Risk Perceptions, Preferences, Ambiguity, and Flood Insurance Demand

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Flood Damage

- In the U.S. flood damages have increased dramatically.

- 8 of the 10 worldwide the costly insurance losses between 1970 to 2009 events occurred in the U.S. because of hurricanes. (Swiss Re, 2009)

NFIP

- Private insurance companies have largely abandoned flood insurance market.

- Federal government introduced the National Flood Insurance Program (NFIP) by the National Flood Insurance Act of 1968.

  - To mitigate risk and losses of coastal and fluvial area residents from flood.

  - NFIP provides subsidized insurance premium.

NFIP

- Amended Acts in 1973 and 1994
  - Extends flood insurance requirement to mortgage loan purchasers.
  - Increases available coverage up to $250,000. (for single-family and multifamily homes)
- Since 1978 the number of policies has increased fourfold. (1,446,354→5,704,198)
- However, still many homeowners not insured. (Burdy, 2001; Landry and Jahan–Parvar, 2010)

Demand for flood insurance

Previous research has found that insurance demand is a function of:

- Income(+)
- Flood Damage Experience(+)
- Insurance Premium(-)
- Mortgage (+/-)
- CRS (Community Rating System) Participation(+)
- Value of house(+)
- Artificial protection (+/-)
- High risk flood zone(+)

(Browne and Hoyt,2000; Kriesel and Landry,2004; Zahan et al, 2009; Landry and Jahan-Parvar, 2010)

Demand for flood insurance

- Kunreuther(1996) indicates the importance of risk preferences and risk perceptions for insurance decision-making.

- However, in spite of all the research done on flood insurance demand, Bauman and Sims(1978) is the only known paper to account for any measure of risk to study flood insurance demand.

Research Objectives

- Design survey instrument to collect household-level data on risk preferences, risk perceptions, and risk ambiguity.
- Construct regression model to observe the role of risk preferences, risk perceptions, and especially ambiguity, on the decision to purchase flood insurance.

Key Contributions

○ This is the first study to explicitly account for individual-level risk preference to explain flood insurance demand, and the first study to account for risk perception since Bauman and Sims. (1978)

Risk ambiguity and perception

- In general, people under ambiguity have more willingness to pay higher insurance premiums. (Kunreuther et al, 1995; Hogarth and Kunreuther, 1989)

- As one's wealth increases, risk perception increases, but risk aversion decreases. (Mossin, 1968)

- For high magnitude-low probability events, people bid too much or nothing. (McClelland, Schulz, and Coursey, 1993)

Data

- Contracted with Knowledge Networks (KN) to survey homeowners on Gulf Coast.
- KN is only survey firm offering a probability-based online sample.
- Data collected during August-September 2010.
  - 1,536 panels invited, and 856 completed.
  - Response rate is 55.7%
  - Florida (61%), Texas (12%), Louisiana (12%), Alabama (2.5%), Mississippi (1.5%)

Empirical Model

○ Dependent variable:

 Whether people hold a flood insurance policy(=1) or not (=0)

○ Independent variables:

- Risk ambiguity
- Risk perception
- Risk aversion
- Mortgage
- CRS (community rating system) class
- Distance from the coast
- Flood damage experience

- SFHA(special flood hazard area)
- PreFIRM
- Education
- Gender
- Age
- Income

Empirical Model

○ Risk aversion measured the degree of avoiding risk using real money risk experiment.

○ Risk Perception /Ambiguity were measured expectations(low/mean/high) on :

1. # of major hurricanes (category 3 or more)
2. % of house damage struk by a major hurricane

○ Risk perception : mean expected damage.

○ Risk ambiguity : variance of expected damage.

Results of Binary Logit Model (N=719)

Variable	Coefficient	Marginal Effect	P>|z|
Risk Ambiguity	-0.064	-0.012	0.464
Risk Perception	0.024	0.004	0.169
Risk Aversion	0.051*	0.009	0.007
Mortgaged	0.599*	0.108	0.002
CRS (Community Rating System) class	-0.037	-0.007	0.537
Distance from the Coast (km)	-0.008*	-0.002	0.098
SFHA (Special Flood Hazard Area)	2.202*	0.468	0.000

* Significant at the 10% level

Results of Binary Logit Model (N=719)

Variable	Coefficient	Marginal Effect	P>|z|
Previous damage experience	0.313*	0.058	0.095
PreFIRM	0.029	0.005	0.874
Education	0.108*	0.019	0.058
Gender	-0.119	-0.022	0.505
Age	0.048	0.009	0.673
Income	0.082*	0.015	0.002

* Significant at the 10% level

Conclusions

- The presence of mortgage, experience of flood damage, and locating in SFHA significantly affect purchasing flood insurance.

  - NFIP's mandatory requirement for flood insurance for mortgage loan borrowers appears to be working, but not a hundred percent effectively.

- Homeowners with higher income, higher education, coastal close location are more likely to purchase flood insurance.

Conclusions

- Risk ambiguity and risk perception were not significant in this model.

- But we have evidences of impact, so it needs further analysis.

- Our measure of risk aversion captured in an experiment was significant explanatory facts on flood insurance demand and positive as hypothesized.