The Shifting Nature of Catastrophic Risk in the United States

Casualty Actuaries Special Interest Seminar
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Steven N. Weisbart, Ph.D., CLU, Senior Vice President & Chief Economist
Insurance Information Institute ♦ 110 William Street ♦ New York, NY 10038

Office: 212.346.5540 ♦ Cell: (917) 494-5945 ♦ stevenw@iii.org ♦ www.iii.org
Until Recently (or so we thought),

- Only Hurricanes Caused Disasters
- Only a Small Part of the U.S. (the Gulf and South Atlantic Coasts) Was Vulnerable
- Only June-November (Hurricane Season) Was Worrisome
- Only Wind Damage Was Likely
Are More Catastrophes Occurring?

It Certainly Seems That Way
7 of the 10 Most Costly Disasters in U.S. History Were Hurricanes

(Insured Losses, 2011 Dollars, $ Billions)

- Hugo (1989) - $7.7
- Ivan (2004) - $8.5
- Charley (2004) - $9.0
- Wilma (2005) - $11.9
- Ike (2008) - $13.1
- Northridge Earthquake (1994) - $19.1
- Tornadoes & Storms (2011) - $21.3
- 9/11 Attack (2001) - $24.0
- Andrew (1992) - $25.0
- Katrina (2005) - $47.6

There have been larger disasters in our history, but none more costly than these, due to growth of exposures and insurance coverage.

*Losses will actually be broken down into several “events” as determined by PCS. Includes losses for the period April 1 – June 30. Sources: PCS; Insurance Information Institute inflation adjustments.
15 Costliest World Insurance Losses, 1970-2011*

Insured Losses, 2010 Dollars, $ Billions

- Chile Quake (2010): $8.0
- Hugo (1989): $8.0
- Charley (2004): $9.3
- New Zealand Quake (2011): $10.0
- Rita (2005): $11.3
- Wilma (2005): $14.0
- Ivan (2004): $14.9
- Spring Tornadoes (2011): $16.3
- Northridge (1994): $20.8
- WTC Terror Attack (2001): $23.1
- Andrew (1992): $24.9
- Japan Quake, Tsunami (2011)*: $35.0
- Katrina (2005): $72.3

*Through June 20, 2011. 2011 disaster figures are estimates; Figures include federally insured flood losses, where applicable.
Sources: Swiss Re sigma 1/2011; AIR Worldwide, RMS, Eqecat; Insurance Information Institute.
US Insured Catastrophe Losses, Yearly, 1989-2011*

$ Billions of 2011 dollars

2000s: A Decade of Disaster
2001-2010: $202B (up 122%)
1991-2000: $91B

US CAT losses in 2011 were the 5th highest in US history on an inflation-adjusted basis

*Munich Re estimate for 2012 first half.
Note: 2001 figure includes $20.3B for 9/11 losses reported through 12/31/01 ($25.9B 2011 dollars). Includes only business and personal property claims, business interruption and auto claims. Non-prop/BI losses = $12.2B ($15.6B in 2011 dollars.)
Sources: Property Claims Service/ISO; Insurance Information Institute.
### Number of Federal Major Disaster Declarations, Yearly, 1953-2012*

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<th>Year</th>
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<td>2011</td>
<td>38</td>
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<td>2012</td>
<td>22</td>
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*Through August 26, 2012. Sources: Federal Emergency Management Administration at [http://www.fema.gov/disasters?field_state_tid=All&field_disaster_type_term_tid=All&field_disaster_declaration_type_value=All&items_per_page=60&=GO](http://www.fema.gov/disasters?field_state_tid=All&field_disaster_type_term_tid=All&field_disaster_declaration_type_value=All&items_per_page=60&=GO); Insurance Information Institute.

From 1953-71, the average number of declarations per year was 16.5.

The average number from 1972-1995 was 31.7.

The average number from 1996-2010 was 58.4.

Some federal major disaster declarations cover the same storm in separate states; for example, there were 3 declarations for a “severe storm” that struck DC, Virginia, and West Virginia on June 29-July 1, 2012.
Before 2006 the number of natural disasters never topped 140 in a year; the 1990-2005 average was about 100.

We’ve had at least 150 natural disaster events every year since 2006.

Source: MR NatCatSERVICE
Natural Disasters in the United States, 1980 – 2012
Number of Events, January – June only

First Six Months 2012
90 Events

© 2012 Munich Re

Source: MR NatCatSERVICE
An Upward Trend: Losses Due to Natural Disasters in the US, 1980–2011

(Overall and Insured Losses)

Source: MR NatCatSERVICE

© 2011 Munich Re

2011 was the 5th most expensive year on record for insured US catastrophe losses.

Roughly half of the overall cost of catastrophes in the US was covered by insurance in 2011.

Overall Losses: $72.8 B
Insured Losses: $35.9 B

(Overall and Insured Losses)
What Happened in 2011 and the 1st Half of 2012

Lately, Insured Claims from Tropical Storms in the US Have Decreased, but Other Causes of Catastrophes Have Risen
# Natural Disasters in the United States, 2011

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Number of Events</th>
<th>Fatalities</th>
<th>Estimated Overall Losses (US $m)</th>
<th>Estimated Insured Losses (US $m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe Thunderstorm</td>
<td>69</td>
<td>617</td>
<td>$46,548</td>
<td>$25,813</td>
</tr>
<tr>
<td>Winter Storm</td>
<td>9</td>
<td>67</td>
<td>$2,708</td>
<td>$2,017</td>
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<tr>
<td>Flood</td>
<td>14</td>
<td>20</td>
<td>$2,705</td>
<td>$535</td>
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<tr>
<td>Earthquake</td>
<td>5</td>
<td>1</td>
<td>$257</td>
<td>$50</td>
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<tr>
<td>Tropical Cyclone</td>
<td>3</td>
<td>0</td>
<td>$10,700</td>
<td>$5,510*</td>
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<tr>
<td>Wildfire</td>
<td>58</td>
<td>15</td>
<td>$1,922</td>
<td>$855</td>
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<tr>
<td>Other</td>
<td>2</td>
<td>33</td>
<td>$8,000</td>
<td>$1,000</td>
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<tr>
<td><strong>Totals</strong></td>
<td>160</td>
<td>753</td>
<td>$72,840</td>
<td>$35,780</td>
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</tbody>
</table>

*Includes flood losses insured through the NFIP.

Source: MR NatCatSERVICE
### Natural Disasters in the United States, 2012 1\textsuperscript{st} Half

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Number of Events</th>
<th>Fatalities</th>
<th>Estimated Overall Losses (US $m)</th>
<th>Estimated Insured Losses (US $m)</th>
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<tbody>
<tr>
<td>Severe Thunderstorm</td>
<td>56</td>
<td>69</td>
<td>13,550</td>
<td>8,760</td>
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<tr>
<td>Winter Storm</td>
<td>3</td>
<td>3</td>
<td>80</td>
<td>38</td>
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<tr>
<td>Flood</td>
<td>6</td>
<td>0</td>
<td>12</td>
<td>Minor</td>
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<tr>
<td>Earthquake</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Tropical Cyclone</td>
<td>2</td>
<td>1</td>
<td>100</td>
<td>50</td>
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<tr>
<td>Wildfire</td>
<td>22</td>
<td>6</td>
<td>875</td>
<td>500</td>
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<tr>
<td><strong>Totals</strong></td>
<td><strong>90</strong></td>
<td><strong>79</strong></td>
<td><strong>14,617</strong></td>
<td><strong>9,348</strong></td>
</tr>
</tbody>
</table>

© 2012 Munich Re

Source: MR NatCatSERVICE
US insured losses from the first half of 2012 totaled $9.3 billion.

- This was well below the $24.4 billion in the first half of 2011 (in 2012 Dollars).

- Thunderstorms (including tornado/hail), account for almost all of this, estimated at $8.8 billion.

- Even though claims in 2012 were 1/3 of those from 2011, the first half of 2012 was the third most costly spring thunderstorm season in US history.
The Good News:
- Very mild winter over most of US caused only minor winter storm losses.
- Lack of heavy winter precipitation limited spring flooding.

The Bad News:
- Lack of heavy winter precipitation has exacerbated drought conditions.
2011’s Most Expensive Catastrophes, Based on Insured Losses

- Thunderstorms, Apr. 22-26: $7,300
- Thunderstorms, May 20-27: $6,900
- Hurricane Irene, Aug. 26-28**: $5,000
  - Thunderstorms, Apr. 3-5: $2,000
  - Thunderstorms, Apr. 8-11: $1,510
  - Thunderstorms, Apr. 14-16: $1,400
  - Thunderstorms, Jun. 16-22: $1,200
  - Texas Drought, 2011*: $1,000
  - Thunderstorms, Jul. 10-14: $980
  - Winter Storm, Jan. 31-Feb. 3: $975
  - Thunderstorms, Aug. 18-19: $840
  - Thunderstorms, Apr. 19-20: $830
  - Wildfire, Sep. 4-19: $530
  - Flooding, April*: $500

**Includes $700 million in flood losses insured through the National Flood Insurance Program.

Source: PCS except as noted by “**” which are sourced to Munich Re; Insurance Information Institute.
Shifting Patterns in Insured Catastrophe Losses

Lately, Insured Claims from Tropical Storms in the US Have Decreased, but Other Causes of Catastrophes Have Risen
Historically Most of US Insured Catastrophe Losses Came From Hurricanes and Tropical Storms

- Hurricanes still account for the majority of the Top 15 catastrophes, but other types of catastrophes are displacing hurricanes

- Thunderstorms (including tornados, large and high winds) are the leading cause of insured loss from 2008-2011 and so far in 2012

- A trend/pattern appears to be emerging: More frequent and more intense thunderstorm activity

- It is unclear if the recent low level of landfalling tropical cyclones is part of a trend or a longer-term oscillation in activity
Inflation-Adjusted U.S. Catastrophe Losses by Cause of Loss, 1990–2011: H1

1. Catastrophes are defined as events causing direct insured losses to property of $25 million or more in 2009 dollars.
2. Excludes snow.
3. Does not include NFIP flood losses.
4. Includes wildland fires.
5. Includes civil disorders, water damage, utility disruptions and non-property losses such as those covered by workers compensation.

Source: ISO’s Property Claim Services Unit.
U.S. Insured Catastrophe Losses by Cause of Loss, 2011 ($ Millions)

- Hurricanes & Tropical Storms, $5,510 (72.1%)
- Wildfires, $855 (5.6%)
- Other, $1,000 (15.4%)
- Flood, $535 (1.5%)
- Geological Events, $50 (0.1%)
- Winter Storms, $2,017
- Thunderstorms (Incl. Tornadoes), $25,813 (2.8%)
- Other, $1,000

Thunderstorm/Tornado losses were 2.5 times above the 30-year average.

Tropical activity accounted for just 15.4% of insured catastrophe losses in 2011.

2011’s insured loss distribution was unusual, with tornado and thunderstorm claims accounting for the vast majority of loss.

Source: ISO’s Property Claim Services Unit, Munich Re; Insurance Information Institute.
Since 2008, insured thunderstorm losses totaled roughly $60 billion vs. about $20 billion for tropical events

- This means that insured catastrophe losses over the past 4 years have occurred predominantly in non-coastal areas
- Midwest, Plains, Mid-Atlantic regions have been hit hard
- Inland sections of coastal states have also been hit hard (e.g., AL, MS, NC)

Higher Catastrophe Losses Are Pressuring Property Insurance Markets

- Rates are rising in many areas hit hard by catastrophe losses in recent years.
The Catastrophe Loss Component of Private Insurer Losses Has Increased Sharply in Recent Decades—Only in Part Due to Tropical Activity

*Insurance Information Institute estimates for 2010 and 2011 based on A.M. Best data.

Notes: Private carrier losses only. Excludes loss adjustment expenses and reinsurance reinstatement premiums. Figures are adjusted for losses ultimately paid by foreign insurers and reinsurers.

Sources: ISO; Insurance Information Institute.
2011-12: Nowhere to Run, Nowhere to Hide

Most of the Country East of the Rockies Suffered Severe Weather in 2011
Tornadoes, Thunderstorms, and Large Hailstorms

2012 Is Off to a Worrisome Start, But a Repeat of 2011 Is Unlikely
Average thunderstorm losses have increased over fivefold since 1980.

Thunderstorm losses in 2011 were $25.8 billion—a record.

First Six Months 2012
$8.8 bn

Sources: Property Claims Service, MR NatCatSERVICE  © 2012 Munich Re
Thunderstorm losses for January – June 2012 were much lower than 2011, but still the third worst spring thunderstorm season loss in history.

First Six Months 2012
$8.8 bn

Sources: Property Claims Service, MR NatCatSERVICE © 2012 Munich Re
Increasing Variability: Number of Tornadoes, 1990 – 2012*

Yearly Range
1990-1997: 1,082 to 1,297
1998-2003: 941 to 1,424
2004-2011: 1,098 to 1,819

Insurers Expect to Pay at Least $2 Billion for the April 2011 Tornadoes in Alabama and a Similar Amount for the May Storms in Joplin

*Through June 2012, latest data after adjusting sightings to actual, as of Sept 10, 2012
Number of Tornadoes, 1st Six Months of the Year vs. Full Year, 2007 – 2012

![Bar Chart]

- **2012**: 724 (1st six months) ???
- **2011**: 1398 (1st six months) 293 (rest of year)
- **2010**: 831 (1st six months) 451 (rest of year)
- **2009**: 854 (1st six months) 292 (rest of year)
- **2008**: 1301 (1st six months) 384 (rest of year)
- **2007**: 798 (1st six months) 304 (rest of year)

**Source:** [http://www.spc.noaa.gov/climo/online/monthly/newm.html](http://www.spc.noaa.gov/climo/online/monthly/newm.html); Insurance Information Institute.
Location of Tornadoes in the US, 2011

1,894 tornadoes killed 552 people in 2011, including at least 340 on April 26 mostly in the Tuscaloosa area, and 130 in Joplin on May 22.

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2011_annual_summary.html#
Tornadoes killed 68 people through July 4

Insured winter storm losses in 2011 totaled $2.0 billion. Average winter storm losses have nearly doubled since the early 1980s.
Location of Large Hail Reports in the US, 2011

There were 9,417 “Large Hail” reports in 2011, causing extensive damage to homes, businesses and vehicles.

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2011_annual_summary.html#
There were 5,452 “Large Hail” reports through July 4, 2012, causing extensive damage to homes, businesses and vehicles.

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2012_annual_summary.html#
Location of Wind Damage Reports in the US, 2011

There were 18,685 “Wind Damage” reports through Dec. 27, causing extensive damage to homes and businesses.

Location of Wind Damage Reports in the US, 2012*

There were 6,851 “Wind Damage” reports through July 4, causing extensive damage to homes and businesses.

There were 29,996 severe weather reports in 2011; including 1,894 tornadoes; 9,417 “Large Hail” reports and 18,685 high wind events.
There were already 13,177 severe weather reports through July 4; including 874 tornadoes; 5,452 “Large Hail” reports and 6,851 high wind events.
Large Hail, 9,417, 31%
Wind Damage, 18,685, 63%
Tornadoes, 1,894, 6%

Tornadoes accounted for just 6% of all Severe Weather Reports but more than 550 deaths in 2011, the most in 75 years

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2011_annual_summary.html#
June 29, 2012 Derecho: Traveled 600 Miles from Midwest to Mid-Atlantic

10-HOUR RADAR COMPOSITE (2PM – MIDNIGHT)

The June 29 derecho traveled 600 miles in just 10 hours—an average speed of 60 MPH! Peak wind gusts 80-100 MPH.

Millions of people were without power in sweltering heat for days, particularly in Mid-Atlantic states.

Wildfires
Subhead: “Wildfires used to be seasonal.

They also used to be regional, pretty much limited to the more fire-prone areas of the country.

Today, wildfires no longer have either characteristic—and that’s not a good thing.”

Callout: “At one point, wildfires were burning continuously in...Texas over an 18-month time span.”

Source: Risk & Insurance magazine, June 2012, p. 19
Number of Acres Burned in Wildfires, 1980 – 2012

- 2011: 8.3 million acres, the 4th worst year on record, causing $855 in insured losses
- 2012 First Half: 1.7 million acres

Source: National Interagency Fire Center
© 2012 Munich Re
Number of Federal Fire Management Assistance Declarations, 1953-2012*

From 1953-69, there were no fire management assistance declarations.

The average number from 1970-1993 was 3.75.

The average number from 1994-2010 was 48.9.

Some fire management assistance declarations cover separate fires in a single state; for example, there were 3 declarations in 2012 for the “Oil Creek,” “Squirrel Creek,” and “Arapahoe” fires in Wyoming.

*Through July 31, 2012. Sources: Federal Emergency Management Administration at [http://www.fema.gov/disasters?field_state_tid=All&field_disaster_type_term_tid=All&field_disaster_declaration_type_value=All&items_per_page=60=&GO](http://www.fema.gov/disasters?field_state_tid=All&field_disaster_type_term_tid=All&field_disaster_declaration_type_value=All&items_per_page=60=&GO); Insurance Information Institute.
Let’s not forget about hurricanes

Whether they make landfall, or not
Number of Major & Minor Hurricanes Making US Landfall, 1983-2012

*Through August 31, 2011.

No hurricane has made US landfall as a category 3-5 since Wilma in Oct 2005.
And did you notice—it’s getting hotter (and, in some places, drier)?
By this measure, June 2012 was over 1 degree (F) hotter than during the average of the middle of the 20th century.

*Northern Hemisphere, month of June each year, through 2012
US Drought Conditions, June 26, 2012

Source: National Drought Mitigation Center
US Drought Conditions, July 31, 2012

U.S. Drought Monitor

July 31, 2012
Valid 7 a.m. EDT

Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:
- Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

Released Thursday, August 2, 2012
Author: Mark Svoboda, National Drought Mitigation Center

Source: National Drought Mitigation Center

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The drought has diminished in intensity over the past month. Crop insurance combined ratios are expected to be in the 100-110 range.

*Credit Suisse, P&C Sector Forecast, Sept. 12, 2012.
Source: US Drought Monitor: [http://droughtmonitor.unl.edu/](http://droughtmonitor.unl.edu/)
And don’t forget the flood risk (even though it’s currently mostly federally insured)
We appear to have had at least one “significant” flood every year since 1978, averaging about 3 per year.

*As determined by the NFIP, measured as an event with 1,500 or more paid losses “or occasionally one added for other reasons.”
**Through July 31, 2012


*Excluding 2005 (which was $20.4 billion in 2011 dollars).
**Through July 31, 2012

Adjusted* Flood Loss Payments, 1978-2011**: No Discernible Trend

*per million policies in force, in 2011 dollars
**Excluding 2005 (which was $4,118 in 2011 dollars).

Some of the increase shown here is due to growth in the number of policies

Summary and Conclusions

- The frequency and severity of most catastrophes seems to be increasing.
- In recent years, thunderstorms and other severe weather has caused most insured damage, supplanting tropical storms/hurricanes.
- 2011 was an especially expensive year for insured losses, and 2012 appears directionally similar.

Q&A
Insurance Information Institute Online:

www.iii.org

Thank you for your time and your attention!