Adaptation Using Financial Markets:
Climate Risk Diversification Through Securitization

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Federal Reserve Board of Governors

FHFA Econ Summit

November 2024

This paper

How does wildfire risk flow through the financial system and what is the role of securitization?

Focus: Private-label residential Mortgage Backed Securities (300,000 loans).

- ▶ Note: this market never recovered after the financial crisis, it is currently relatively small.
- ▶ BUT! We are able to trace the mortgages which comprise individual MBS.

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Findings:

1. Individual mortgages performance is affected by wildfire compared to similarly risky unaffected mortgages: more delinquencies, prepayment; interest rates go up at origination.
2. MBS with concentrated exposure to wildfires also suffer losses, 0.5% of the deal size.
3. How do we design a MBS that incorporates climate risk?
4. Does the market price exposure to climate risk (Fama-Macbeth)?

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Question: How much better does a MBS portfolio perform if it incorporated fire risk?

- ▶ Simulate N mortgage paths in given ZIP code, with each house subject to evolving fire risk.
- ▶ Construct and compare two portfolios:

  [1] Benchmark: Restrict portfolio to include only single-ZIP code houses.

  [2] Incorporate wildfire: Sharpe ratio maximizing portfolio.

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→ **Instead:** Make Sharpe ratio-maximizing portfolio by optimizing based on select ZIP characteristics, instead of the individual mortgages.

► The method is inspired by Koijen-Yogo's demand estimation, but it also echoes older work by Brandt, Santa-Clara and Valkanoff (2009).

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▶ **Finding:** Portfolio [2] outperforms [1], and has non-zero weight on wildfire-prone mortgages.

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1. Here: how well p.f. [2] performs against a fully undiversified p.f.

$\rightarrow$ A more direct way to address the question:

   Compare two p.f.s: one that explicitly includes wildfire risk as a characteristics and one which excludes that risk.

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2. The estimates rely on the authors' wildfire risk model, which is validated against wildfire realization.

$\rightarrow$ Can we see some sensitivity analysis to using an independent existing risk model (e.g., First Street's)?

Comment 2: Welfare Effects (2)

▶ MBS securitization leads to credit expansion...

... for better of for worse - Great Financial Crisis (Mian and Sufi, 2009).

▶ If financial intermediaries can increase prices of MBS through reducing disaster risk, areas with higher risk will have more credit access.

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▶ There are externalities beyond mortgage markets to expanding credit to high risk areas.

(3) Are we able to correctly assess the *correlation* risk structure of mortgages which future physical climate loss may cause?

▶ **Here:** risk comes from being directly in the path of physical danger.
However, if risks↑, we may start seeing more economic distress in neighboring communities.

Smaller comments

▶ **External validity:** the paper argues that while private-label RMBS is a small market, there is wide external validity to other markets.

→ It will be helpful in that discussion to discuss if the mortgages in private-label RMBS are positively or negatively selected and thinking about how that affects the results.

▶ **Simulation sample:** Paper excludes ZIP codes with zero non-wildfire risk:

"Creating an MBS with lower wildfire propensity scores, with mortgages in New York and New England would lower the risk of the pool but may have non-trivial impacts on expected returns."

→ I am not sure what is the problem here, maybe add for robustness.

▶ **Sample timing:** I suspect the authors (correctly) exclude the pre- and during-financial period in all their analysis, but it was not very clear what is the final sample.

→ In the data section some series started in the 90s, but the MBS composition is revealed post-GFC.

→ More clarification will be helpful to confirm that the findings apply to the market as it is today.

Overall...

▶ The question at the heart of this work is very important – how exposed are various agents to climate losses and how can we harden them?

▶ A LOT of work went into this paper already, and we learn a lot:
  ▶ Trace how wildfire risk spreads to the financial system from individual mortgages into MBS securities.
  ▶ Develop a flexible paradigm to diversify wildfire risk when constructing MBS.
  ▶ Develop wildfire risk model.
  ▶ ...

▶ I am looking forward to the next iteration of the paper!