Rate Indications

Actuarial / Underwriting Committee Meeting

December 1, 2020

TEXAS WINDSTORM INSURANCE ASSOCIATION

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Reminder on WTW Report dated September 4, 2020

- 67 page report delivered to the Committee on September 4, 2020

Hurricane Projection Method	Residential Indicated Rate Level Change	Commercial Indicated Rate Level Change
Actual Experience and Models (50%/50%)	32%	42%
Actual Experience	21%	34%
Hurricane Models (25% AIR/ 75% RMS)	42%	49%
AIR Model	54%	54%
RMS Model	39%	47%

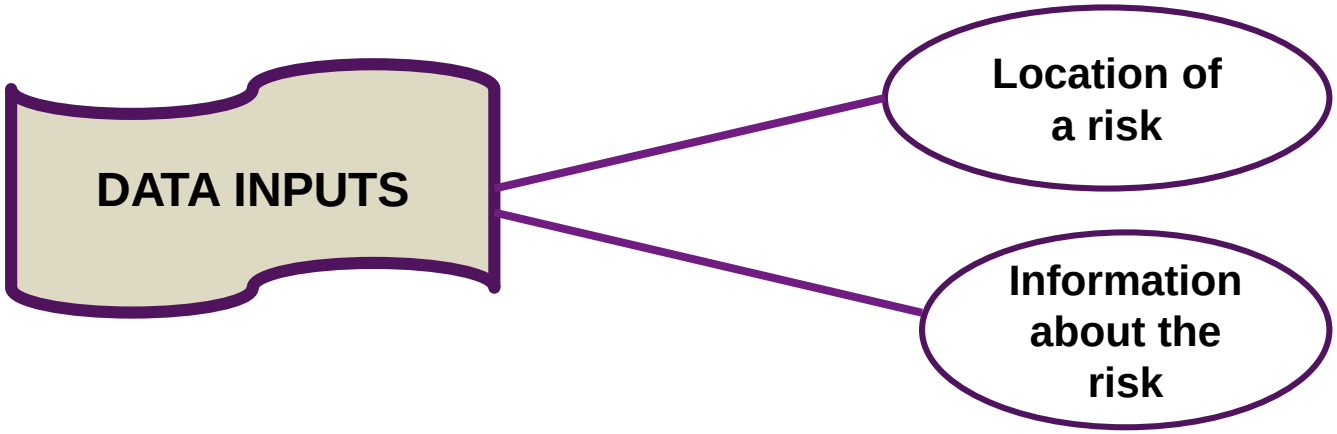
- Adjustments in PML determination
  - LAE load increase from 15% to 17.2%
  - 75% / 25% blend of RMS / AIR
- Data quality initiative
  - WTW Sensitivity Analysis (pg 29-35)
- This engagement is not related to any analysis of the TWIA rating plan

Prompted follow up WTW study

Preface

- What is *DATA QUALITY*?
- Why is data quality important in the reinsurance buying process?
- Define modeling terminology
  - Primary risk characteristics
  - Secondary modifiers

Why is data quality important?



- If you don't tell the catastrophe model about a risk, it will make assumptions based on industry data = "unknown"
- Example: For Opening Protection, RMS assumes 60% of homes built pre-2002 have "*no exterior openings have wind-borne debris protection*."
  - TWIA underwriting guidelines for the Seaward & Inland 1 regions suggest this default assumption may not give enough recognition for homes built with opening protection
- Models are calibrated using industry data, so using TWIA-specific data will lead to results more reflective of TWIA underlying risk

Why is data quality important for TWIA's reinsurance purchase?

- In its simplest form, all reinsurers will follow the same process when reviewing TWIA's reinsurance program
  - Every reinsurer has a different approach or view of risk, but the process is the same

- Step 1: Receive exposure data from TWIA / Broker. No adjustments to the exposure data

- Step 2: Model in RMS and AIR using broker provided files; reinsurers can "plug" files from broker into RMS & AIR models

- Step 3: Make qualitative adjustments: view of risk, claims handling, model weights, historical claims, territorial adjustments, LAE, etc.

- Step 4: Develop a price for the TWIA reinsurance program

What Data Inputs Impact Catastrophe Models?

Primary Characteristics

Primary Characteristics	Residential		Commercial	
	RMS	AIR	RMS	AIR
Coverage Amount	Y	Y	Y	Y
Location	Y	Y	Y	Y
Construction	Y	Y	Y	Y
Year Built	Y	Y	Y	Y
Occupancy	Y	Y	N	N
Sq footage	Y	Y	Y	
Height / # stories	Y		Y	Y

Y = TWIA originally provided to WTW in Sept 2020

N = Not originally provided to WTW in Sept 2020

Secondary Risk Characteristics

RMS Modifiers for Wind-Only	AIR Modifiers for Wind-Only
Cladding Type	Appurtenant Structures
Commercial Appurtenant Structures	Building Condition
Construction Quality	Building Foundation Connection
Flashing and Coping Quality	Exterior Doors
Frame-Foundation Connection	Glass Percentage
Ground-Level Equipment	Glass Type
Opening Protection	Large Missile
Residential Appurtenant Structures	Roof Anchorage
Roof Age and Condition	Roof Attached Structures
Roof Anchors	Roof Cover Attachment
Roof Covering	Roof Covering
Roof Equipment Hurricane Bracing	Roof Deck
Roof Geometry	Roof Deck Attachment
Roof Sheathing Attachment	Roof Geometry
	Roof Pitch
	Roof Year Built
	Seal of Approval
	Small Debris
	Terrain Roughness
	Tree Exposure
	Wall Attached Structures
	Wall Type
	Window Protection
	Wall Siding

- **TWIA has not been modeling with any "secondary" risk characteristics for rate making or reinsurance**
- **As you will see, TWIA's 1-100 yr PML and reinsurance costs have been inflated**

Output of Data Quality Project

Data Collection Process & Sources

TWIA's System
(data warehouse)

TWIA Class Code
Structure Condition
Roof Year
Building Code Credits & Standards Built

Eagle View Data

Roof Condition
Roof Material
Roof Style
Tree Overhang

WPI-8 Data

Type of Inspection (Roof/Openings)
Certification Date
Location: Inland / Seaward
Building Code (IRC, IBC…)
Engineered (Y or N)

Highlights of Data Extraction

- Over 10,000 risks believed to be single family homes were actually condo / apartment risks (lower loss cost)
- Occupancy: approx. 23% of Commercial risk were re-categorized as other than General Commercial (Multi-Family Dwelling (Condos, Homeowners Association, Education, Religion & Non Profit)
- Hurricane rated roof covering: 50,595 locations that previously modeled as "unknown"
- Roof year: 42% is post 2008 (Hurricane Ike)
- Location credit for building code: 39,937 insureds obtained this credit yet TWIA didn't get a credit on reinsurance
- WPI-8 Roof – 21,927 locations have a WPI-8 certified roof; avg certification of Sept. 2009 (1 year after Hurricane Ike)
- WPI-8 Engineered: 17,463 locations are certified with engineered construction yet previously modeled as "normal"

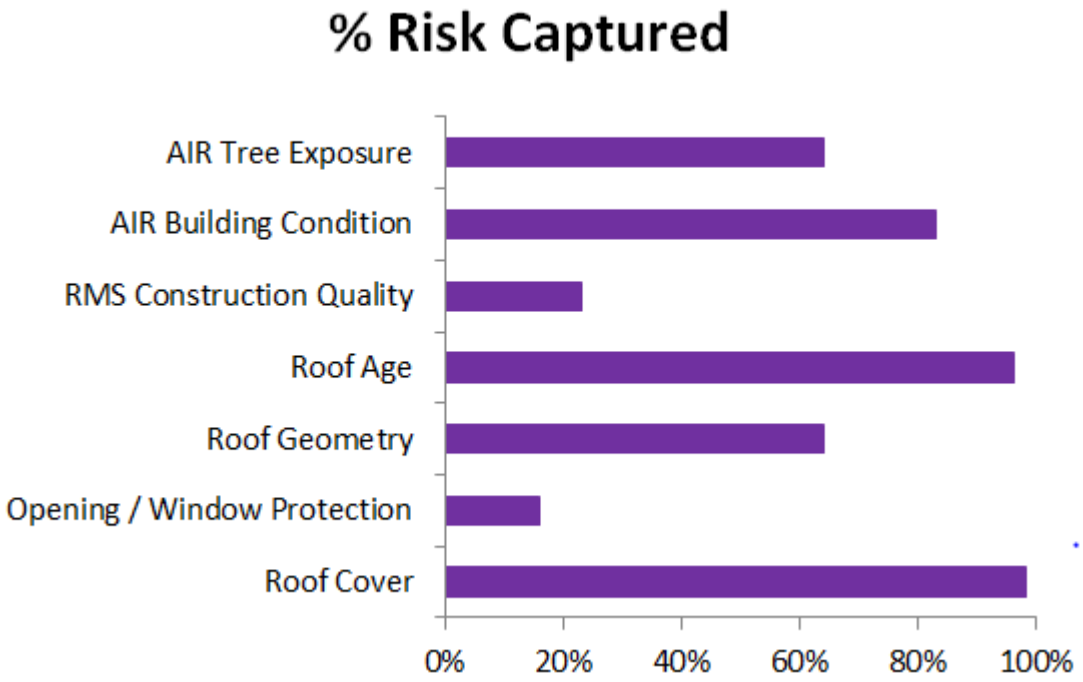
Key Secondary Modifiers Captured by WTW Project

RMS Modifiers for Wind-Only
Cladding Type
Commercial Appurtenant Structures
Construction Quality
Flashing and Coping Quality
Frame-Foundation Connection
Ground-Level Equipment
Opening Protection
Residential Appurtenant Structures
Roof Age and Condition
Roof Anchors
Roof Covering
Roof Equipment Hurricane Bracing
Roof Geometry
Roof Sheathing Attachment

AIR Modifiers for Wind-Only
Appurtenant Structures
Building Condition
Building Foundation Connection
Exterior Doors
Glass Percentage
Glass Type
Large Missile
Roof Anchorage
Roof Attached Structures
Roof Cover Attachment
Roof Covering
Roof Deck
Roof Deck Attachment
Roof Geometry
Roof Pitch
Roof Year Built
Seal of Approval
Small Debris
Terrain Roughness
Tree Exposure
Wall Attached Structures
Wall Type
Window Protection
Wall Siding

- Secondary modifiers highlighted in **green** are newly captured through this WTW data quality project
- WTW reviewed information from the 3 data sources together with TWIA staff to determine appropriate mappings for modeling
- Outcome: 5 secondary modifiers in RMS and 6 in AIR
  - versus 0 before
- Additional work should serve to further reduce rate indication / reinsurance costs

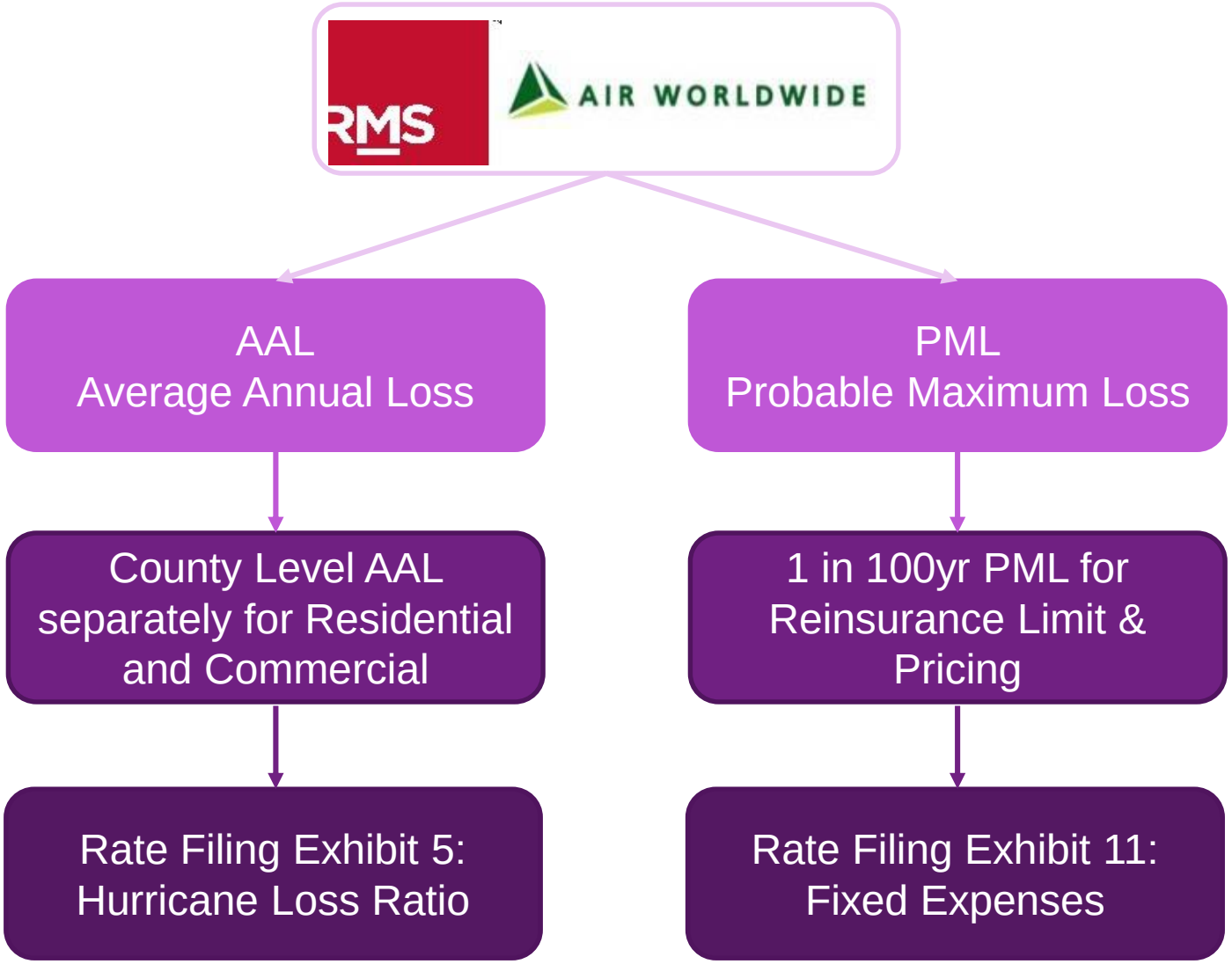
Key Secondary Modifiers Captured by WTW Project



- Impact of these modifiers on modeled losses vary by models and by different options within a particular modifier
- Modifiers generally have more impact in RMS than in AIR

- The following primary risk characteristics were also updated:
  - 10,000 multi-family dwellings were previously modeled as single family homes
  - All mobile home risks have been updated to explicitly include tie-downs (vs unknown)
  - 23% of Commercial business have been re-categorized to occupancies other than *General Commercial (*which is used when the exact nature of commercial business is unknown)

Catastrophe Model uses in Rate Filing



Modeled Average Annual Loss

- Modeled hurricane loss ratio; 75% / 25% weighting with RMS / AIR

- WTW “Original” project in September 2020
  - Residential: 52.6% loss ratio
  - Commercial: 61.2% loss ratio
- WTW “Revised” project December 2020
  - Residential: 49% loss ratio
  - Commercial: 59.8% loss ratio

Hurricane only modeled loss, excluding LAE. See WTW rate indication for additional information

Impact of Data Quality on TWIA's Reinsurance Expense & 1-100 Year PML

Cat model approach for reinsurance and rate filings

Metric	TWIA's Current Approach[3] (Column A)	WTW Recommendation Pre-Data Quality "Original" (Column B)	WTW Recommendation With Data Quality "Revised" (Column C)	TWIA Current Approach vs WTW Recommendation Pre-Data Quality "Original" (B - A)	Pre-Data Quality vs With Data Quality Original vs Revised (C - B)	Pre-Data Quality vs With Data Quality Revised vs TWIA Current (C - A)
Model Weight (RMS/AIR)	50% / 50%	75% / 25%	75% / 25%			
1-100 yr (11/30/19 data)	3,600,000,000	3,180,000,000	2,997,136,072	(420,000,000)	(182,863,928)	(602,863,928)
LAE Load	15.00%	17.20%	17.20%	2.20%	0.00%	2.20%
1-100 yr w/ LAE (rounded)	**4,200,000,000**	**3,740,000,000**	**3,515,000,000**	**(460,000,000)**	**(225,000,000)**	**(685,000,000)**
Assumed Reinsurance Limit (2020)	2,100,000,000	1,640,000,000	1,415,000,000	(460,000,000)	(225,000,000)	(685,000,000)
Assumed Reinsurance Retention (2020)	2,100,000,000	2,100,000,000	2,100,000,000			
2020 Net Reinsurance Spend $[4]	102,066,436	85,227,815	76,000,000	(16,838,621)	(9,227,815)	(26,066,436)
2020 Reinsurance Cost % for Rate Indication (Res)	18.7%	15.8%	13.1%	-2.9%	-2.7%	-5.6%
2020 Reinsurance Cost % for Rate Indication (Comm)	18.7%	17.9%	20.3%	-0.8%	2.4%	1.6%
			Assumed upper limit ROL	*3.66%*	*4.10%*	*3.81%*

[1] Hurricane Loss and LAE Ratio found in Indication Exhibit 5

[2] Reinsurance Spend as a part of Fixed Expenses found in Indication Exhibit 11

[3] This figure represents the methodology TWIA is currently using and the actual limit purchased.

[4] Current Net Spend = 107,500,000 gross spend less broker discount, depopulation policies and applicable commissions. See Indication Exhibit 11.2

[5] Details on the calculation of the Loss Adjustment Expense for the HuLR can be found in Indication Exhibit 4.2

- Willis Re data quality project has reduced the 1-100 yr PML by $225M and reduced reinsurance expense by $9.2M vs the original recommendation
- Based on WTW report and supplementary data, TWIA purchased $685M excess reinsurance limit in 2020, which cost $26M (assumptions approved by TWIA staff)

Impact of Data Quality on TWIA's Reinsurance Expense & 1-100 Year PML

50% / 50% Weight on catastrophe models (versus WTW recommendation)

Cat model approach for reinsurance and rate filings	Column A	Column B	B - A
Metric	**TWIA's Current Approach[1]**	**WTW Recommendation With Data Quality "Revised"**	**Pre-Data Quality vs With Data Quality Revised vs TWIA Current**
Model Weight (RMS/AIR)	50% / 50%	50% / 50%	
1-100 yr (11/30/19 data)	3,600,000,000	3,312,170,236	(287,829,764)
LAE Load	15.00%	17.20%	2.20%
1-100 yr w/ LAE (rounded)	**4,200,000,000**	**3,880,000,000**	**(320,000,000)**
Assumed Reinsurance Limit (2020)	2,100,000,000	1,780,000,000	(320,000,000)
Assumed Reinsurance Retention (2020)	2,100,000,000	2,100,000,000	
2020 Net Reinsurance Spend $[2]	102,066,436	89,874,436	(12,192,000)
		Assumed upper limit ROL	*3.81%*

[1] This figure represents the methodology TWIA is currently using and the actual limit purchased.

[2] Current Net Spend = 107,500,000 gross spend less broker discount, depopulation policies and applicable commissions. See Indication Exhibit 11.2

- Even if TWIA didn't initiate WTW approach on 75% / 25% cat models, the data quality project would still provide a significant financial benefit to TWIA & its policyholders
  - 50% / 50% model weight scenario, Willis Re data quality project reduces the 1-100 yr PML by $320M and reduces reinsurance expense by $12.2M

TWIA Rate Indication - Residential

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Summary of Indicated Rate Change
By Method for Projecting Hurricane Loss & LAE

Exhibit 1

Hurricane Projection Method	Indicated Loss & LAE Ratio: Hurricane	Indicated Loss & LAE Ratio: Non-Hurricane	Fixed Expenses	Total	Permissible LLAE Ratio	Indicated Rate Change
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Using Experience and Models (50%/50%)	42.6%	14.9%	39.5%	97.1%	77.1%	+26%
Using Actual Industry Experience	36.2%	14.9%	39.5%	90.6%	77.1%	+18%
Using Hurricane Models (25% AIR, 75% RMS)	49.0%	14.9%	39.5%	103.5%	77.1%	+34%
AIR Model	58.6%	14.9%	39.5%	113.0%	77.1%	+47%
RMS Model	45.9%	14.9%	39.5%	100.3%	77.1%	+30%

Rate indication decreased from +32% in Sept 2020 to +26%

See rate indication report for additional details

TWIA Rate Indication - Commercial

Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
Summary of Indicated Rate Change
By Method for Projecting Hurricane Loss & LAE

Exhibit 1

Hurricane Projection Method	Indicated Loss & LAE Ratio: Hurricane	Non-Hurricane	Fixed Expenses	Total	Permissible LLAE Ratio	Indicated Rate Change
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Using Experience and Models (50%/50%)	55.0%	9.2%	46.7%	110.9%	77.1%	+44%
Using Actual Industry Experience	50.2%	9.2%	46.7%	106.1%	77.1%	+38%
Using Hurricane Models (25% AIR, 75% RMS)	59.8%	9.2%	46.7%	115.7%	77.1%	+50%
AIR Models	64.7%	9.2%	46.7%	120.6%	77.1%	+56%
RMS Models	58.2%	9.2%	46.7%	114.1%	77.1%	+48%

Rate indication increased from +42% in Sept 2020 to +44%

See rate indication report for additional details

Summary

- WTW initiated this data quality project which proved to be financially beneficial to TWIA, insureds, and all stakeholders
- All “new” data was previously available to TWIA and reinsurance advisors
- Over the last 43 business days, WTW has:
  - Worked with TWIA staff to gather risk elements from various existing sources
  - Improved accuracy of rate filing loss cost
  - Reduced 1-100 year PML by $225M, which also reduces annual reinsurance cost by an additional $9.2M, absent market conditions
    - Reinsurance cost reduction of “Current” vs “Revised” = $26M, or 25.5%

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