Discussion of
Who Bears Flood Risk?
Evidence from Mortgage Markets in Florida

(*Parinitha Sastry*)

José-Luis Peydró

(Imperial College London)

Bank of England, London, June 2023

Motivation and general vs specific question

- Climate change is a crucial risk for humanity
- More narrowly, climate change is important for central banks, for financial stability (stress tests, e.g. BoE) but potentially even for monetary policy (see e.g. ECB strategy revision)
- There are transitional risks as well as physical risks
- On the physical risks we are already experiencing some negative effects, e.g. changes in floods
- **Crucial to understand: how flood risks affect real estate, including renting vs buying, mortgages and construction**

This paper:

- More narrowly, key to understand: how residential mortgage contracts distribute flood risk exposures across banks, households, and the government flood insurer?
  - Well defined and important question. Excellent identification strategy and data to tackle it
- What are the implications? For example, bank risk-taking? Distributional effects? Moral hazard effects?

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Summary of the paper

- Question: how **residential mortgage contracts** distribute **flood risk** exposures across **banks**, **households**, and the **government flood insurer**?

- Identification:
  - **Staggered flood map updates** on ex-ante risks of floods (via update risk maps using historical digitalized maps of Federal Emergency Management Authority)
  - **Novel dataset** that geo-locates individual mortgages and thereby property's flood zone classification at origination
  - All this creates both **cross-sectional and time series variation** in flood risk classifications
  - **Strict flood insurance coverage** (government insurance around 250K)

- Results:
  - **Banks offload flood risk to the government** through flood insurance contracts, and **to households** through higher required down-payments
  - This **credit rationing** shifts the composition of mortgages in flood zones towards **richer and higher credit quality borrowers**

General comment

- Important paper (question and results) with excellent identification and extremely polish

- No surprise that it is R&R at RFS and a very successful JMP

Specific comments: question

- What is the **most general question** that one would like to answer for flood risk?
- Perhaps: how flood risks affect real estate, including renting vs buying, mortgages and even construction (and pricing)?
- But identification is crucial, and this paper tackles a **more narrow**:
  - How **residential mortgage** contracts distribute flood risk exposures across banks, households, and the government flood insurer?
- Excellent identification strategy and data to tackle it
- **An issue** could be whether answering the general question may matter to answering the question on mortgages in this paper

Specific comments: Extensive margin matters?

How important is the extensive margin in mortgages?

- Several extensive margins:
  - Buying a house (via mortgage) vs. renting
  - Accepting a mortgage application vs. rejecting the borrower
- How **would the extensive margin affect the results on the intensive margin on LTVs**? Any **potential bias**?
- Results suggest that flood risk is important, it changes LTVs, and it changes the credit composition regarding borrower income, so:
  - Could it be that there is an extensive margin, especially on lower-income borrowers, on either continue renting (not demanding a mortgage) and/or being rejected from a mortgage application (especially in areas with higher flood risk, and potentially not fully insured by the government)?
  - If so, would **your results be a lower bound?**

Specific comments: Borrower unobservables

- Results with observable borrower controls decrease estimated coefficients by around 66% in initial (but not key) table (Table 3)
  - There are borrower controls which are unobserved such as wealth
- What happens to **Binding*Flood with vs without borrower controls (Table 4)?**
- An important contribution and result is that: "there is **credit rationing** and it has strong distributional consequences for those who would like to purchase homes in flood zones"
- If the extensive margin is important, could it be that **selection on higher income and wealthy borrowers makes that LTVs go down but not driven by bank supply? It is just purely borrower selection?**
- In a sense, if you **control for more unobservables, would the estimated Binding*Flood on LTV go to 0?** Maybe you could apply the **Oster (2019) bounds** to your Table 4?
  - That is, **richer people** may like houses with nice ocean views, and their houses are in flood risk areas and very expensive so with limits above public insurance, but their LTVs are lower because they are rich
  - Oster (2019) would be helpful for reducing this concern (note that **pricing and quantity are not good for Demand vs Supply as risk is very different for variations in Binding*Flood**)

Specific comments: Delinquencies

- You show that: "*Lender risk management leads **delinquency rates to equalize** inside and outside of flood zones.*"
- But a key risk of loan default is (ex-post) flood risk, so HH may default (delinquent loan) when there are floods, but then the value of the houses in these areas may be very low, and hence **loss given default (LGD) vey high**
- So, **PD should not be equal, but PD*LGD?**
- As LGD may vary a lot between flood zones and not flood zones, should PD be different in equilibrium?
- Unless LGD does not matter because most mortgages are fully securitized?
- How **does it change depending on securitization to public agencies vs private market vs. continue holding it**?

Specific comments: Insurance and moral hazard

Can the bank force private insurance if the house is over 250K? Is this observable to you?

- There must be an important market failure in these insurance contracts, and if there are limits to public insurance, there must be a problem with the private insurance market
- E.g. one problem with the bank is that private insurance contracts are annual (??) contracts and mortgages have long maturities, and hence banks hedge it by reducing loan volume (LTV) or reject applications
- If this is the case, the problem lays with: (i) private insurance contracts, or (ii) lack of commitment from borrowers to renew annually the private insurance, or (iii) lack of incentives of the bank to monitor each year whether borrower has (private) insurance:
  - **What is the friction? Can you show anything on this**? Is there data on private insurance contracts?

Moral hazard of constructing houses in flood areas due to public insurance

- Who should theoretically bear the mortgage risks? E.g. if houses were not new, then there is moral hazard of even constructing in areas with higher flood risk, so risks should also be on real estate constructors and developers, buyers (HH), banks, ie on the private market. Can you know whether these houses are new? That is, from a social point of view there may be too much new construction in areas with flood risks if public insurance is too generous
- I love the result on interaction with securitization or not to the US public agencies (Freddy Mac/Fannie Mae). I saw this result in a figure but not much highlighted in the paper, I think it is very interesting

EXCELLENT PAPER !!