Insurance and Behavioral Economics:

Improving Decisions in the Most Misunderstood Industry

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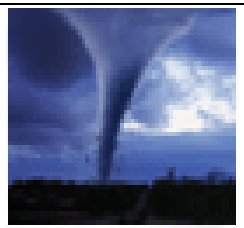
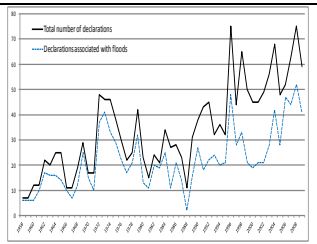
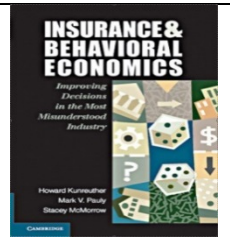






What is Great and Not-So-Great about Insurance

Some insurance markets work well

- Term life insurance
- Auto collision insurance
- Homeowners' insurance

But Low-Probability, High-Consequence (LP-HC) events puzzle consumers, insurers and politicians/regulators

- Consumers: Very limited personal experience with events
- Insurers: Ambiguous risks and correlated losses pose insurability challenges
- Politicians/Regulators: Concerned with re-election and fairness/equity

A Motivating Examples

Purchase of Disaster Insurance by Homeowners

Most homeowners in flood-prone areas do not voluntarily purchase flood insurance – even when it is highly subsidized – until after they suffer damage from a disaster.

Those who do not experience losses in the next few years are likely to cancel their policy.

Demand for earthquake insurance in California increased significantly after the Northridge earthquake of 1994 – the last severe quake in the state; today, relatively few homeowners have coverage.

Key Roles of Insurance

Insurance today is not effectively meeting two of its most important objectives:

- Providing information to those residing in hazard-prone areas
- Incentivizing those at risk to invest in loss reduction measures

Factory mutual companies in the 19th century played these roles very effectively

- Required inspections of factories prior to issuing a policy
- Poor risks had their policies canceled
- Premiums reflected risk and were reduced for factories that instituted loss prevention measures

How Can Insurance Encourage Loss Prevention?

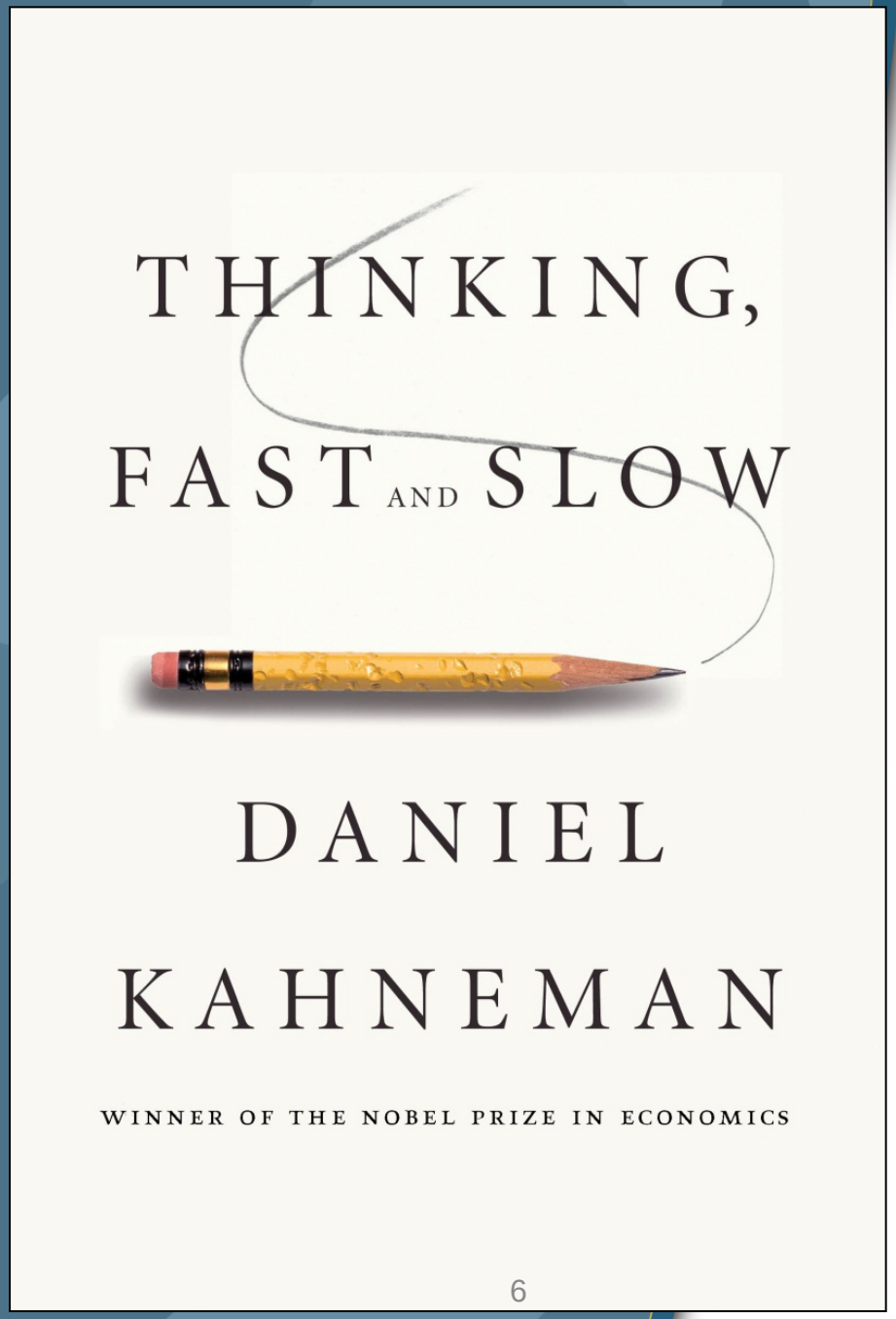
Questions to be addressed:

- What are the decision processes that explain the actions taken by each of the interested parties based on the above three examples?

- What are three guiding principles for insurance to encourage loss prevention prior to a disaster?

- How can the National Flood Insurance Program be modified to serve as a model for linking insurance and loss prevention measures?

Linking Intuitive and Deliberative Thinking for Dealing with Extreme Events



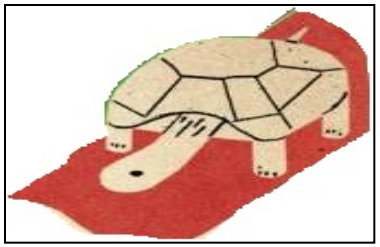
Intuitive Thinking (System 1) and Deliberative Thinking (System 2)

System 1 operates automatically and quickly with little or no effort

- Individuals use simple associations including emotional reactions
- Highlight importance of recent past experience
- Basis for systematic judgmental biases and simplified decision rules

System 2 allocates attention to effortful and intentional mental activities

- Individuals undertake trade-offs implicit in benefit-cost analysis
- Recognizes relevant interconnectedness and need for coordination
- Focuses on long-term strategies for coping with extreme events



Behavior Triggered by Intuitive (System 1) Thinking

***Availability Bias* –** Estimating likelihood of a disaster by its salience

***Threshold Models* –** Failure to take protective measures if perceived likelihood of disaster is below threshold level of concern

***Imperfect Information* –** Misperceives the likelihood of event occurring and its consequences.

***Myopia* –** Focus on short-time horizons in comparing upfront costs of protection with expected benefits from loss reduction

Lack of Interest in Protection Against Disasters: *Cancellation of Flood Insurance Even When Required*

Many homeowners cancel their flood policy if they have not experienced a flood for several years.

Reason: Flood insurance was not a good investment.

Data: Of 1,549 victims of a flood in August 1998 in northern Vermont, FEMA found 84% of residents in SFHAs did *not* have flood insurance. 45% were required to purchase it.

Dynamic Analysis of Flood Insurance Tenure

New Business Year	2001	2002	2003	2004	2005	2006	2007	2008
Housing Units	841,000	876,000	1,186,000	986,000	849,000	1,299,000	974,000	894,000
1 year	**73%**	**67%**	**77%**	**78%**	**76%**	**73%**	**74%**	**73%**
2 years	**49%**	**52%**	**65%**	**65%**	**63%**	**59%**	**58%**	
3 years	**39%**	**44%**	**57%**	**55%**	**53%**	**48%**		
4 years	**33%**	**38%**	**50%**	**48%**	**44%**			
5 years	**29%**	**33%**	**44%**	**38%**				
6 years	**25%**	**30%**	**33%**					
7 years	**22%**	**26%**						
8 years	**20%**							

Note: our analysis of the American Community Survey reveals that the median length of residence was about 6 years over this period.

Sources: Michel-Kerjan, Lemoyne de Forges and Kunreuther – Data from NFIP/FEMA

Aiding Decision Makers to Undertake Deliberative (System 2) Thinking

Provide better information on the role of insurance

- The best return on an insurance policy is no return at all

Use availability bias to focus on consequences

- Highlight financial problems if disaster occurred and the property were destroyed because it was unprotected and it was uninsured

Overcome threshold model by stretching time horizon

Example: Likelihood of 100 year flood

- Next year: 1 in 100
- 25 years: greater than 1 in 5 chance of experiencing at least 1 flood during this period

Consumer Behavior: Purchase and Cancellation of Earthquake Insurance

Prior to the Loma Prieta earthquake (1989) only 22.4 percent of the homes had earthquake insurance. Four years later, 36.6 percent had purchased earthquake insurance—a 72 percent increase.

One year after the Northridge earthquake of 1994, more than two-thirds of the homeowners surveyed in Cupertino County had purchased earthquake insurance.

There have been no severe earthquakes in California since Northridge and only 10 percent of those in seismic areas of the state currently have coverage.

If a severe quake hits San Francisco in the near future, the damage could be as high as $200 billion, and it is likely that most homeowners suffering damage will be financially unprotected.

Guiding Principles for Insurance

Principle 1: Premiums reflecting risk

- Signals to individuals the hazards they face
- Encourages investment in cost-effective adaptation measures

Principle 2: Dealing with equity and affordability issues

- Provide vouchers to individuals requiring special treatment
- To receive vouchers, homeowners must mitigate their property to reduce future flood losses

Principle 3: Multi-year insurance contracts

- Premiums reflecting risk with vouchers to deal with affordability
- Addresses myopia
- Encourages investment in loss reduction measures through loans

Insurance Vouchers: Existing Programs as Models

Food Stamp Program

Mission: Vouchers to purchase food based on annual income and family size

Low Income Home Energy Assistance Program

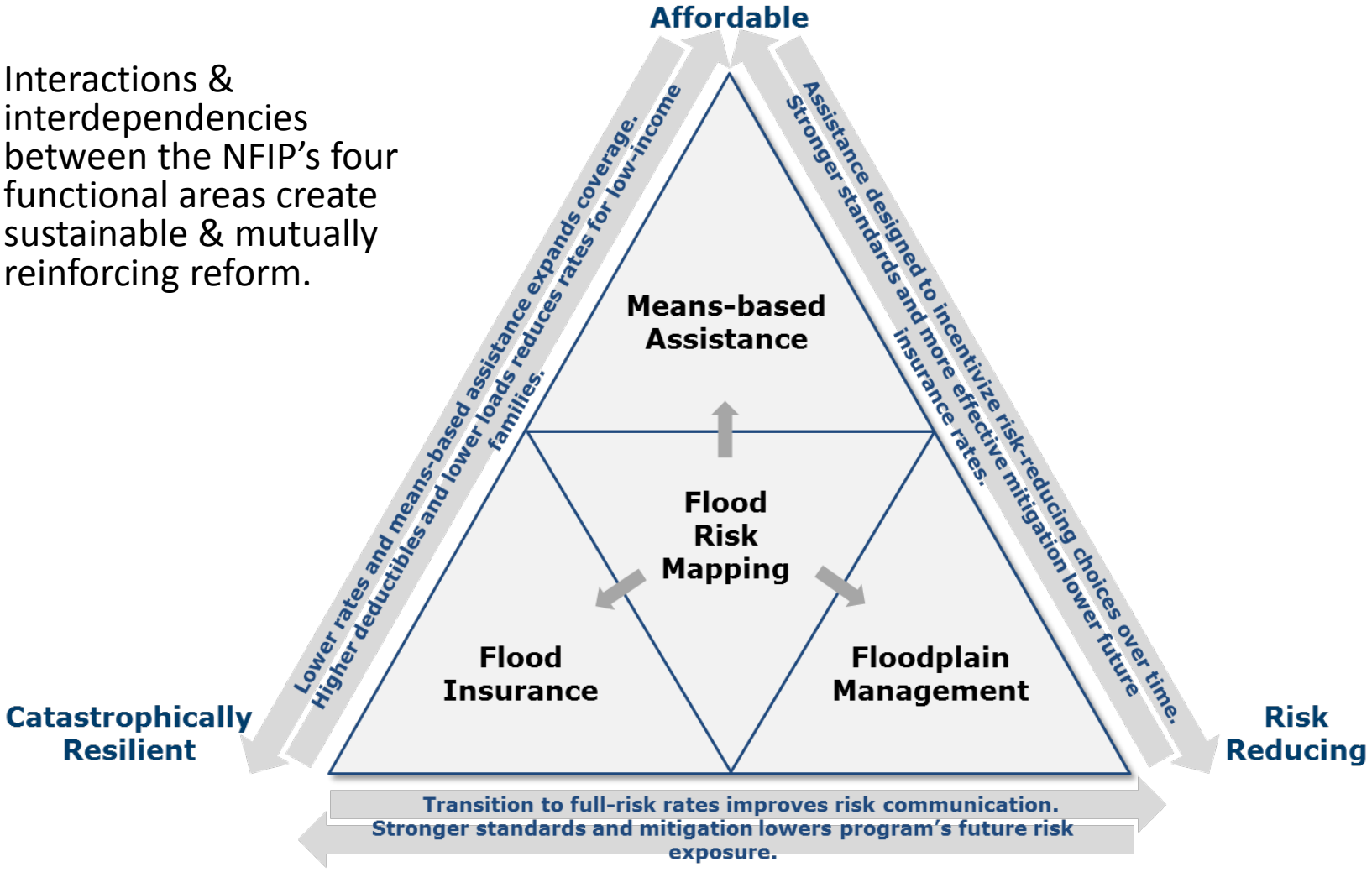
Mission: Assist low-income households in meeting immediate energy needs

Universal Service Fund

Mission: Provide discounts to low-income individuals in rural areas so rates for telecommunications services are comparable to urban areas

The National Flood Insurance Program (NFIP) Policy Problem

Interactions & interdependencies between the NFIP's four functional areas create sustainable & mutually reinforcing reform.



Proposed NFIP Strategy for Reducing Future Disaster Losses*

Encourage Investment in Loss Reduction Measures

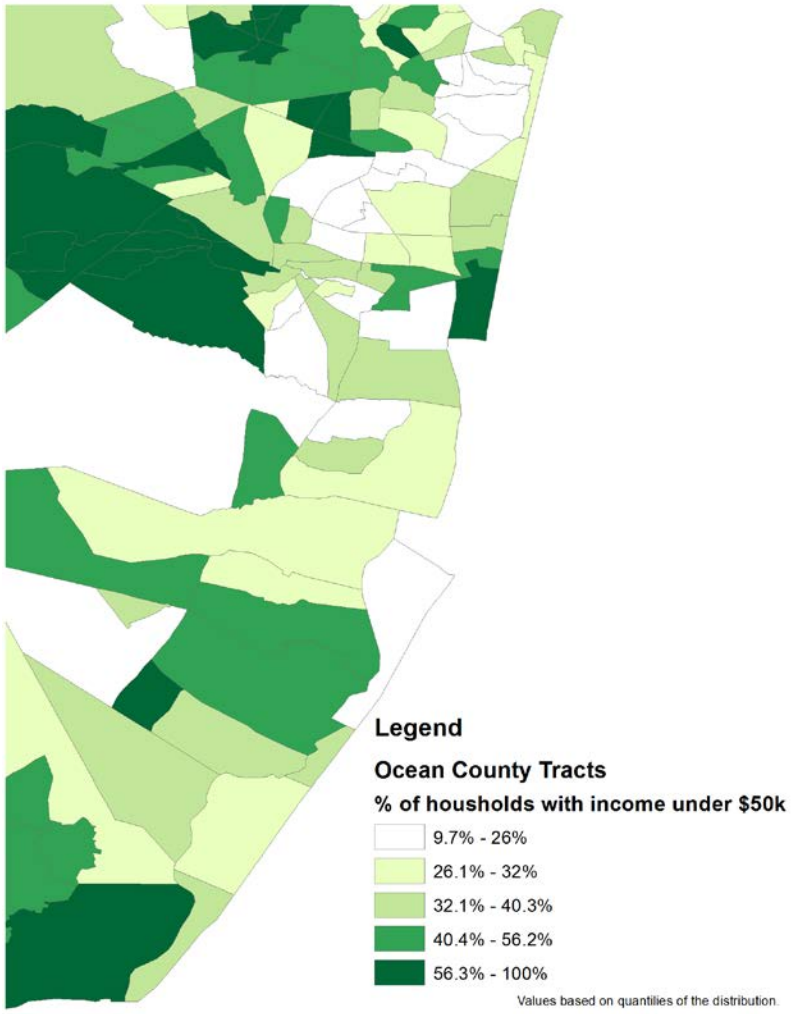
- Risk-based premiums based on updated flood maps
- Home improvement mitigation loans tied to property
- Premium reductions for undertaking mitigation measures

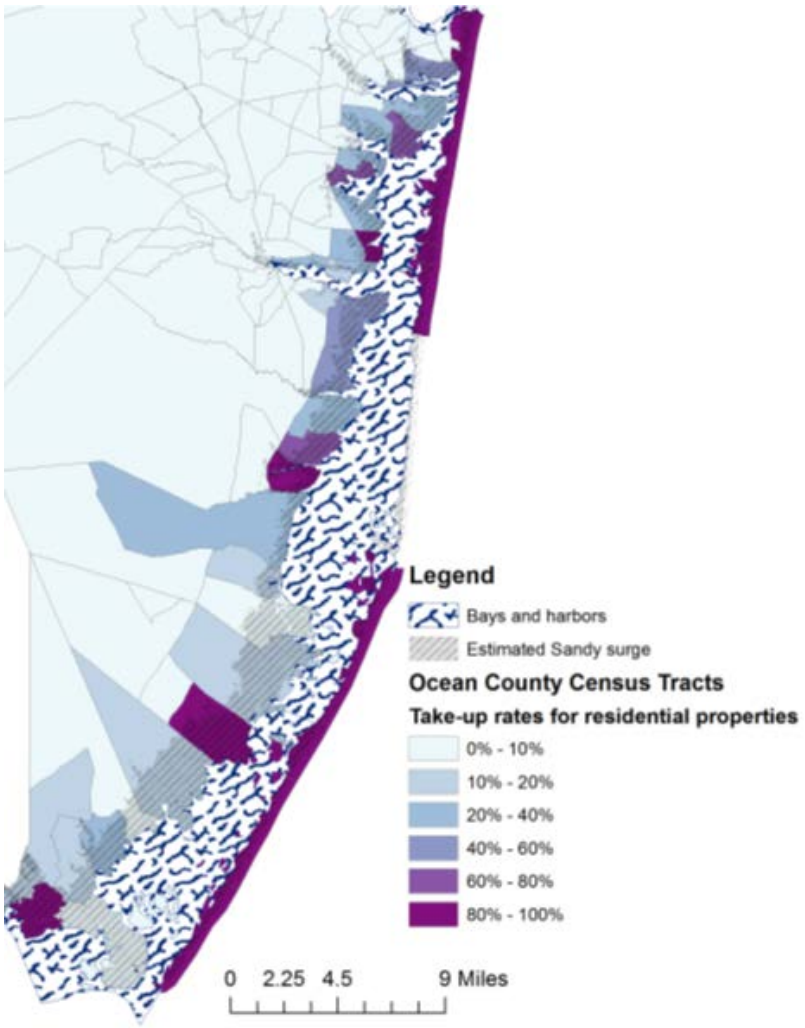
Address the Affordability Issue

- Means-tested vouchers for current residents
- Covers insurance premium and mitigation loan
- Condition for a voucher: ***You must mitigate***
- Required multi-year insurance and loans tied to the property

*Kousky, C., and Kunreuther, H. (2014). Addressing Affordability in the National Flood Insurance Program. *Journal of Extreme Events* 1(01).

Dealing with Affordability in Ocean County, NJ (Population 580,000)





Two Families Residing in Ocean County, NJ

Family 1 is in the A zone and pays $4,000 for flood insurance.

Family 2 is in the V zone and pays $18,550 for flood insurance.

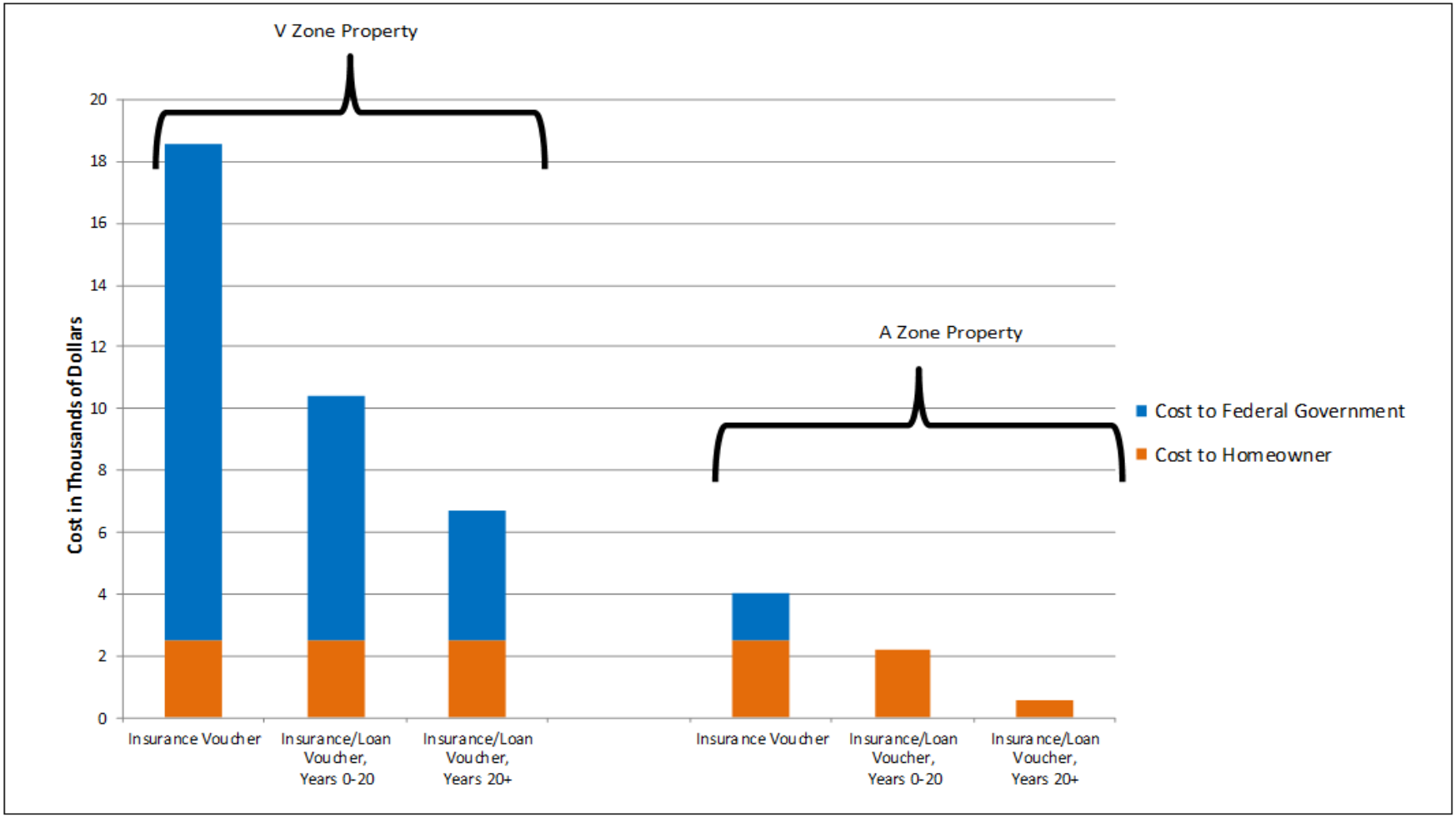
- Both homes are 3 feet below Base Flood Elevation (BFE)
- Each family has an annual income of $50,000 per year

Cost to elevate home to 1 foot above BFE:

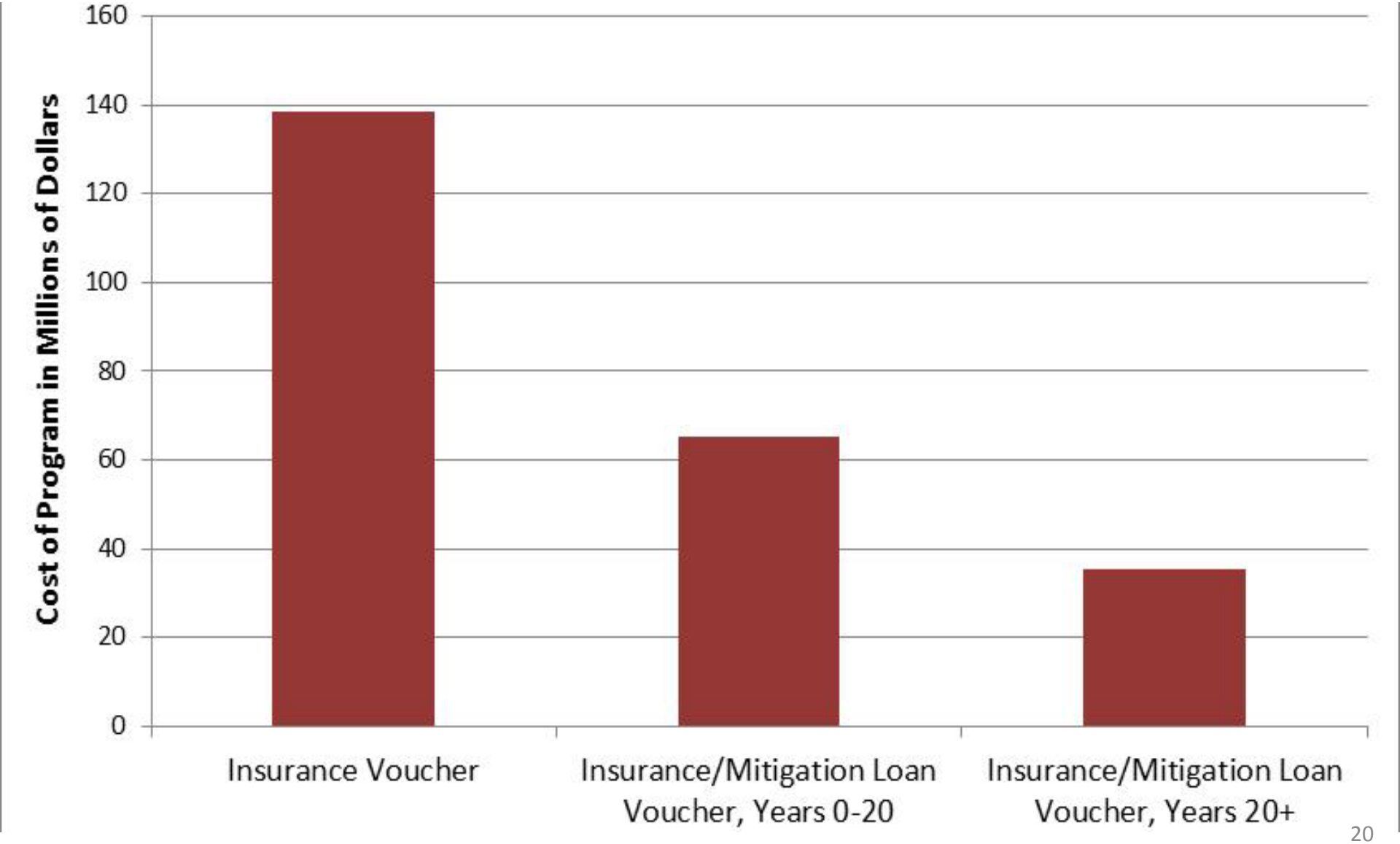
- Family 1: $25,000 20-Year 3% Loan (Annual Payment: $1,680)
- Family 2: $55,000 20-Year 3% Loan (Annual Payment: $3,660)

Means-tested voucher covers insurance and mitigation costs above $2,500 (i.e., above 5% of income)

Cost to the Federal Government and the Two Families



Estimates of Program Costs for Ocean County Tracts that Experienced Storm Surge



Everyone is a Winner

Homeowner:
Lower total annual payments

NFIP:
Reduction in flood losses

Financial institution:
More secure investment due to lower losses from disaster

Federal government:
Lower voucher costs due to reduced insurance premiums because property is mitigated (e.g., elevated; flood-proofed)

General taxpayer:
Less disaster assistance

Challenge Between Today and 2017 When National Flood Insurance Act is Up for Renewal

Long-term strategies for reducing flood risk, given climate change (e.g., sea level rise)
(Deliberative thinking)

Short-term incentives for encouraging this behavior
(Intuitive thinking)

Develop risk management strategy that recognizes the importance of equity and affordability
(Policy analysis)

Future Challenges and Questions for Discussion

LONG-TERM ISSUES

How long will it take FEMA with its partners, including the private sector, to develop new hazard maps that more accurately assess the risks of flooding?

How costly will affordability programs be to the public sector and residents in flood-prone areas in the United States?

SHORT-TERM CHALLENGES

How can the impacts of climate change be incorporated in designing flood insurance to encourage investments in adaptation measures?

What are the most appropriate ways of dealing with affordability issues?

- What empirical data should be collected?
- What controlled experiments/surveys should be undertaken?

Conclusions

Insurance can help spread the risk of unavoidable disasters and offer incentives to mitigate risk.

The National Flood Insurance Program faces challenging questions with respect to implementing mitigation measures and addressing affordability issues.

We need to encourage deliberative thinking by focusing on the long term while providing short-term incentives for acting now, rather than waiting by assuming *it will not happen to me*.

The Challenges of Linking Flood Insurance with Adaptation Measures

"Jerry looked into flood insurance but says it's too darned expensive."

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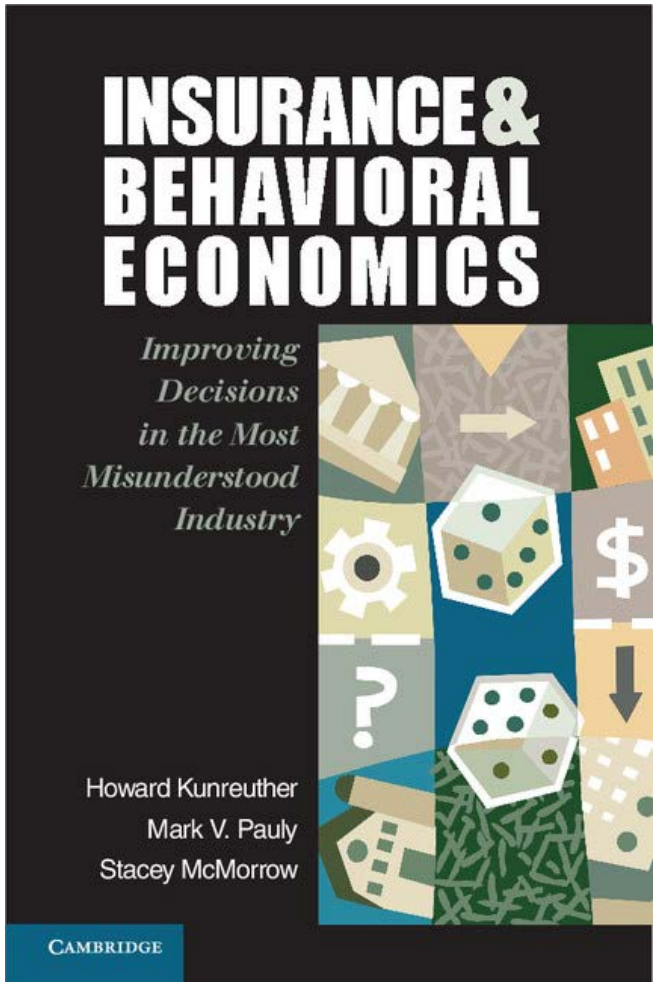

Part I: Contrasting Ideal and Real Worlds of Insurance

Chapter One: **Purposes of this Book**

Chapter Two: **An Introduction to Insurance in Practice and Theory**

Chapter Three: **Anomalies and Rumors of Anomalies**

Chapter Four: **Behavior Consistent with Benchmark Models**

Part II: Understanding Consumer and Insurer Behavior

Chapter Five: **Real World Complications**

Chapter Six: **Why People Do or Do Not Demand Insurance**

Chapter Seven: **Demand Anomalies**

Chapter Eight: **Descriptive Models of Insurance Supply**

Chapter Nine: **Anomalies on the Supply Side**

Part III: The Future of Insurance

Chapter Ten: **Design Principles for Insurance**

Chapter Eleven: **Strategies for Dealing with Insurance-Related Anomalies**

Chapter Twelve: **Innovations in Insurance Markets through Multi-Year Contracts**

Chapter Thirteen: **Publicly-Provided Social Insurance**

Chapter Fourteen: **A Framework for Prescriptive Recommendations**