

Economic Brief

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How Does Market Competition Affect Banks' Adaptation to Changes in Flood Risks?

By [Toan Phan](#)

This article examines the interplay between market competition and banks' strategic responses to projected long-term changes in flood risks, using data from the home-equity credit market post-Hurricane Harvey. Our work reveals that banks updated their risk models based on exposure to the hurricane, with those in competitive markets less likely to adopt cautious lending practices. It also explores the concept of strategic complementarity, showing that banks' adaptive behaviors are influenced by their competitors. These findings shed insights on how market forces may influence the way banks adapt to evolving risks.

Understanding the factors that influence banks' risk management strategies has been the subject of a large body of research literature. This inquiry has both theoretical and practical significance, given the pivotal role of the banking sector in the global economy and its capacity to manage a wide spectrum of risks, including those emanating from climate change. Its relevance is underscored by the unique challenges posed by projected long-term changes in the distribution of extreme weather. Given the changes in weather-related risks, the adaptation strategies of financial institutions in this context remain relatively unexplored.

In my upcoming working paper, "Bank Competition and Strategic Adaptation to Climate Change" — co-authored with Dasol Kim and Luke M. Olson — we investigate how banks respond to climate change risks, focusing particularly on the influence of market competition with other banks. Using the case of Hurricane Harvey in 2017, the paper examines how banks adjust their internal risk models in response to significant climate events and how these adjustments vary across different competitive environments.

Methodology

Our paper uses the FR Y-14M data of internal bank risk models and lending activities, combined with First Street Foundation's projections of property-specific flood profiles by 2050. We focus on the home equity line of credit (HELOC) market. The empirical strategy we employ seeks to exploit variations in how banks learned and adapted to climate risks following Hurricane Harvey, distinguishing between behavioral changes driven by learning and those influenced by competitive dynamics. Our research thus contributes to the research literature on climate finance, which examines how financial institutions and markets respond to and integrate environmental risks.

How Banks Adapt

Our study demonstrates that banks impacted by Hurricane Harvey significantly adapted their risk models to better incorporate future flood risks, with the change being most pronounced in banks directly affected by the disaster. After the hurricane, affected banks raised the projected HELOC default risk on houses at high risk of future flooding, even if these houses were not damaged by the hurricane itself. The effect was significant and persistent even after two years, suggesting that the exposure to the hurricane triggered an adaptation process where banks revised the capitalization of future flood risks in their internal risk models. The change in the risk model translates to lower loan amounts and credit limits to borrowers whose houses are at high risk of future flooding (again, even if these houses were not damaged by Hurricane Harvey).

However, we observe that how banks adapt varies with the level of market competition. In less competitive markets, banks tend to reduce lending in areas with higher flood risks, demonstrating a cautious approach to risk management. Conversely, this cautious approach is less apparent in more competitive markets, suggesting that competitive pressures might lead to a tendency towards maintaining or increasing risk levels. This observation aligns with existing research that suggests that competition can influence banks' risk-taking behaviors.¹

Furthermore, our paper introduces the concept of strategic complementarity in banks' adaptive behaviors. We find that banks in markets with less adaptive competitors also exhibit less inclination to adapt, suggesting that banks' strategies are influenced not only by their own assessments of risk but also by the actions of their competitors. This aspect of the study contributes to the broader discourse on strategic interactions in financial markets.

Benefits of Research

Our nuanced findings underscore the interdependence of climate-adaptation strategies among banks, highlighting that an individual bank's adaptive actions are intertwined with competitive considerations. Adaptation to emerging risks in financial markets represents a

promising area for future research, especially given its potential impact on financial system stability. While there is a substantial body of literature on climate adaptation in general, few studies have specifically examined strategic adaptation in financial markets.

Understanding the dynamics of how banks adapt to climate risks in competitive environments can inform the development of more effective regulatory frameworks and policies. This understanding is relevant in the context of the increasing frequency and severity of extreme weather events. Our study implies the importance of considering both microprudential and macroprudential perspectives in addressing emerging risks in the banking sector. While microprudential approaches focus on the resilience of individual banks, macroprudential perspectives consider the systemic implications of these risks.

Our findings suggest that individual banks' adaptation efforts can have positive externalities on the wider banking system. Furthermore, as banks in less competitive markets demonstrate more cautious adaptation strategies, there may be opportunities for collective action in more competitive environments to ensure that risk management does not become a casualty of competition. Such collaborative efforts could include joint initiatives to develop a common guidance for managing risks.²

Conclusion

In conclusion, "Bank Competition and Strategic Adaptation to Climate Change" sheds light on the complex ways in which banks respond to climate risks, influenced by their respective competitive landscapes. The study opens up new avenues for research and policymaking, aiming to deepen our understanding of the systemic implications of climate risks in the banking sector.

More research is needed in the fields of climate finance and risk management, with a critical need for a more comprehensive analysis of market forces, strategic behavior and potential inefficiencies. For example, further research is needed to fully understand how individual adaptation strategies aggregate and interact within financial markets. These interactions may, in some cases, increase the vulnerability of certain markets and systemically important institutions to climate shocks, warranting further investigation and policy response.

Toan Phan is a senior economist in the Research Department at the Federal Reserve Bank of Richmond.

¹ See, for example, Michael Keeley's 1990 paper "*Deposit Insurance, Risk and Market Power in Banking*" and John Boyd and Gianni De Nicolo's 2005 paper "*The Theory of Bank Risk Taking and Competition Revisited*."

² See, for example, the [interagency principles for climate-related financial risk management for large financial institutions](#) from the Federal Reserve Board of Governors, the Federal Deposit Insurance Corp. and the Office of the Comptroller of the Currency.

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