

Climate Risk and Credit

Identifying
Climate Risk in
Credit: Leveraging
Academic Research
for Institutional
Investors



September 2026

Marketing Communication



Executive summary.

Climate risk is increasingly recognised as a material factor in credit markets. Yet for investors, one challenge remains unresolved: **how should climate exposure be measured when different climate indices often produce conflicting results?**

New research conducted through the KEDGE-Candriam “Finance Reconsidered” Chair explores this question in depth¹. Using nearly two decades of US and European corporate bond data, the study finds that uncertainty around climate exposure is itself priced by markets, with investors demanding additional compensation for ambiguity in climate risk assessments.

The research highlights an important issue for institutional investors. While climate exposure has become increasingly integrated into investment processes, estimating that exposure remains highly dependent on the

methodology, datasets, and climate indicators used. Different climate indices often produce materially different assessments of the same issuer or bond.

The study shows that **this dispersion — referred to as climate beta uncertainty — represents a distinct source of risk in corporate bond markets.**

The findings provide valuable insights for investors seeking to strengthen climate-aware portfolio construction and demonstrate how academic research can support more robust investment decision-making.



¹ *Climate Beta Uncertainty in Corporate Bonds*, par Ricardo Henriquez-Salman (KEDGE Business School / Université Aix-Marseille), <https://iscfs2025.sciencesconf.org/642770/document>



Candriam has a long history of recognising climate risk and its implications for institutional investors. This is why we have long supported sustainable investing, not only through climate analysis, but also by considering its links with broader environmental issues such as biodiversity. Academic research plays an important role in helping us continue to refine our investment frameworks and risk analysis.

Marie Niemczyk

Head of ESG Client Portfolio Management, Candriam

Matters for Investors ?

Why Academic Research Matters for Investors.

As climate risks become increasingly material for issuers, investors face growing pressure to understand how these risks may affect corporate balance sheets, financing conditions, and long-term creditworthiness.

Physical risks — including floods, droughts, and extreme weather events — can disrupt operations and supply chains. Transition risks arising from regulation, carbon pricing, technological disruption, and changing consumer behaviour may also reshape entire industries and business models.

At the same time, investors face a more practical challenge: measuring climate risk consistently remains difficult.

This is where academic research can provide a valuable perspective. By combining rigorous methodologies with long-term datasets, academic work can help investors better understand how climate risks are transmitted through financial markets and how they may influence asset pricing over time.

Moving from theoretical to practical

Candriam has developed longstanding relationships with leading academic institutions to help bridge the gap between academic research and practical investment management. One example is the KEDGE-Candriam “Finance Reconsidered” Chair, launched in 2019 and recently renewed². The Chair focuses on topics including ESG materiality, sustainable asset pricing, and climate risks in fixed income markets — all areas that are becoming increasingly important for institutional investors.

² The Candriam Institute for Sustainable Development supports partnerships with leading academic institutions, including KEDGE Business School, to promote research and education related to sustainable finance and long-term economic development.

Understanding Climate Beta Uncertainty.

The research paper *Climate Beta Uncertainty in Corporate Bonds*, authored by Ricardo Henriquez-Salman (KEDGE Business School / Aix-Marseille University), analysed more than 680,000 US and European corporate bond observations between 2004 and 2023.

The study examines a **central challenge facing credit investors: how to measure a bond's sensitivity to climate risk.**

What Is Climate Beta?

This is where climate beta comes in. Climate beta (β_{CC}) measures the sensitivity of a corporate bond's returns to movements in a climate risk proxy. Like a traditional market beta, it captures how much a bond's return co-moves with changes in climate-related risk factors.

Unlike traditional market risk factors, however, climate risk does not have a single universally accepted measure. Investors today rely on a wide range of climate indices built using different datasets, methodologies, and assumptions.



One of the biggest challenges faced by investors is analysing and interpreting data from numerous industry indices.

Climate Beta Uncertainty in Corporate Bonds, authored by **Ricardo Henriquez-Salman**, KEDGE Business School/Aix-Marseille University



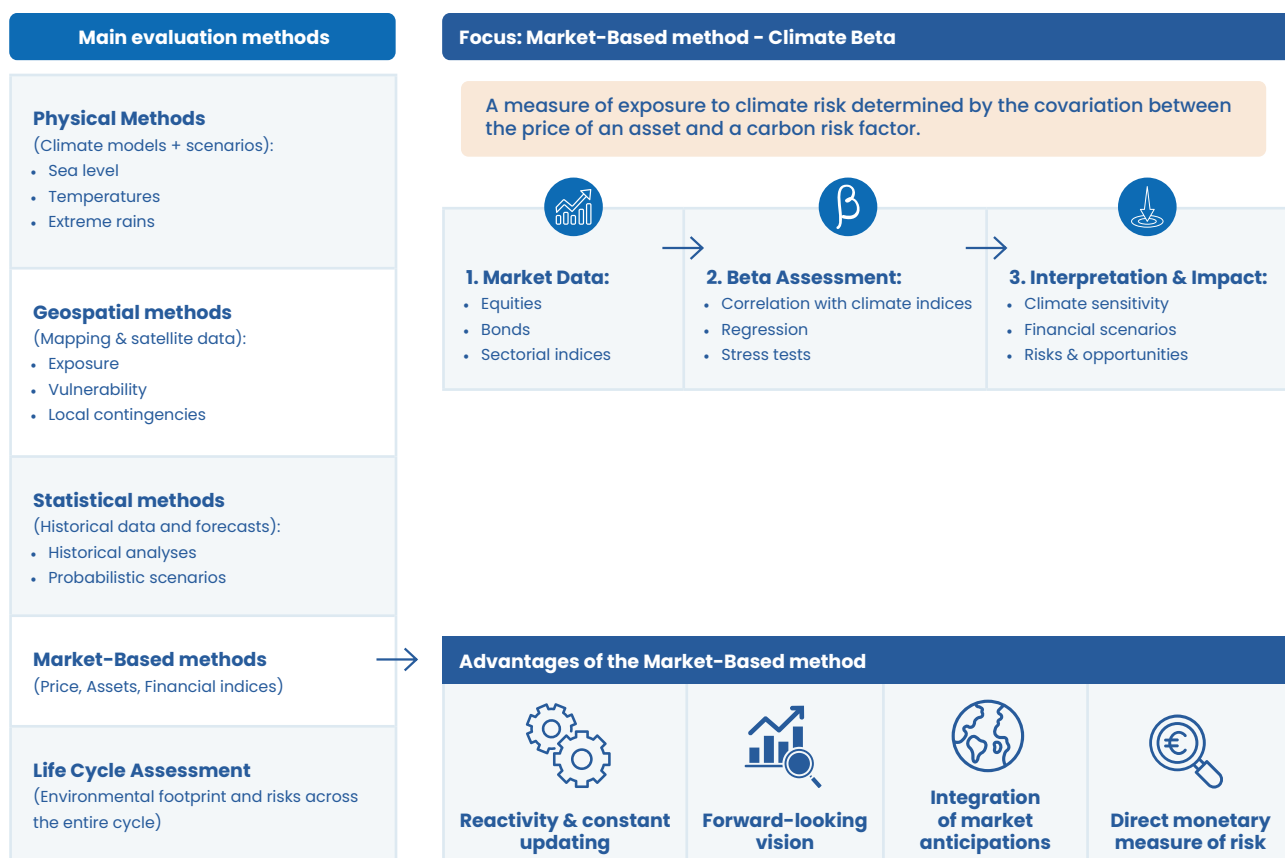
These indices may focus on:

- physical climate risks,
- transition risks,
- regulatory developments,
- media sentiment,
- policy uncertainty,
- or climate-related market attention.

As a result, different indices may produce significantly different estimates of a bond's climate exposure.

The research demonstrates that this uncertainty itself has financial consequences.

Figure 1: Various ways to assess climate risks



Source: Empirical Asset Pricing & ESG Materiality Three Essays, Ricardo Henriquez-Salman, Chair: KEDGE/Candriam
 "Finance Reconsidered: Addressing Sustainable Economic Development," Aix-Marseille University, March 17, 2026

Key Findings from the Research.

Climate Beta Uncertainty is Priced by Markets

One of the study's central findings is that bonds with greater climate beta uncertainty tend to offer higher future returns.

In other words, investors appear to demand additional compensation when climate exposure is difficult to assess with confidence.

Figure 2: Historical evidence suggests a link between climate beta uncertainty and bond returns

Market/Return Type	Uncertainty Premium (γ)	Per σ Increase (bps/month)	Annualised (approx.)	Annual Cost on \$1bn
US—Total Returns	0.09***	5.5 bps	~66 bps	~\$6.6m
EU—Total Returns	0.13**	7.8 bps	~94 bps	~€9.4m
US—Duration-Adjusted	0.05***	2.6 bps	~31 bps	~\$3.1m
EU—Duration-Adjusted	0.06***	1.6 bps	~19 bps	~€1.9m

Source: *Climate Beta Uncertainty in Corporate Bonds* authored by Ricardo Henriquez-Salman, KEDGE Business School/Aix-Marseille University. The results presented are based on historical academic research covering the period 2004–2023. Historical observations and relationships identified in the study may not persist in the future and must not be interpreted as forecasts of future performance or investment outcomes

Importantly, this premium exists independently from the level of climate exposure itself. The findings therefore suggest that uncertainty

around climate risk has become a distinct risk factor in credit markets.

Climate Events Can Reduce Uncertainty

The research also suggests that major climate or regulatory events may help reduce uncertainty by improving market understanding of climate exposure.

Events such as:

- the Paris Agreement,
- climate-related regulatory changes,
- or major physical climate events,

can help investors reassess which issuers are genuinely exposed to climate risks and how those risks should be priced.

The findings, which were observed across both US and European corporate bond markets, indicate that periods of heightened climate awareness may contribute to improved price discovery in credit markets.



Climate Risk in Corporate Bonds Is Not Only a Credit Story

Another important conclusion is that **some of the apparent climate-hedging characteristics of investment-grade corporate bonds are linked to duration effects** rather than purely to issuer resilience.

This distinction matters for investors constructing climate-aware fixed income portfolios.

The research suggests that investors seeking to isolate climate-related credit effects may need to distinguish carefully between duration exposure, sovereign risk and issuer-specific credit risk.



Implications for Institutional Investors.

The research highlights several practical considerations for institutional investors integrating climate analysis into credit portfolios.

1. Climate risk cannot be captured by a single index

No individual climate index fully captures the complexity of climate-related financial risks.

Using a single dataset or methodology may lead to incomplete or potentially misleading assessments of issuer exposure.

For investors, this reinforces the importance of:

- using multiple data sources,
- comparing methodologies,
- and incorporating uncertainty analysis into portfolio risk frameworks.

2. Climate uncertainty has portfolio construction implications

The findings suggest that climate beta uncertainty may represent a persistent source of risk premia within credit markets.

This has implications for:

- portfolio allocation,
- issuer selection,
- spread analysis,
- and risk-adjusted return expectations.

As climate regulation, disclosure standards, and transition pathways continue to evolve, investors may increasingly need to assess not only climate exposure itself, but also the reliability and consistency of climate-related data.

3. Physical climate risks are becoming increasingly relevant

The study also highlights the growing importance of physical climate risks.

Extreme weather events can have direct financial consequences for issuers through:

- operational disruptions,
- supply chain interruptions,
- asset damage,
- and rising financing costs.

As these events become more frequent, investors are placing greater emphasis on understanding how physical climate vulnerabilities may affect long-term credit quality.



Risk into Cred

Analysis

How Candriam Integrates Climate Risk into Credit Analysis.

At Candriam, climate analysis is integrated directly into the assessment of issuer resilience and long-term creditworthiness.

Our approach considers both physical climate risks and transition risks associated with the shift toward a lower-carbon economy, and covers scope 1, 2 and 3 emissions³.

This includes analysing how climate-related factors may affect:

- cash flow durability,
- business models,
- financing conditions,
- and long-term solvency.

Importantly, we recognise that climate risk assessment cannot rely on a single metric or methodology. The findings from the KEDGE research reinforce the importance of adopting a multidimensional approach to climate analysis in fixed income portfolios.

This is why our analysis incorporates a range of forward-looking indicators, including:

- carbon footprint,
- carbon intensity (more precisely weighted average carbon intensity),
- temperature alignment,
- fossil fuel exposure,
- green activity exposure,
- and transition readiness.

Candriam also continues to expand its assessment of physical climate risks across portfolios to provide clients with a broader understanding of potential climate-related vulnerabilities.

3 Scope 1, 2 and 3 emissions are classifications of greenhouse gas emissions. Scope 1 are direct emissions owned or controlled by a company (e.g. from its vehicles), scope 2 are indirect emissions from the generation of purchased energy, such as energy consumed by the company, and scope 3 are all other indirect emissions that occur in a company's value chain, including both upstream and downstream emissions (e.g. emissions from suppliers and product users).

Investment Practice

Conclusion: Bridging Academic Research and Investment Practice.

As climate considerations become increasingly embedded in financial markets, investors face growing challenges in measuring, interpreting, and pricing climate-related risks.

The research conducted through the KEDGE-Candriam “Finance Reconsidered” Chair highlights an important reality: uncertainty around climate exposure is itself financially material.

For institutional investors, this reinforces the need for:

- robust climate data analysis,
- diversified analytical frameworks,
- and forward-looking risk assessment approaches.

More broadly, the study illustrates the value of combining academic research with practical investment expertise. Partnerships between academia and asset managers can help generate deeper insights into emerging risks and support the development of more resilient investment strategies in an increasingly complex climate environment.





€163 B

AUM at end
December 2025*



600

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committed professionals



+ 25 years

Leading the way in
sustainable investing

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