

Why Getting **Risk-Based Flood Insurance Right** Is So Important

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Study 1: Survey of over 1,000 residents in NYC

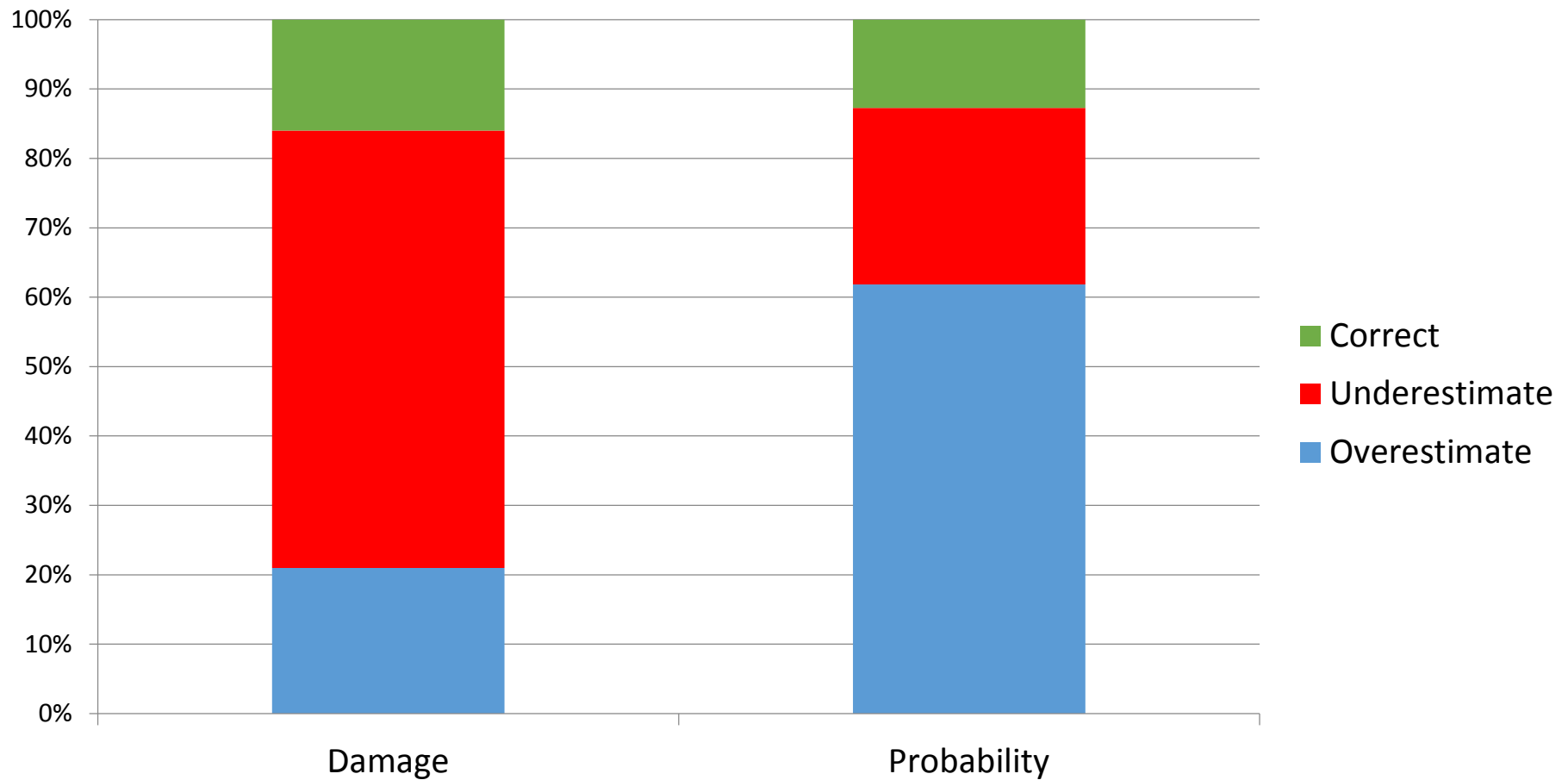
A block-level grid flood risk model was developed as part of a full cost-benefit analysis of flood protection measures for the city (joint work with J. Aerts, W. Botzen, K. Emanuel, N. Lin and H. de Moel, *Measuring Flood Resilience Strategies for Coastal Megacities*, Science, 2014)

Conducted a survey of homeowners in New York City in 2013 and superposed their response/location on the top of model results

First empirical study ever completed on divergence of flood risk perception that looks at **both** the perception of **probability** and **severity** of a flood.

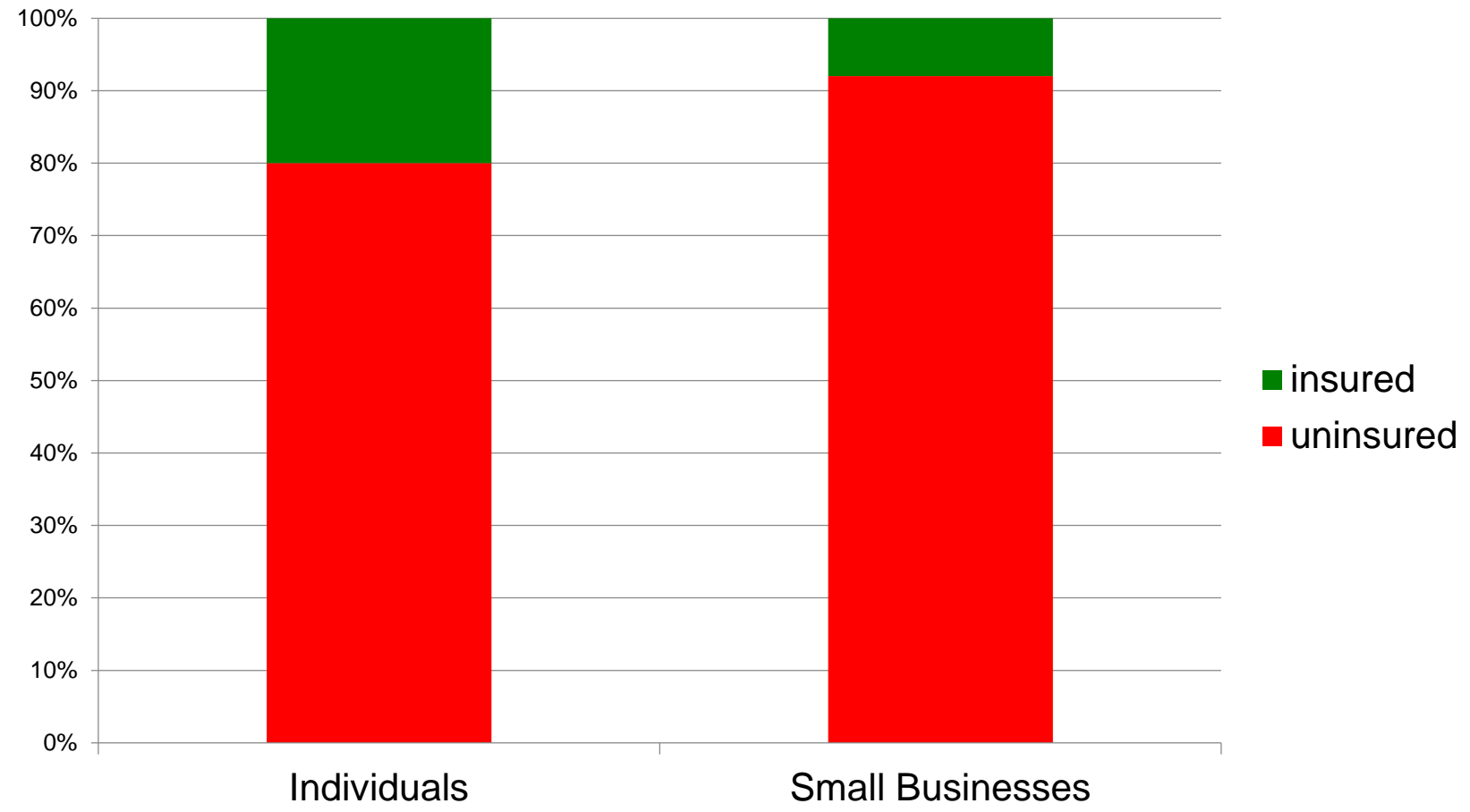
Finding 1: Many people underestimate the **severity** of the flood

Table 1. The percent of respondents who correctly, under-, or over-, estimate the flood probability and flood damage (25% error margin)



Study 2. This contributes to a vulnerable financial situation

Portion of homeowners and small businesses with flood insurance in areas inundated by flood surge from Sandy in 2012



Source: Joint work with C. Kousky – Wharton Risk Center Issue Brief

People get their risk information from FEMA and through flood insurance premium as a signal of exposure

- Problem 1: Our national debate needs to change focus from probability (which people don't know what to do with) to *severity*
- Problem 2: The (artificial) binary frontier between SFHAs and non-SFHAs is misleading (see study 3 next)
- Problem 3: The situation where many people receive subsidized rates or largely overpay for flood insurance --- without even knowing it --- is unsustainable in today's world (see study 4)

Study 3. An Analysis of 35 Years of Flood Insurance Claims in the U.S.

- First empirical large-scale analysis of flood insurance claims ever performed
- Over 1 million of single-family NFIP claims between 1978 to 2012
- Nationwide
- Location, type of housing, flood zone, pre/post-FIRM, repetitive losses, etc.
- Focus here only on one of the many results of study 3

Study 3. An Analysis of Flood Insurance Claims in the U.S.

NFIP Claim Statistics (in 2012 USD) for Single-Family Homes over the period 1980-2012

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Year	Mean Claim	Median Claim	Number of Paid Claims	Annual Claim Rate for Single Family Policies	Annual Claim Rate for Single Family Policies not in the SFHAs	Annual Claim Rate for Single Family Policies in the SFHAs
1980	\$14,130	\$6,378	32,514	2.85%	1.81%	3.84%
1981	\$12,397	\$4,584	17,963	1.30%	0.87%	1.94%
1982	\$12,509	\$5,603	25,919	1.91%	1.64%	2.34%
1983	\$18,094	\$8,088	42,356	2.93%	2.84%	3.09%
1984	\$17,387	\$7,712	21,058	1.40%	1.39%	1.42%
1985	\$17,884	\$9,228	31,346	2.00%	2.39%	1.20%
1986	\$18,726	\$7,546	10,302	0.90%	0.70%	0.57%
1987	\$12,686	\$5,940	10,445	0.62%	0.61%	0.63%
1988	\$11,758	\$5,019	5,981	0.34%	0.33%	0.37%
1989	\$28,711	\$12,537	30,001	1.78%	1.77%	1.80%
1990-89	\$16,335	\$7,515	228,255	2.30%	1.66%	3.44%
1990	\$17,322	\$8,455	11,861	0.67%	0.68%	0.55%
1991	\$19,327	\$8,378	23,665	1.20%	1.38%	1.00%
1992	\$21,780	\$10,956	35,457	1.80%	2.19%	1.09%
1993	\$25,773	\$18,266	29,713	1.49%	1.35%	0.77%
1994	\$29,588	\$12,118	17,801	0.84%	0.79%	0.99%
1995	\$26,934	\$13,654	49,318	2.35%	2.23%	2.33%
1996	\$18,997	\$9,748	42,334	1.85%	2.03%	1.37%
1997	\$21,427	\$9,936	25,226	1.02%	0.96%	1.18%
1998	\$18,909	\$7,851	47,210	1.71%	1.85%	1.21%
1999	\$16,573	\$7,139	39,322	1.41%	1.74%	0.80%
1990-99	\$21,595	\$9,900	321,913	1.44%	1.50%	1.40%
2000	\$14,402	\$7,183	12,932	0.41%	0.48%	0.30%
2001	\$34,986	\$20,714	38,631	1.32%	1.05%	1.88%
2002	\$19,040	\$8,544	21,442	0.70%	0.72%	0.60%
2003	\$21,434	\$10,153	31,804	1.05%	1.25%	0.65%
2004	\$38,092	\$12,559	44,009	1.43%	1.60%	1.08%
2005	\$91,911	\$72,889	177,100	5.21%	6.16%	3.31%
2006	\$23,117	\$11,840	20,379	0.71%	0.58%	0.90%
2007	\$22,499	\$10,902	18,270	0.69%	0.55%	0.40%
2008	\$42,805	\$18,843	65,244	1.69%	2.12%	1.30%
2009	\$22,940	\$10,379	26,584	0.88%	0.72%	0.64%
2000-09	\$54,506	\$21,740	456,255	1.36%	1.52%	1.06%
2010	\$20,994	\$8,532	23,832	0.62%	0.70%	0.52%
2011	\$25,830	\$12,723	63,565	1.65%	1.25%	0.91%
2012	\$34,080	\$20,080	105,434	2.13%	2.02%	1.09%
1980-2012	\$34,478	\$12,555	1,199,274	1.45%	1.55%	1.27%

Average claim rate is higher than the 1% level FEMA uses in both SFHAs and non-SFHAs: 1.45% (# claims per year / # PIF)

- In “high risk” SFHAs: 1.55%
- In “low risk” non SFHAs: 1.27% (but not that low)
- No statistically significant difference found in these rates across the two groups for any decade or for the entire time period
- The claim rate is actually higher in “low risk” non-SFHAs for 10 years.

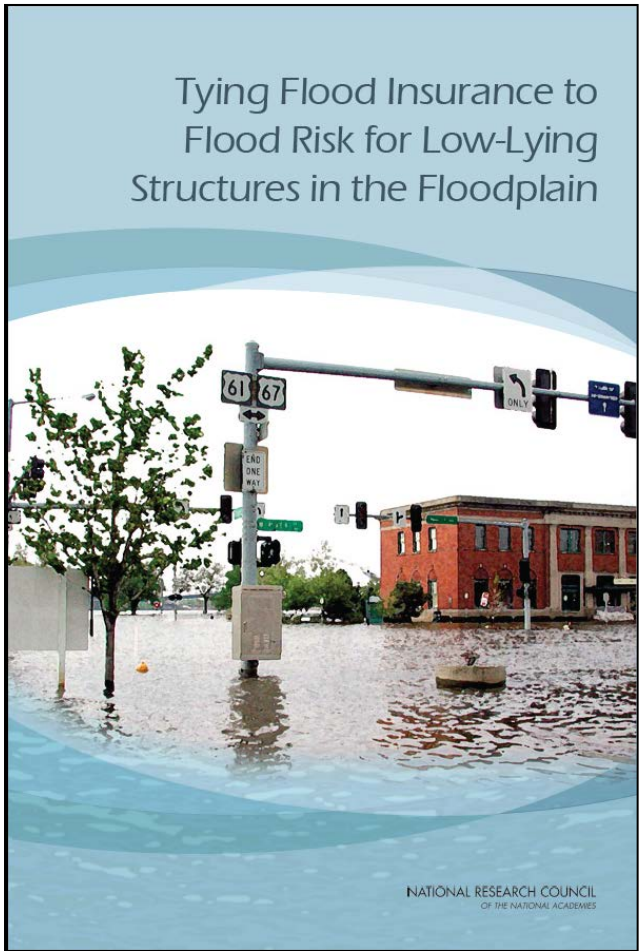
This is likely to be very confusing for the residents....

A focus on severity would help too:

Mean claim: \$35,000

Median: \$12,500

Study 4: Tying Flood Insurance to Flood Risk for Low-Lying Structures in the Floodplain – NRC Report – June 2015



NRC Committee Members

- David Ford, *Chair*, David Ford Consulting Engineers
- Ross Corotis, University of Colorado, Boulder
- Wei Du, Corelogic Spatial Solutions
- Clive Goodwin, FM Global Insurance Company
- Larry Larson, Association of State Floodplain Managers
- Howard Leikin, FEMA, retired
- Martin McCann, Jack R. Benjamin & Associates
- Laura McLay, University of Wisconsin, Madison
- Erwann Michel-Kerjan, Wharton School, University of Pennsylvania
- Lindene Patton, Corelogic Spatial Solutions
- Patricia Templeton-Jones, Wright National Flood Insurance Company
- Susan Voss, American Enterprise Group, Inc.
- Anne Linn, NRC staff

What is the concern?

Low lying = high flood risk

- flood more frequently
- flood deeper
- flood for longer periods
- suffer a higher proportion of damage from small flood events

Up to 1 million low-lying structures in NFIP portfolio (most concerned by BW12 and Affordability 2014).

NFIP wants to ensure rates are fair and accurate.

But FEMA is lacking elevation data for up to 750,000 of these 1 million houses.



Low-lying structure



Structure built to NFIP standards

Focus of NRC Report

- This report examines methods for calculating risk-based rates for low-lying structures
 - Examine current NFIP methods and possible changes to those methods
 - Identify data and analysis needs
 - Discuss issues of feasibility and cost for implementing risk-based rates for low-lying structures
- Focus is on methods, not on what those rates or premiums should be

Key Incremental Changes

- Enhance flood hazard assessment
 - Account for frequent flooding, which causes significant portion of potential losses
 - Localize flood hazard description, rather than using averages
- Expand exposure and vulnerability assessment
 - Determine the extent to which structure damage is caused by factors other than inundation depth
- Account for effectiveness of levees
 - Assess the protection of non-accredited levees against frequent floods
- Change underinsurance adjustment
 - Tie to replacement cost of the structure, rather than average building values

Take Aways

- Subsidized rates are being replaced by risk-based rates → premiums will go up significantly for low-lying structures and other residents
- Risk-based pricing reflects the true cost of living in flood prone areas and should help enhancing personal and community responsibility (other NRC work on community-based insurance)
- Affordability can be addressed if a dedicated program is well-designed, based on income and transparent (other NRC work)
- Our NRC report shows that NFIP (or private re/insurers) cannot develop fair and accurate rates without
 - structure elevation and consistent replacement cost data – **the data exists**
 - changes to methods to price more granularly and transparently – **this can be done**

Improving Americans' knowledge about flood risk can be enhanced by peer-reviewed empirical analysis. Transferring this new knowledge is then key to improving financial protection, and resilience altogether.

Acknowledgements

FEMA and SBA for providing full access to NFIP, IA and SBA disaster loan data

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- National Science Foundation
- DHS's Center of Excellence CREATE at the University of Southern California
- Wharton Risk Center's Managing and Financing Extreme Events project

All the studies are available on the web or upon request



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KNOWLEDGE FOR ACTION
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