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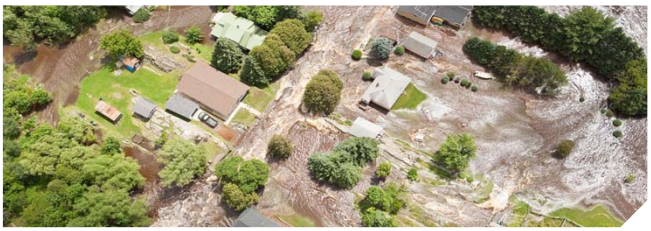
Overview of the Private Flood Market

2018 CAS Underwriting Collaboration Seminar

Nancy Watkins
June 26, 2018



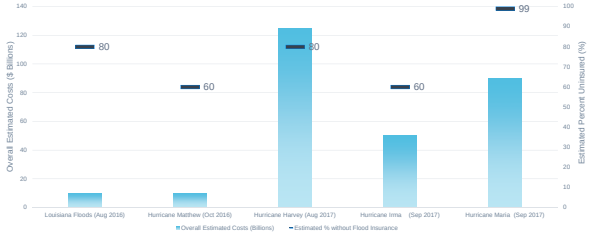
Agenda

- Introduction
- Approaches to private flood insurance
- Best practices
  - Catastrophe model evaluation
  - Market feasibility study
  - Rate, rule and form development

Introduction

Estimated percent uninsured during recent loss events

Between 60% and 99% of those affected by five recent catastrophes did not have flood insurance.



Source: www.Artemis.bm, www.ClaimsJournal.com, www.usatoday.com, www.wsj.com, NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2018). www.ncdc.noaa.gov/billions/

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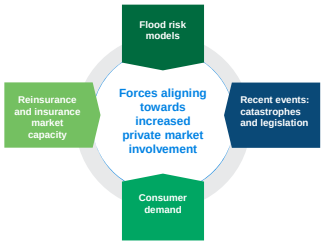
Why would primary insurance companies consider offering flood insurance?



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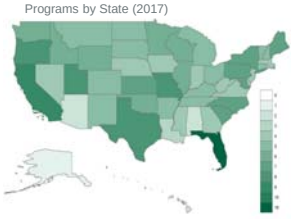
Private flood growth

Entrants to the private flood market have increased in recent years; highest activity in Florida

Private Standalone Flood Program Launches

Number of Private Standalone Flood Programs by State (2017)



Source: SNL.com; excludes non-admitted and endorsement programs

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Rapid private flood premium growth in 2017

Private flood written premiums grew over 50% in 2017, up to $624 million

State	Private Written Premiums (Millions)		2016 to 2017	
	2016	2017	% Change	$ Change
Florida	47.8	84.5	77%	36.7
California	48.8	72.0	48%	23.2
Texas	31.8	53.5	68%	21.7
New York	27.4	47.7	74%	20.3
New Jersey	17.0	28.9	70%	11.9
Pennsylvania	13.2	18.8	42%	5.6
Louisiana	11.5	17.9	56%	6.4
Massachusetts	9.0	15.3	70%	6.3
Ohio	5.6	14.2	154%	8.6
Illinois	9.8	14.0	43%	4.2

Source: Insurance Journal. Originally reported by S&P Global

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Approaches to private flood insurance

How do companies approach their private flood decisions?

Three common approaches

Stay Out

- Avoids underwriting risk, but
- May be at competitive disadvantage
- May end up paying to adjust non-covered flood claims for no premium

Me-too NFIP

- Relatively fast / low cost to entry, but
- Limited market
- No competitive differentiation
- Will be obsolete when NFIP changes rates

Solution First

- Proprietary solution, but
- May result in commitment to an approach with limited information
- Front loads costs
- May not produce desired results

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Best practices – a three step process

Evaluate cat models

- What catastrophe model(s) should we use to manage and measure our results?
- What are the limitations and uncertainties of the cat model(s) we will use?
- What risks are considered in the models vs. covered by flood policies?

Market feasibility study

- Should we offer private flood insurance?
- What states or markets should we prioritize?
- What expense, reinsurance, profit provision and minimum premium should we build into the rates?

Develop and test rates, rules, and forms

- What policy limits and coverages should we offer?
- What types of risks should be eligible?
- What rating methodology should we use?
- What data elements will we need to quote and underwrite?
- What volume can we expect?

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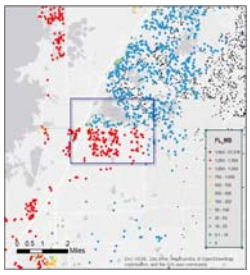
Best practices: Catastrophe model evaluation

Evaluation of flood models

The flood models are less mature than those for other perils



- There are currently substantial differences among the models available commercially
- Model results should be assessed for reasonability both in aggregate and at the location level
- Does the model you are using
  - Have discontinuities?
  - Have many AALs that are zero (or nearly zero)?
  - Produce results that are illogical (e.g. very low in high risk areas or very high in low risk areas)?
  - Have (or not have) secondary modifiers that reflect important risk characteristics?
  - Include all the sub-perils that you think are important?
- Model comparisons can help identify outliers
- What are reinsurance costs going to be based on?

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Evaluation of flood models

Which models are most reasonable?

Beach House

Model X	Model Y	Model Z
$1,000	$30	$20,000

Inland Property

Model X	Model Y	Model Z
$1,500	$3	$30

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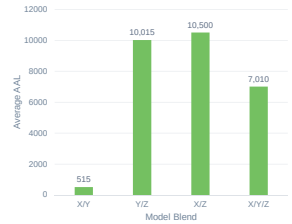
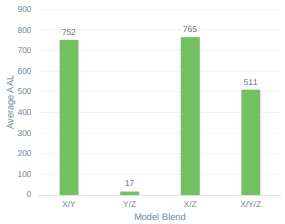
Blending can help, but still has limitations

An outlier has a large impact on the average

Beach House



Inland Property



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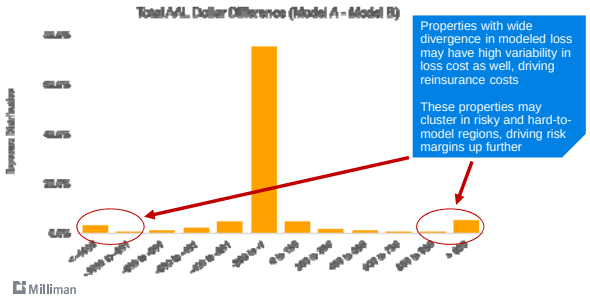
Agreement “on average”, “most of the time”, may not reduce uncertainty in measuring program’s cost of capital



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Best practices: Market feasibility study

Flood market feasibility study drives business plans, helps attract capital, and limits program risk

Whatever models(s) are used as the risk engine, a flood feasibility study is essential before final product development, reinsurance plan, and market rollout. It answers questions like:

What is the incremental cost of adding flood coverage to a Homeowners policy?	How do my potential premiums compare with those of the NFIP and competing private flood writers?	Which consumers would be most likely to purchase a private flood product?	How sensitive are my results to different assumptions regarding models, expenses, profit and minimum premiums?

Feasibility study drives point of sale risk engine (models and rates), product design, resource allocation for rollout, and reinsurance design. Best of all, the data from the study can be used in rating plans, reinsurance contracts, elsewhere.

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Feasibility study is the time for wide-open scenario testing

Multiple combinations of key assumptions

Exposures ▪ (Notional) Market basket ▪ In-force Homeowners book	Catastrophe Models ▪ Model A ▪ Model B ▪ Blend	Product Features ▪ Coverage limits ▪ Deductibles ▪ Bonus coverages
Cost structures ▪ Permissible loss ratio ▪ Cost of capital approach ▪ LAE loading	Underwriting and Marketing ▪ NFIP Zones ▪ Foundation types ▪ Entire state vs. regions	Minimum Premium ▪ None ▪ Smaller ▪ Larger

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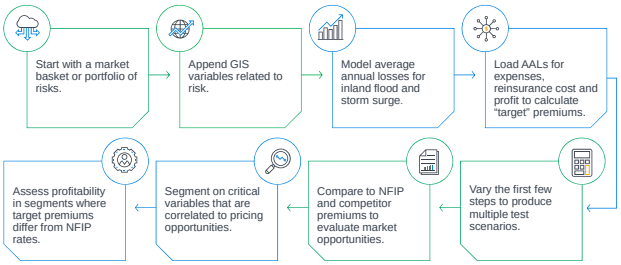
Steps in the market feasibility study



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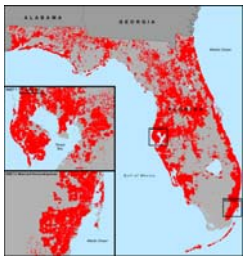
Market Baskets are essential tools when data are sparse

A portfolio of hypothetical risks with a realistic distribution of the characteristics used for catastrophe modeling, pricing and underwriting

- The locations are the actual locations of real risks in the marketplace, as well as specific characteristics of those risks such as the year built and square footage
- For other characteristics, realistic distributions are derived from industry data sources and are simulated by location
- The final market basket is a deterministic but notional policy roster
- Market Baskets allow analysis of areas where in-force data may be thin or non-existent



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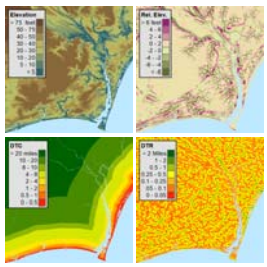
Leverage Geographic Information Systems to add value to study and refine results

Enrich data with geographic characteristics correlated with flood risk

- Elevation (absolute)
- Relative elevation (local vs. nearby points)
- Distance to coast (or ocean)
- Distance to river or stream
- Size of river or stream
- Hydrological features and watersheds
- Slope
- Curvature
- Flood protection and levees



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Critical assumptions and data underlying Florida study

- Market basket of 400,000 risks representing single family homes in Florida, developed by Milliman based on parcel data and other third-party sources
- GIS variables created by Milliman based on data from NOAA and USGS
- Maximum flood limits of $250k, consistent with NFIP coverage
- NFIP rates current as of October 2017 (most recent available)
- KatRisk catastrophe model to estimate inland flood and storm surge losses
- Target loss ratio of 35% assumes 65% for expenses, reinsurance and profit
- $100 minimum premium, no additional provision for non-modeled losses

This is just an example – the use of different data sources, catastrophe models and target expense assumptions will produce different results.

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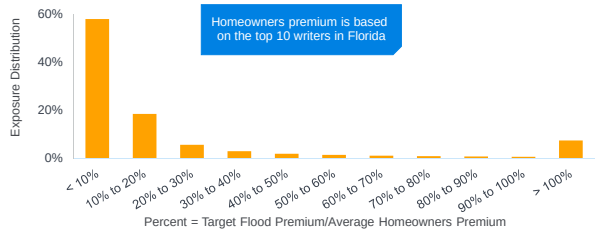
Overall – Target flood premium vs. Homeowners premium

Target Flood Premium as % of Homeowners



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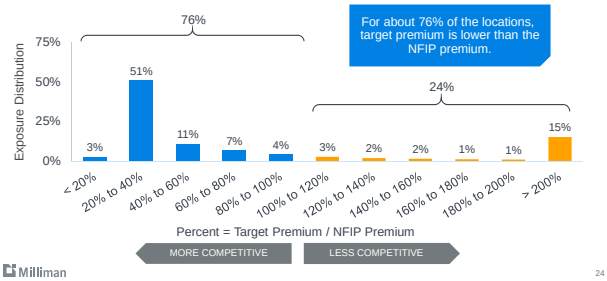
Overall – Target flood premium vs. NFIP premium

Target Premium as % of NFIP Statewide Distribution



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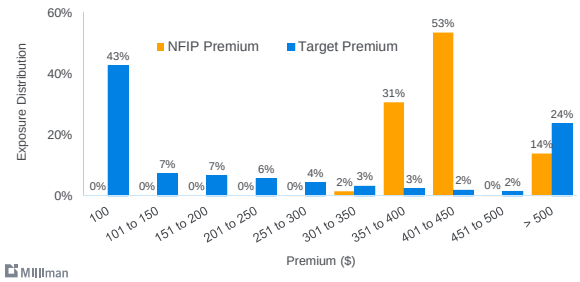
Overall – Distribution of Target and NFIP premiums

Target vs. NFIP Premium Distribution



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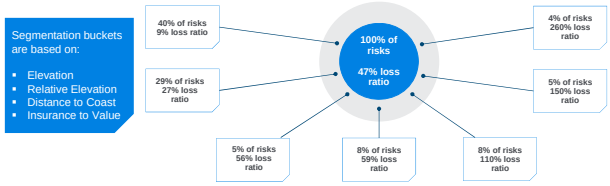
Modeled NFIP loss ratios by segment

Subsidies in the current NFIP premiums result in very few locations being priced adequately



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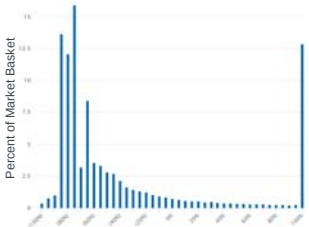
Consider other private programs in competitive analysis

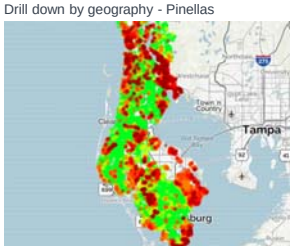
Example: Target premium versus TypTap

Distribution by premium difference



Difference = Target / TypTap - 1

Drill down by geography - Pinellas



Difference = Target / TypTap - 1

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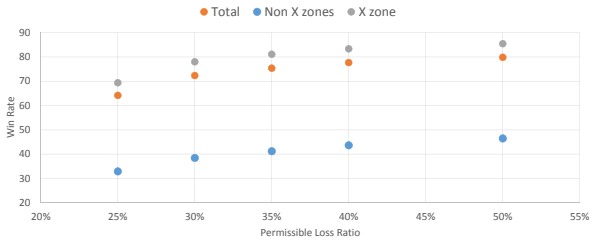
Competitive position will vary significantly by segment

Example: Target vs NFIP

Test sensitivity of key metrics to assumptions

Example: Win Rate by Permissible Loss Ratio



Putting it together: key metrics to determine go vs. no-go

These metrics can be refreshed once proposed rates have been developed

	HO Policies in Force	Average Flood Premium	Win Rate	Estimated Bind Rate	Projected Flood PIF	Projected Flood Premium	Expected Flood Loss Ratio
Zone X, A, AO, D, VE and Distance to Coast >=12.2 miles	15,000	$229	94%	50%	7,500	$1,717,500	28%
Zone X, A, AO, D, VE and Distance to Coast < 12.2 miles	25,000	671	73%	25%	6,250	4,193,750	34%
Zone AE, AH	5,000	3,592	35%	5%	250	898,000	35%
Total	45,000		76%	31%	14,000	$6,809,250	33%

Best practices:
Rate, rule and form development

A spectrum of pricing approaches exists

But there is no clear winner when all practical factors are considered

Low — Matching of Premium to Modeled Loss — High

NFIP Clone	Refined Rating Plan	Grid Rating Plan	Risk-Level Modeling

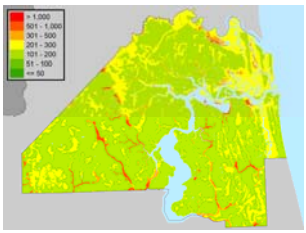
The NFIP Clone approach is efficient, but limited

- Rates and territories follow existing NFIP
- Underwriting used to avoid unprofitable areas

Advantages
- Low requirements and time to develop
- Easy to explain to agents and regulators
- Faster IT implementation time

Disadvantages
- Limited market of profitable risks
- Limited rate differentiation, especially outside of Special Flood Hazard Area
- Underutilization of technology and advanced analytics
- Once NFIP rolls out refined rating plan, existing rates may be obsolete

Duval County Inland Flood Base Rates



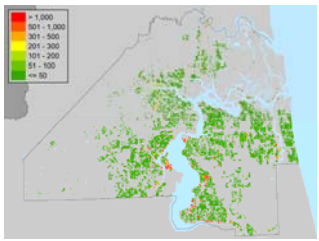
Risk-Level Modeling aligns to model results, but may sacrifice stability and transparency

- Catastrophe model is run on every risk to derive annual average loss
- Loss is loaded for reinsurance, expense, and profit to derive premium

Advantages
- Low requirements and time to develop
- Matches premium to modeled loss
- Larger market of profitable risks
- Using reinsurer models may incent quota shares

Disadvantages
- Requires model call at quote (API)
- Limited transparency for agents, regulators
- Difficult to control pricing strategy
- Handling discontinuities and extreme values
- Reliance on one catastrophe model

Duval County Inland Flood Base Rates



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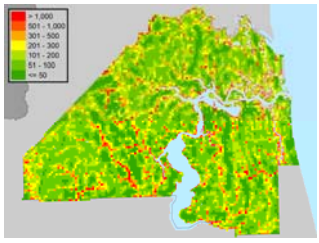
Grid Rating plan: granular and stable, but more effort

- Pre-compiled approach to all geographical characteristics from risk-level modeling
- Grids typically based on latitude and longitude - can achieve size efficiencies by limiting to populated areas
- Additional rating factors for property and policy characteristics, e.g. number of stories, deductible

Advantages
- Similar to risk-level modeling without having to call a cat model at quote
- Large market of profitable risks
- Supports model blending
- Easier regulatory approval than risk-level modeling

Disadvantages
- Maintenance of base rates can be difficult & expensive
- Premium will diverge from modeled loss as resolution decreases
- Similar issues to risk-level modeling regarding transparency, discontinuities and extreme values

Duval County Inland Flood Base Rates



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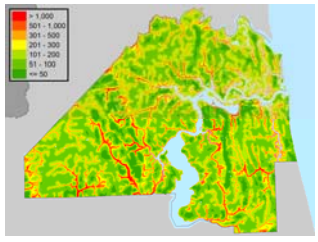
Refined Rating plan allows custom territories yet tabular rates, but requires research and buy-in

- Complete rating plan with unique territories, rating factors, and algorithm
- Reflects geographical and building characteristics that relate to flood risk

Advantages
- Easy to explain to agents and regulators
- Control of pricing strategy
- Fewer discontinuities and extreme values
- Larger market of profitable risks

Disadvantages
- High development cost, maintenance cost when models change
- Requires significant GIS and modeling expertise

Duval County Inland Flood Base Rates



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No clear real-world winner in pricing approach, but Grid and Refined stress balance, stability, and judgment

	NFIP Clone	Refined Rating	Grid Rating	Risk-Level Modeling
Low requirements and time to develop	■			■
Easy to explain rates to agents	■	■		
Faster IT implementation time	■		■	
Can manage rate volatility	■	■	■	
Easier regulatory approval	■	■	■	
Matching of premiums and expected losses		■	■	■
Differentiation from current premium		■	■	■
Fewer discontinuities/extreme values		■	■	
Larger market of profitable risks		■	■	■

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Rule and Form development interacts with Rating Plan, so final decisions are interdependent on project plan as a whole

"At least as broad" as NFIP to ensure regulator and lender acceptance

- Coverage limits
- Deductibles and type
- Loss settlement and coinsurance
- Excluded items
- General conditions (cancellation, earned premium)
- Coverages and settlement affect modeling

Compatibility with underlying form for policy and claims management

- Endorsement – modifies flood exclusion and certain general conditions, otherwise adopts base form
- Stand-alone – align effective dates, systems issues, cancellation, claims handling
- Ancillary coverages affect modeling

Underwriting and sales workflow to manage reinsurers and producers

- Will stand-alone be written over only existing customers?
- What limits will trigger UW referrals?
- What producer networks will accept non-branded (WYO) alternatives?
- Scope affects feasibility study scenarios and data

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Thank you

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