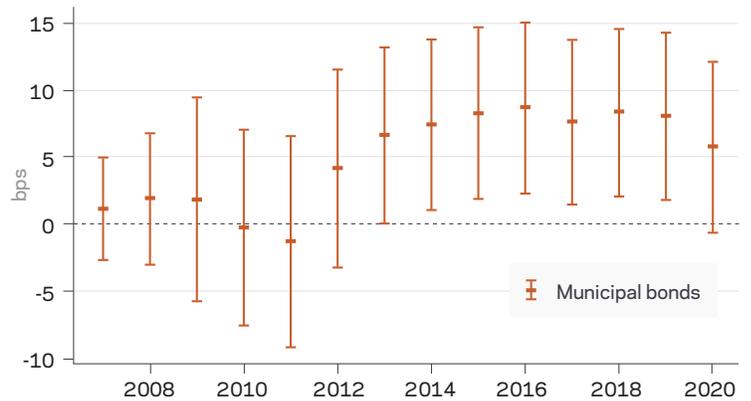
Understanding how climate-related risks affect the cost of capital is crucial for making decisions about investment in mitigation.

The research explores regional variations in exposure to heat stress to find if climate risk is priced in municipal and corporate bonds as well as in equity markets. The risk is seen across five key dimensions: heat stress, drought, floods, hurricanes, and rising sea levels. The study further highlights how exposure to such physical risks affects the debt issuance costs of municipalities and corporations, as well as expected returns on equities, focusing especially on the impact of heat stress.

While it's widely known that heat stress is the primary climate change factor to cause economic damage, this is the first study to quantify the effects on asset prices and the cost of borrowing.

Estimated impact of heat score on municipal bond spreads

Municipalities in locations with higher heat stress exposure find access to bond markets more expensive. This is important because these municipalities need capital to invest in climate-risk abatement projects.



Estimated impact of heat score on corporate bond spreads and expected returns on equities

The researchers found qualitatively similar results in corporate bond spreads. Higher yields are associated with increased exposure to heat stress for sub-investment grade corporate bonds, with little effect for investment grade corporate bond spreads.

Results

The study's main finding was that exposure to heat stress-related disasters increased yield spreads and expected returns.

Heat stress exposure affects companies' cash flows and their expected default frequency, which is a statistical probability of default based on historical default experience data. The effect of heat stress exposure on credit spreads is positive but dampened over time statistically.

Researchers found that asset prices suggest that extreme heat can cause damage to the local economy through several different channels, including:

- increased energy demand
- decreased efficiency of electricity production
- decreased labor productivity

Heat stress stands out in terms of its consistent asset-pricing impact relative to other physical risks and is priced in municipal credit spreads, corporate credit spreads, and equity markets. The effects of heat stress are substantial, ranging from 15 bps (municipal bonds) to 45 bps (equity).

The cost of capital associated with heat stress is continuously increasing across all three asset classes.

The main channels through which the risk affects pricing are energy expenditures and a decrease in labor productivity in industries more exposed to heat stress.

Conclusion

Understanding how asset markets price climate risk is important for gauging the private incentives for issuers to respond to the threat, e.g., by undertaking investment in abatement technologies. The magnitude of the market's expected losses and required compensation for risk can also be important inputs to structural models of the broader economic consequences of global warming.

[+ Download](#) the full paper.

[Learn more](#) about the Chazen Senior Scholar.

[Subscribe](#) to Chazen Global Insights.