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Climate Change and Firm Innovation: Empirical Evidence on Quantity and Quality in China

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Extended Abstract

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Abstract Summary

This paper examines how climate change affects corporate innovation in China, focusing on both the quantity and quality of innovation output. Using panel data for more than 3,000 listed firms from 2007 to 2020, we relate firm-level innovation to provincial climate exposure measured by temperature anomalies and extreme weather events. Innovation quantity is captured by patent applications, while innovation quality is measured by forward citations.

We find that greater climate exposure is associated with higher innovation quantity. A one-standard-deviation increase in climate exposure is linked to a 12.3% increase in patent applications, with stronger responses for invention patents and green technologies. By contrast, the effect on innovation quality is much weaker and less consistent across specifications. This suggests that climate-related pressure encourages firms to innovate more, but does not necessarily lead to more influential or technologically significant innovation.

Additional analysis indicates that adaptation needs, regulatory pressure, and market incentives are likely to be important channels. The positive quantity effect is more pronounced in high-pollution industries, state-owned enterprises, coastal regions, and larger firms. The main results remain robust to alternative specifications, instrumental-variable estimation, and placebo tests.

Overall, the findings suggest that climate change can stimulate corporate innovation in China, but the response appears to be concentrated more in innovation volume than in innovation quality. This has implications for climate policy design and for how firms adjust their innovation strategies under rising environmental pressure.

Presenting Author Biography

Qianzhi Xu is a third-year PhD student in the Department of Economics at International Business School Suzhou (IBSS), Xi'an Jiaotong-Liverpool University. Her research focuses on climate economics, corporate strategy, energy transition and the evaluation of environmental policies.