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Aviation Risk

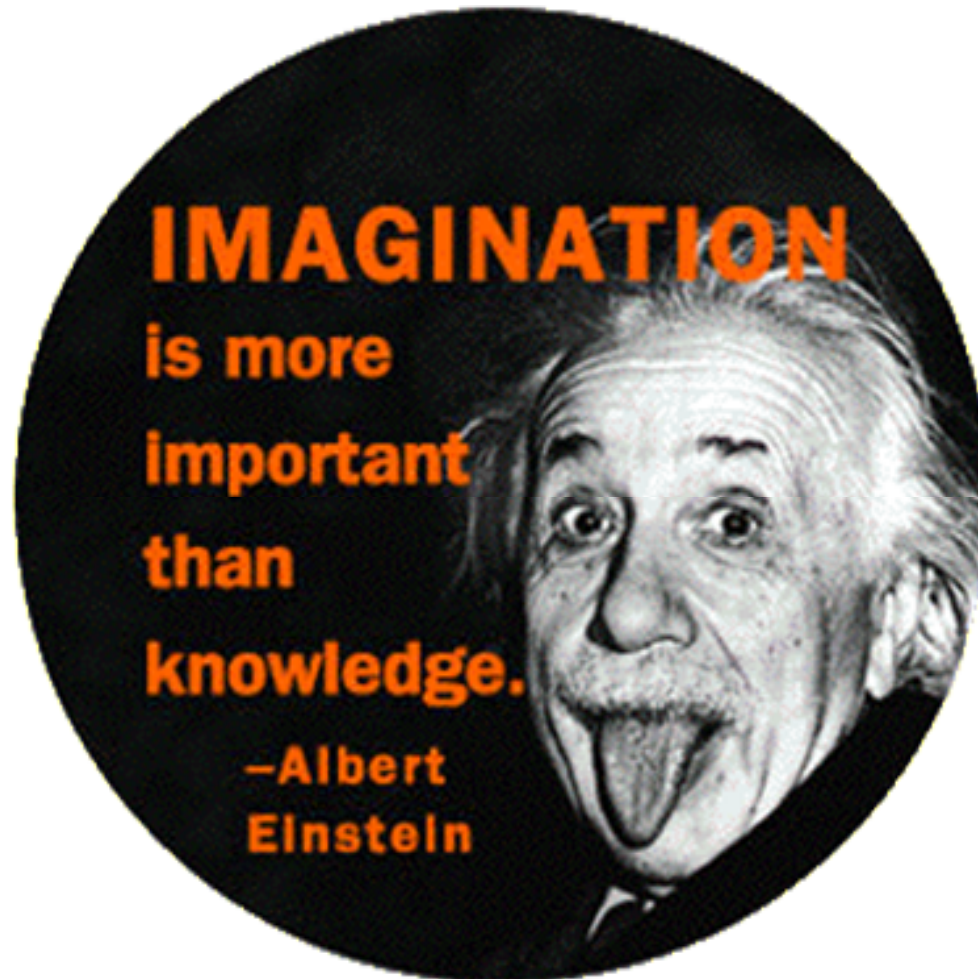
The Elephant in the Room

Severity Events

Mike Falcone

Global Aerospace

Imagination and Knowledge



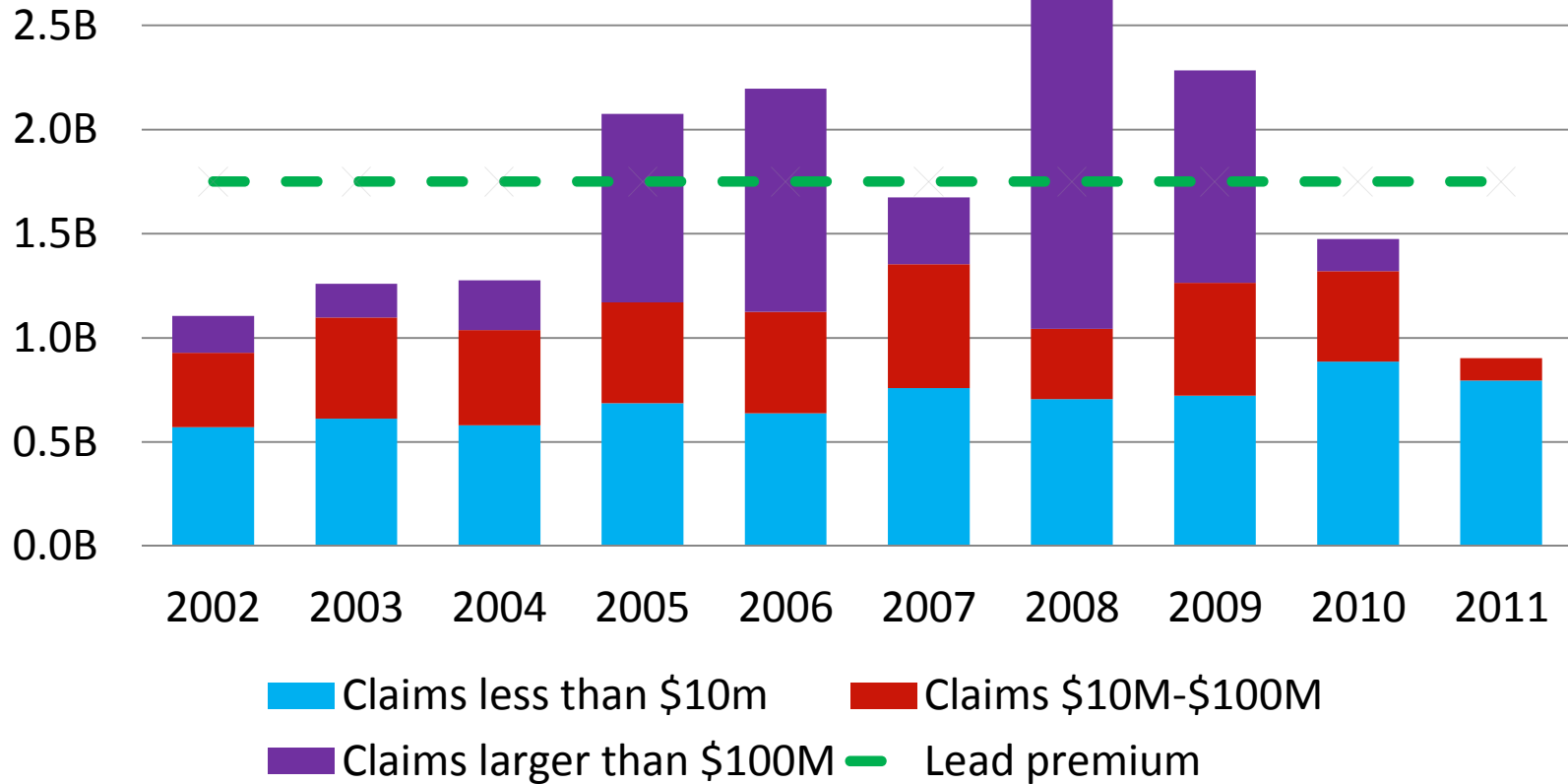
What can I talk about?

- **Review some basic information about Airline Insurance**
 - Aggregate loss amounts by year
 - Definition of Catastrophe
 - Improvements in safety over time
 - Limits Provided
- **A “Regular” Cat – Colgan**
- **An Extreme event - September 11th**



Airlines - Claims at Present Day Value vs 2012 Lead Premium

By policy year

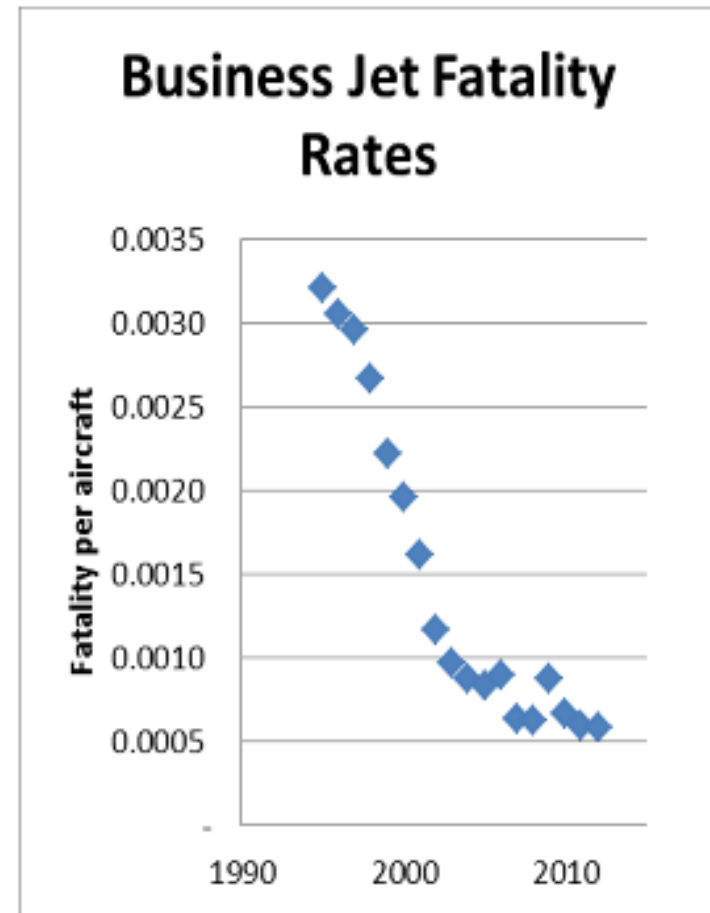
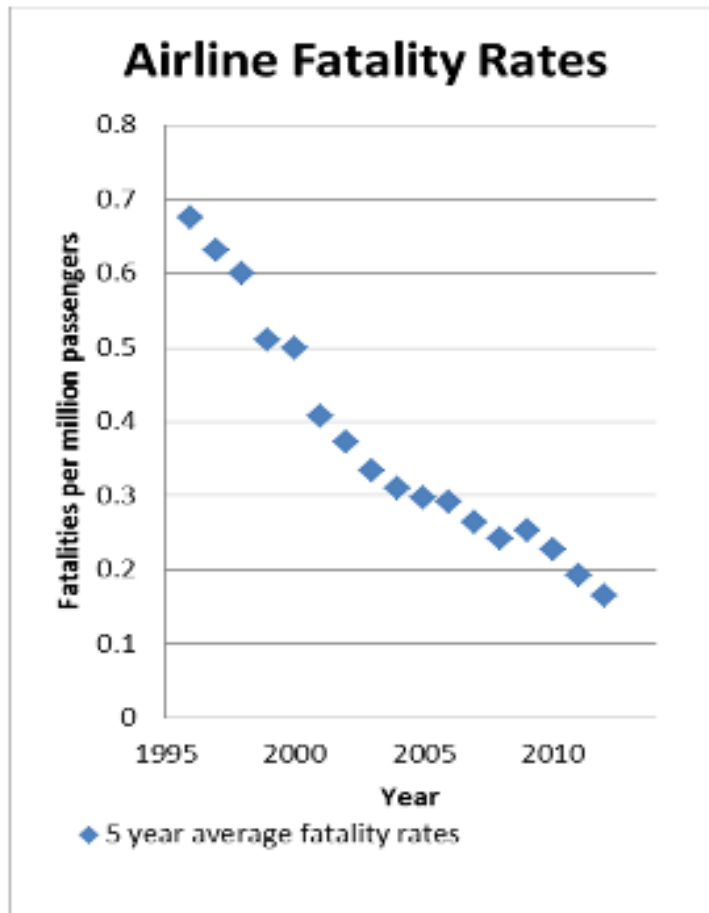


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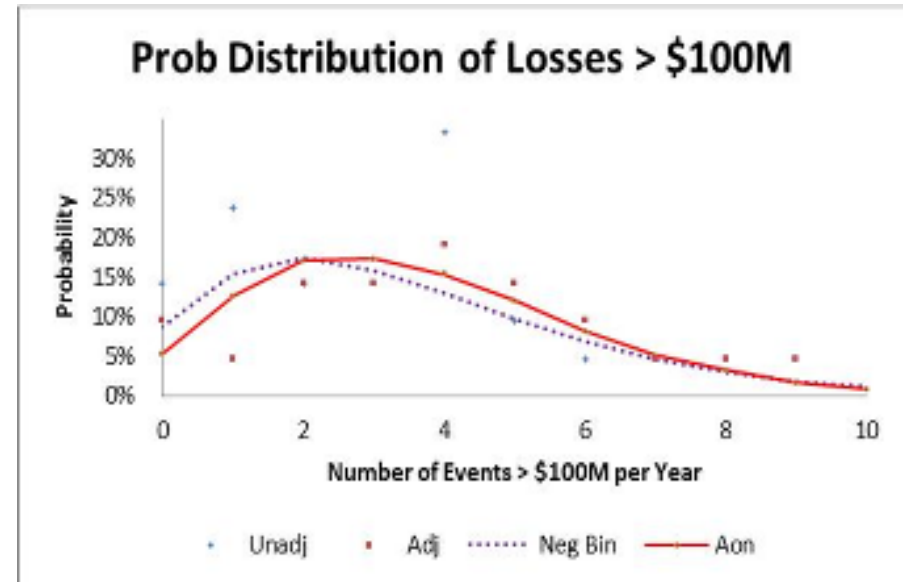
INSURE WITH CONFIDENCE

Fatality Rates have improved in both Airlines and GA



2010-12 versus Distribution of Large Losses (>\$100M)

# Claims	Unadjusted	Adjusted	Neg. Bin. Curve Fit	Aon Analysis
0	14.3%	9.5%	8.8%	5.4%
1	23.8%	4.8%	15.5%	12.7%
2	14.3%	14.3%	17.4%	17.1%
3	-	14.3%	16.0%	17.3%
4	33.3%	19.0%	13.0%	15.4%
5	9.5%	14.3%	9.7%	12.1%
6	4.8%	9.5%	6.9%	8.2%
7	-	4.8%	4.7%	5.2%
8	-	4.8%	3.1%	3.3%
9	-	4.8%	2.0%	1.7%
10	-	-	1.2%	0.9%



- From 2010 – 2012 only Asiana (\$137.3M) is over \$100M
- Lion Air & National Air Cargo (2012 U/W Yr) ~ \$60M each but still early

How Unusual are years 2010-12?

Total Losses over 3 Yrs	Unadj	Adj	Neg Bin	Aon
No Loss	0.29%	0.09%	0.07%	0.02%
1 or Fewer	1.75%	0.22%	0.43%	0.13%
2 or Fewer	5.05%	0.67%	1.47%	0.54%
3 or Fewer	9.32%	1.46%	3.65%	1.60%

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Elephant in the Room – Airline Limits

At any given Moment		
12,500 Aircraft in Flight	Assume \$1.25bn as a typical limit. Implies total limits of \$15.6 trillion exposed	At a PML of \$375m, implies circa \$5 trillion

In a 15 minute period		
1,050 aircraft take off	PML of \$375m, implies almost \$400 billion exposed	\$50k

All figures very crude estimates

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Colgan Flight 3407



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Colgan Flight 3407



Colgan Flight 3407 - 12 Feb 2009

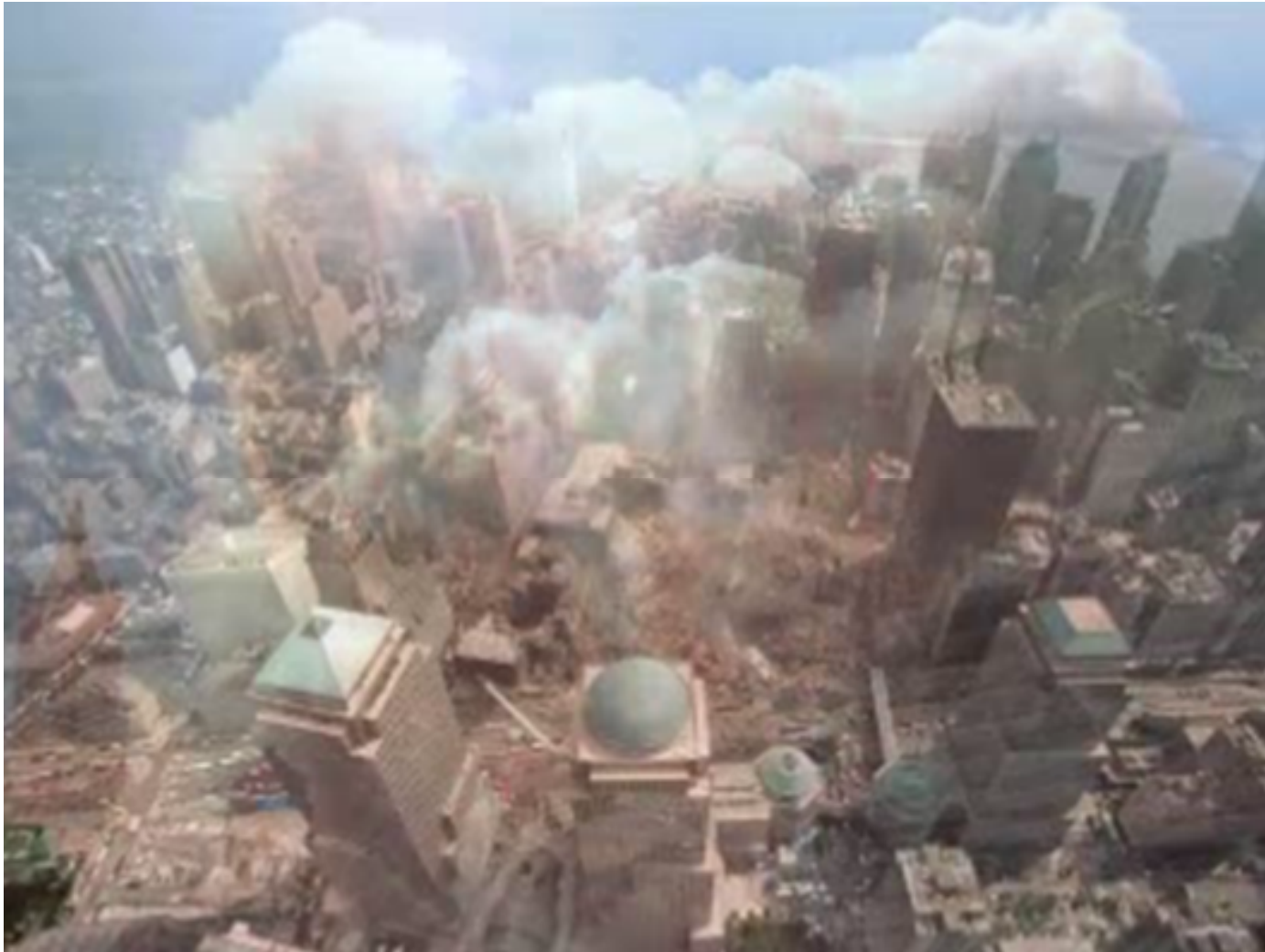
- **Colgan – Financial Overview**
 - Over \$300m event
 - \$20m Hull
 - 50 fatalities
 - Liability Losses / Fatality – over \$6m
 - NY law – single no dependents
 - Large current outstanding reserve
 - Expenses



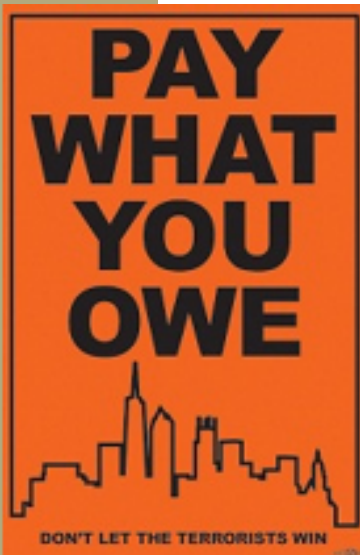
Sept 11th - WTC

- **Aviation Market Losses**
 - \$3.6bn incurred
 - \$2bn O/S losses
 - Airlines and Security companies
- Victims Compensation Fund (\$7bn), Fatalities, Respiratory, Property Insurers, WTCP, other
- Current Status / Main outstanding items
 - WTCP – Greater of two and correspondence is on appeal
 - Cantor – Liability trial scheduled





Severity Events - Claims Process can get politicized



**INSURANCE COMPANIES
FAIL TO PAY**

Global Aerospace	\$288 million
USAU	\$307 million
AMR Corp.	\$157 million
Lloyd's of London	\$235 million
Federal Insurance Company & The Chubb Group	\$82 million
Swiss Re	\$92 million
AXA	\$88 million
Generali	\$313 million




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Differences by Region (Airlines)

Item	Placement Region		
	US	Developed World	Developing World
Hull Values (Submission Info)	\$18m	\$30m	\$27m
Passengers per a/c (Submission info)	55	103	94
Passengers per a/c (loss info)	27	123	88
Cost per Pax	\$6m	\$2m	\$1m
loss Freq >10m per mil departures	0.50	0.80	3 - 12

- **Significant difference in size of a/c in the US vs ROW**
- **US has lower frequency and higher severity**
- **Non US developed world Frequency / Severity is impacted by developing world airlines under developed world placements**



Traditional Airline RDS'

■ An A380

- Hull Value: Circa \$190 - 325m
- 450-490 passengers (talk of 800 as possible)
- No US Carriers - Flights to and from the US (JFK, SFO, MIA, LAX +)
- BA, Air France / Lufthansa / Quantas / Emirates / Thai / MAS, etc
 - Will buy \$2.25bn Liability limit
- **\$300m Hull + \$4m * 450 = \$2.1bn**

■ Clash Event

- Two widebodies over a big city (Tokio or New York)
- B777 up to \$180 / 350 seats each
- Tenerife 1977. Two Boeing 747s (583 fatalities, 68 survivors)
- Linate 2001 Citation and MD87. 114 + 4 Fatalities.

-
- **Aircraft hits others on the gate (toward the terminal)**



Qantas Flt 32 - November 4th 2010



Indonesia to
Sydney. 440
pax + 29 crew



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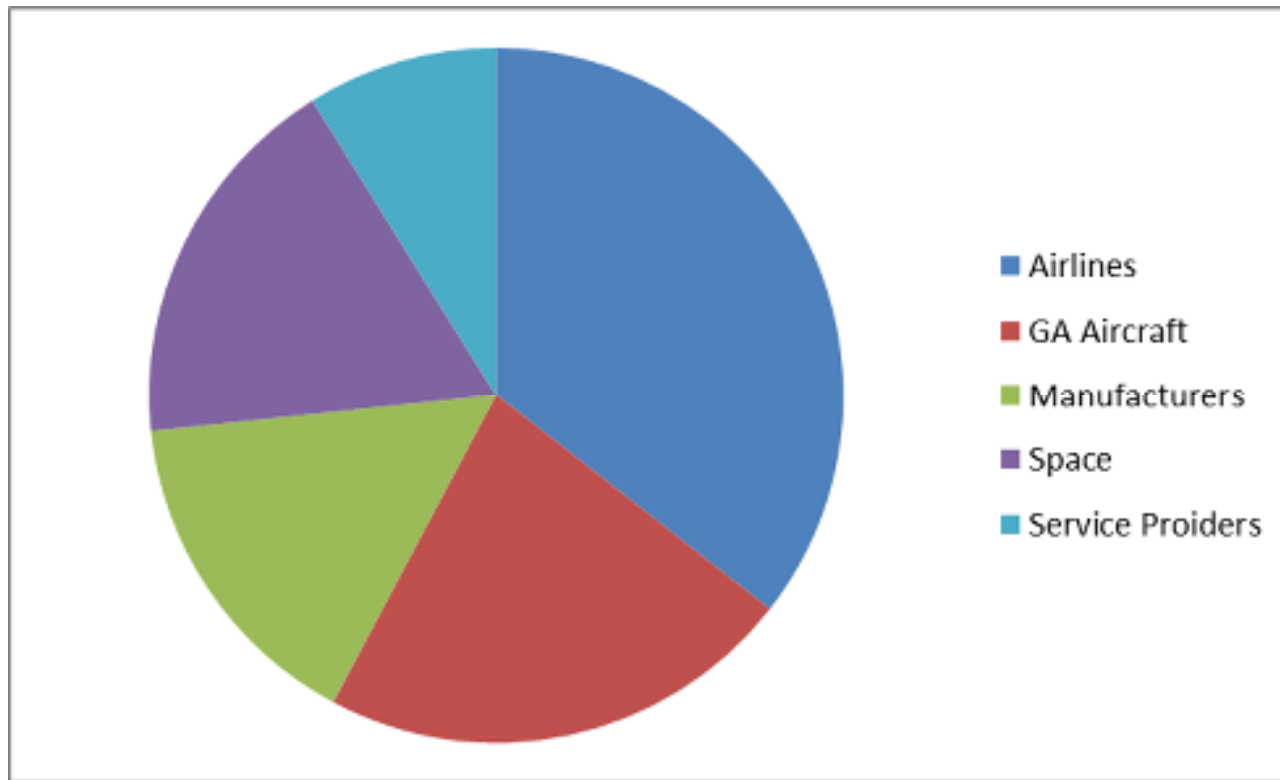
Airline Clash

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The entire Aerospace Market

- Crude Estimate: \$5bn in premium



- **Regular Airlines Exposures, plus....**



- **Turkish Airlines - \$325m. Hull: \$29m**

- Flight 1951 - Feb 2009. Istanbul to Schipol.
- 9 fatalities. 86 Injuries.

General Aviation and Satellite

■ General Aviation

- \$500m minimum liability limit required for a BBJ
- Typically written 100%
 - Some insurers can write up to **\$750m liability 100%**
 - Hulls can be very expensive (Airline Equipment)
 - Typically under \$80m
- Passengers with High Incomes / Net Worth
- Can get “entangled” with an Airline

■ Satellite

- \$20bn in in orbit limits
- Meteor or Carrington events



Natural Catastrophe

- **Biggest loss – Dulles (Hanger Collapse \$230m)**
- **Earthquake**
 - Shaking will not typically damage an aircraft
 - Biggest issue is Hanger Collapse
- **Hurricanes tend not to be significant losses**
 - Warning and equipment is mobile. Sandy (\$10m)
- **Tsunami?**
 - Military aircraft loss in Japanese Tsunami
 - Haneda – near the bay with significant concentrations
 - Structure of the bay is said to protect from a Tsunami
- **Tornado**
 - Would have to be a very precise strike.



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- **I struggle to envision risks that access these limits**
 - Technological – Cyber, ATC, DVT
 - Coverage expansion?

All figures very crude estimates





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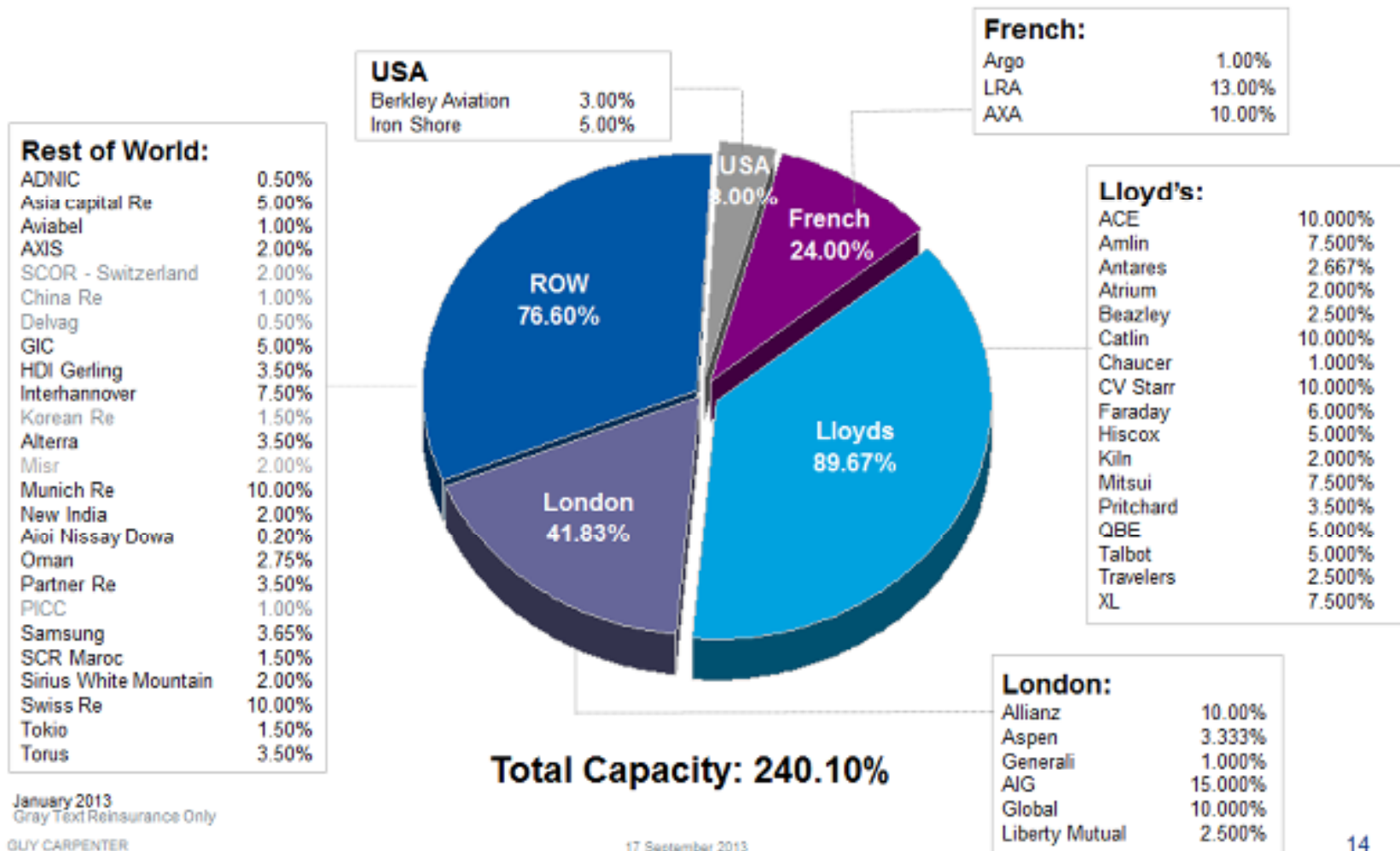
Additional Materials



Airline Capacity Non US \$1.5bn limit

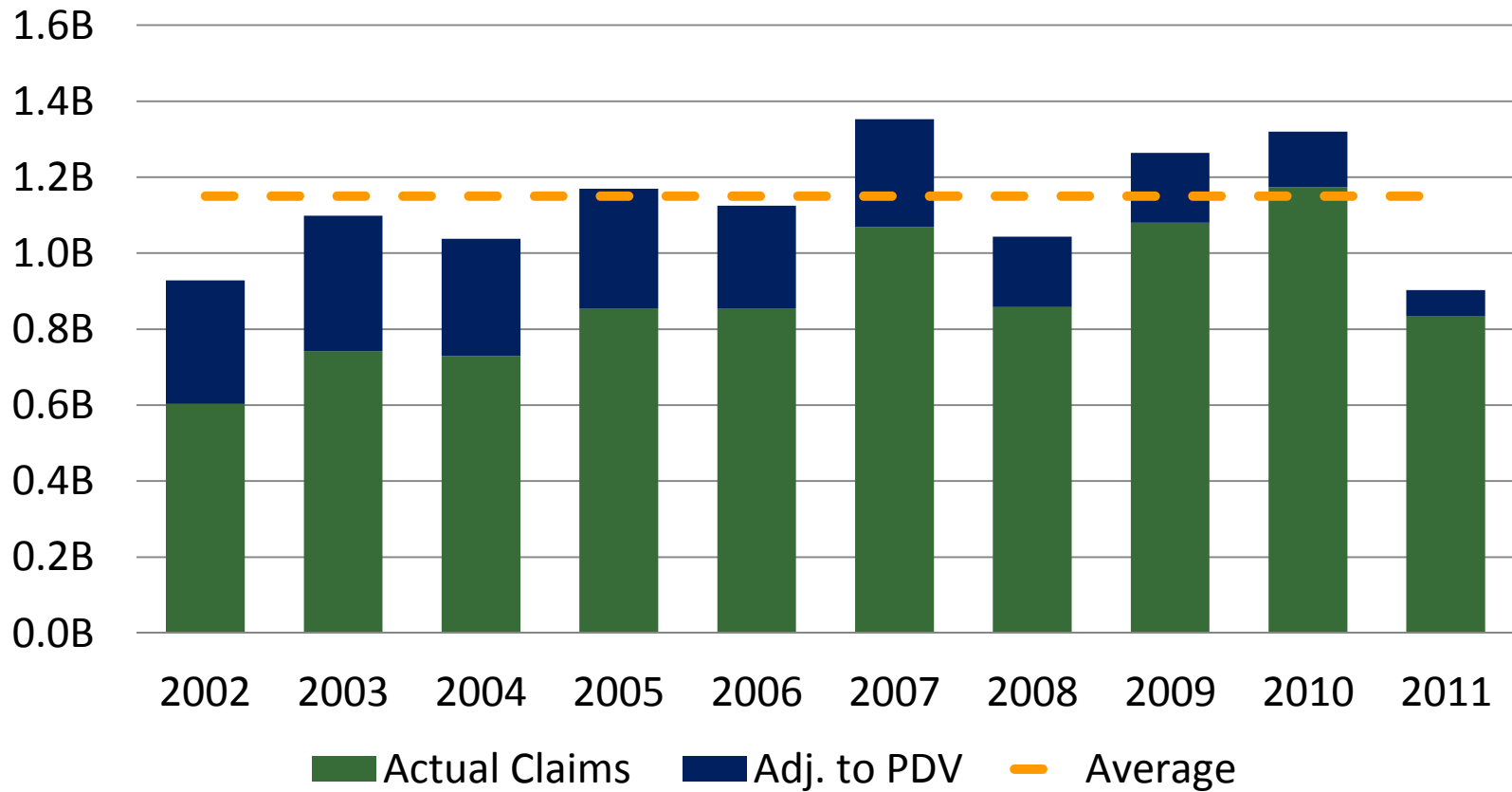
2013 Overview Theoretical Airline Capacity

Based on a Non-US major airline with a CSL of \$1.5bn



Claims *Excluding* Losses larger than \$100m

By policy year



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