

# Aviation Insurance

Casualty Loss Reserve Seminar

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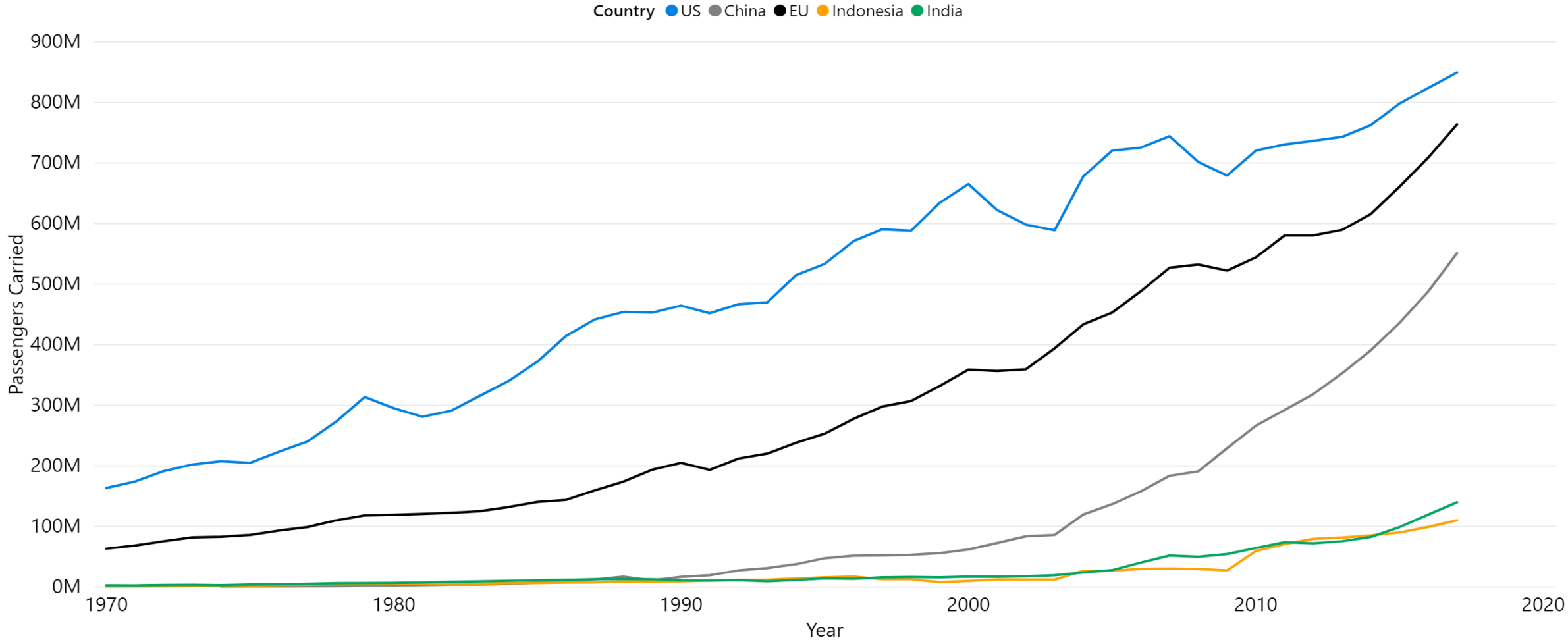


# Presentation Overview

- Aviation Industry Statistics
- Aviation Insurance: Coverages and Exposures
- Legal Discussion
- Boeing 737 MAX
- Actuarial Considerations
- Questions?

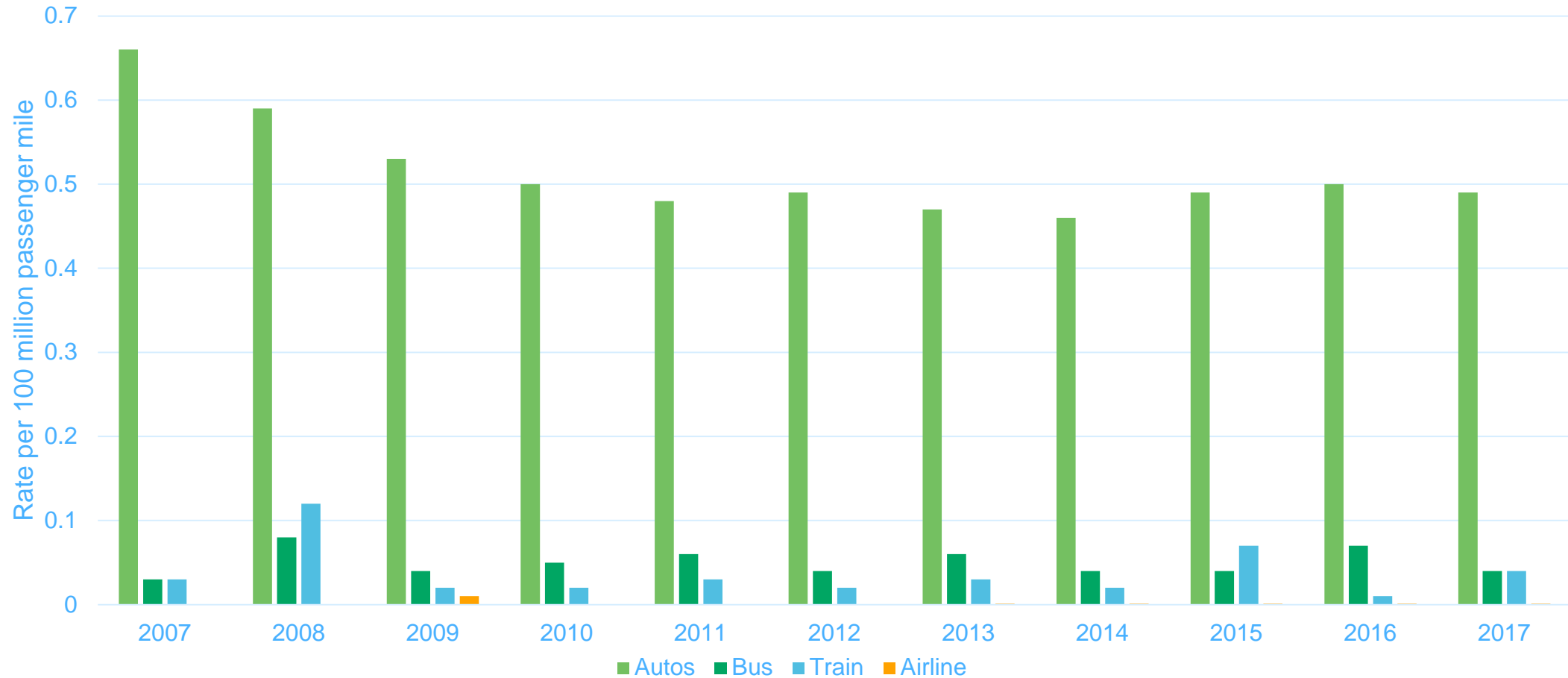
# **Aviation Industry Statistics**

Air Transport Passengers Carried by Country from 1970-2017



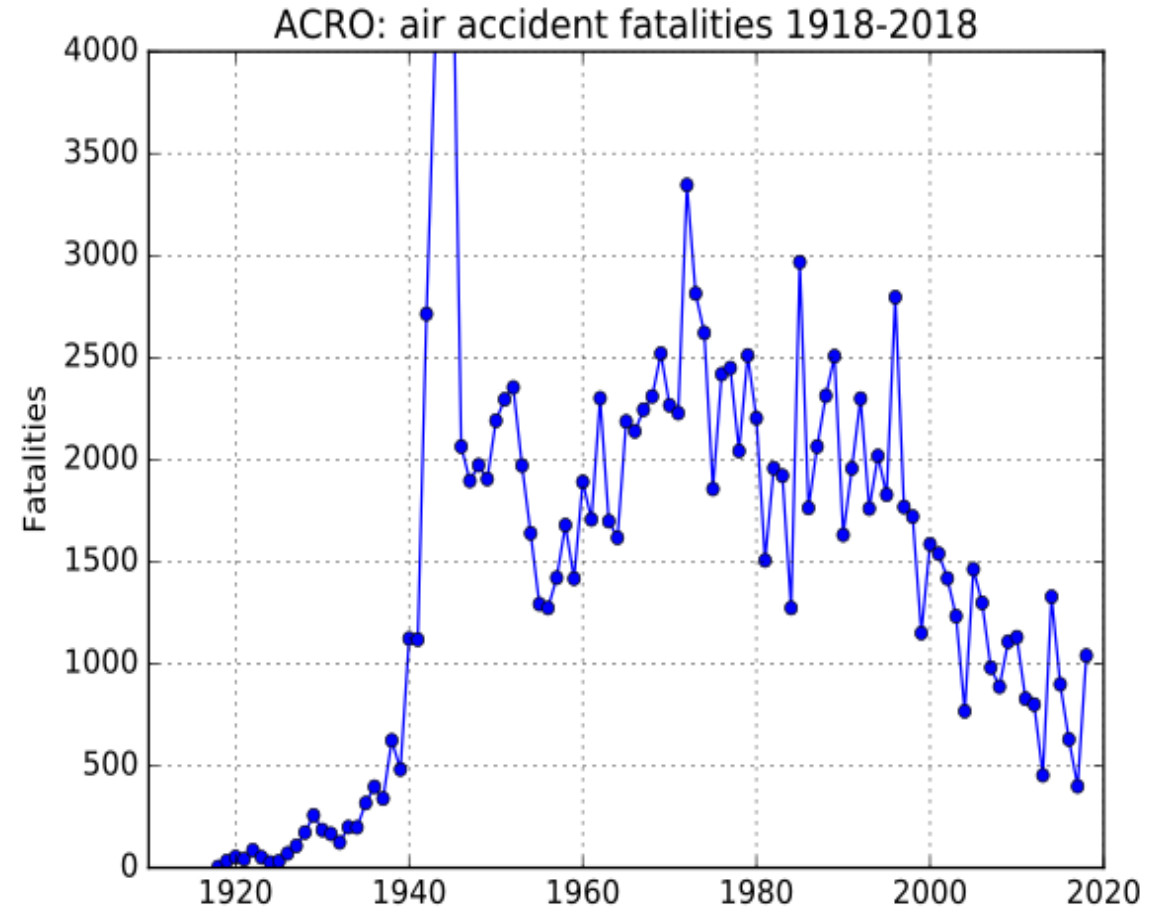
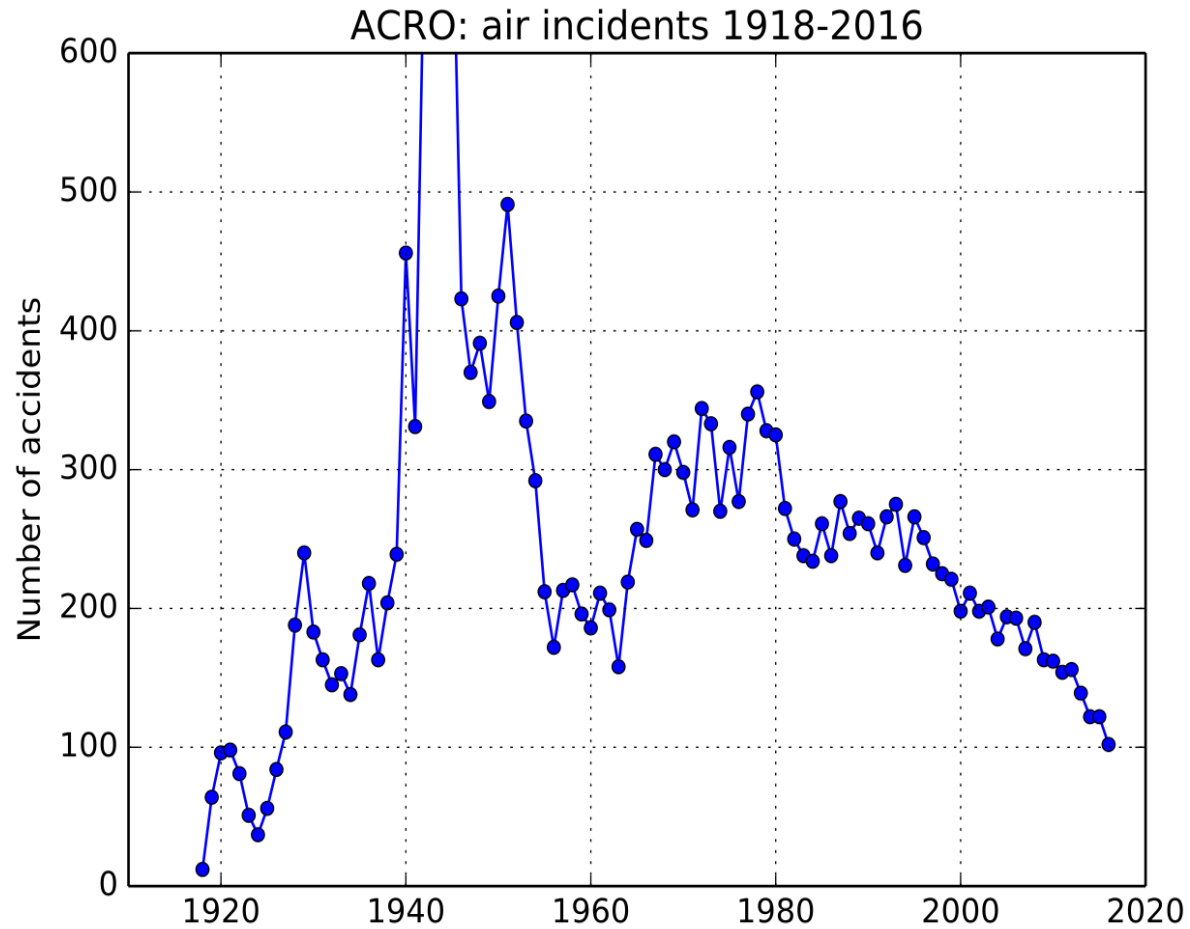
Data from The World Bank

# Passenger Death Rates by Transportation Mode (US)



Source: National Safety Council

# Airline Safety



Source: <http://www.baaa-acro.com/statistics/death-rate-per-year>

# **Aviation Insurance**

# Why Separate Market for Aviation?

- General liability (GL) reinsurance policies historically excluded aviation risks
  - Primary GL excluded aviation risks
- Need for Specialization
  - Specialized policy, underwriting and claims handling
  - Separate laws (state, country, international treaties)
  - Spread of risk
  - Large policy limits (\$2B+)
    - Vertical placement

Primary \$1B limit								Excess \$1.5B Xs \$1B							
Ins1	Ins2	Ins3	Ins4	Ins5	Ins6	Ins7	Ins8	XS1	XS2	XS3	XS4	XS5	XS6	XS7	XS8



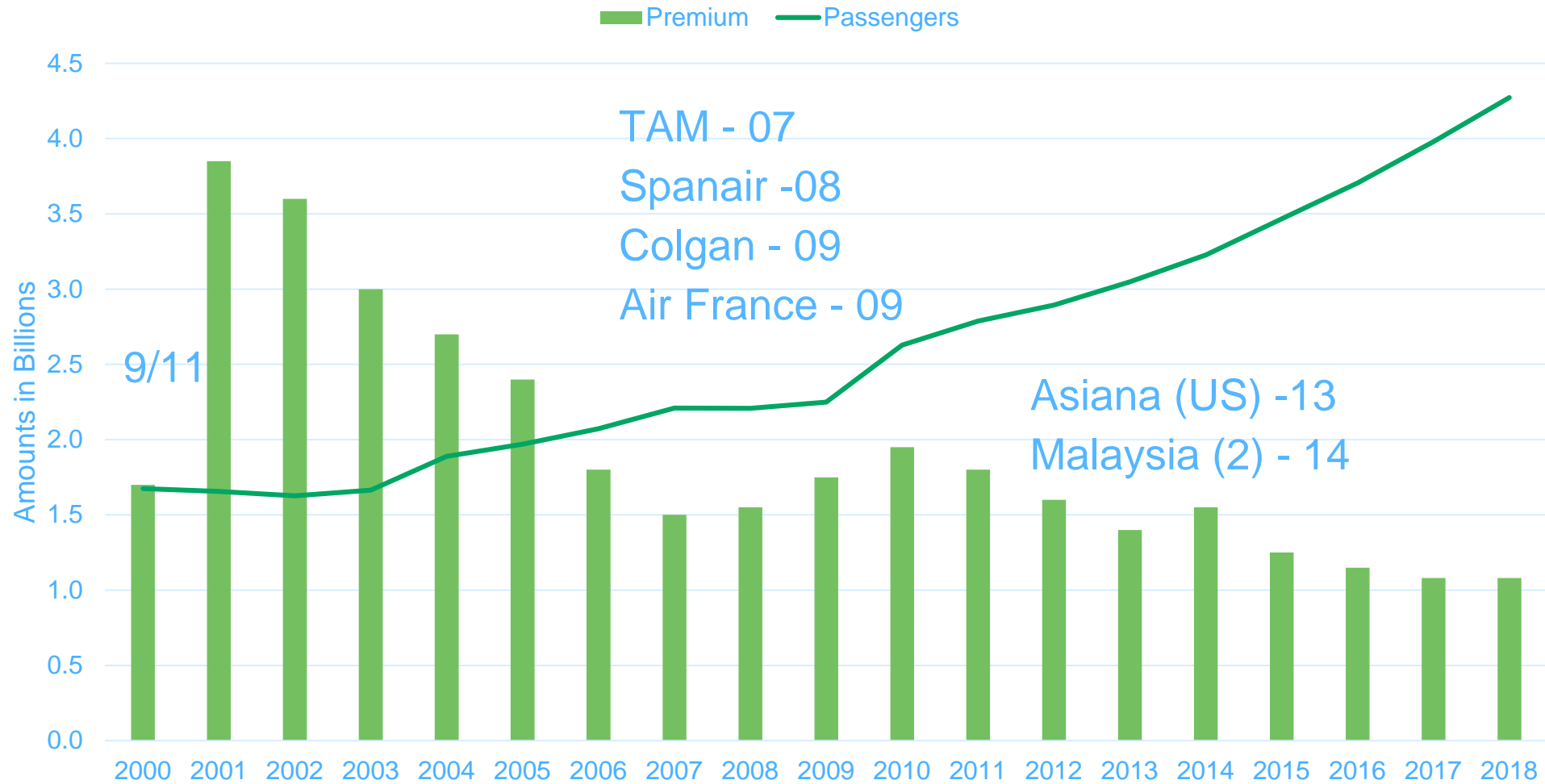
# Covered Risks and Exposures

- Major/ Regional /Cargo Airlines
  - American Airlines
  - FedEx
- Major Manufacturers (Products)
  - Boeing
  - Rolls Royce (engines)
- General Aviation
  - Charter
  - Corporate Fleets
  - Fractional Ownership
  - FBOs (Fixed based operators)
  - Minor products

# Market Players / Infrastructure

- Heavily brokered market
- Insurers include:
  - Lloyds Syndicates
  - Large Insurers/Reinsurers
  - Aerospace Pools
  - Local Direct Writers of General Aviation Only
  - Bermuda/Specialty Writers

# Airline Passengers to Airline Premium



# Aviation Insurance Underwriting Cycle - Why?

- Relatively easy to enter aviation market as a follow
  - Lead insurer provides loss adjusting and expertise
  - Policy language negotiated between brokers and major players
  - Subscription markets
- Short term memories
  - All major events are unique and “won’t happen again”
- Excess capital in market
  - Assumed little to no correlation to property cat risks

# A Brief History of Aviation Insurance

- 1688 – Lloyd’s begins in a coffee house to insure shipping industry
- 1903 – Wright brothers first flight
- 1914 – World War I; airplanes first used for military purposes
- 1924 – British Aviation Insurance Group formed
- 1929 – Associated Aviation Underwriters formed
- 1939 – WWII; first jet aircrafts used in military
- 1996 – Lloyd’s formation of Equitas
- 2001 – September 11th
- 2019 – “Lloyd’s of London calls time on drink and drugs” – BBC; April 8, 2019
  - “On-site bar will become a coffee shop”
- July 24, 2019 Flightradar24 records over 225,000 flights in one day

# Legal Discussion

# Aviation Civil Litigation

- Liability
  - Product Liability
  - Negligence
  - Breach of Contract
- Damages
  - Wrongful Death
  - Survival
  - Economic
  - Non-Economic

# Value of Human Life

- Common Law
- State Law
- International Law (Montreal Convention)
- Wrongful Death Damages
- Survival Damages
- Catastrophic Injury



# Wrongful Death Damages

- Lost Financial Support/Inheritance
- Lost Services
- Lost companionship, guidance tutelage

# State Comparison: Wrongful Death

- Illinois (Boeing Headquarters)
- Texas (American/Southwest HQ)
- Montreal Convention (International)

# Survival Damages

- Lost wages
- Personal Injury
- Pain and suffering

# State Comparison: Survival Damages

- Illinois (Boeing Headquarters)
- Texas (American/Southwest HQ)
- Montreal Convention (International)

# Which Law Applies?

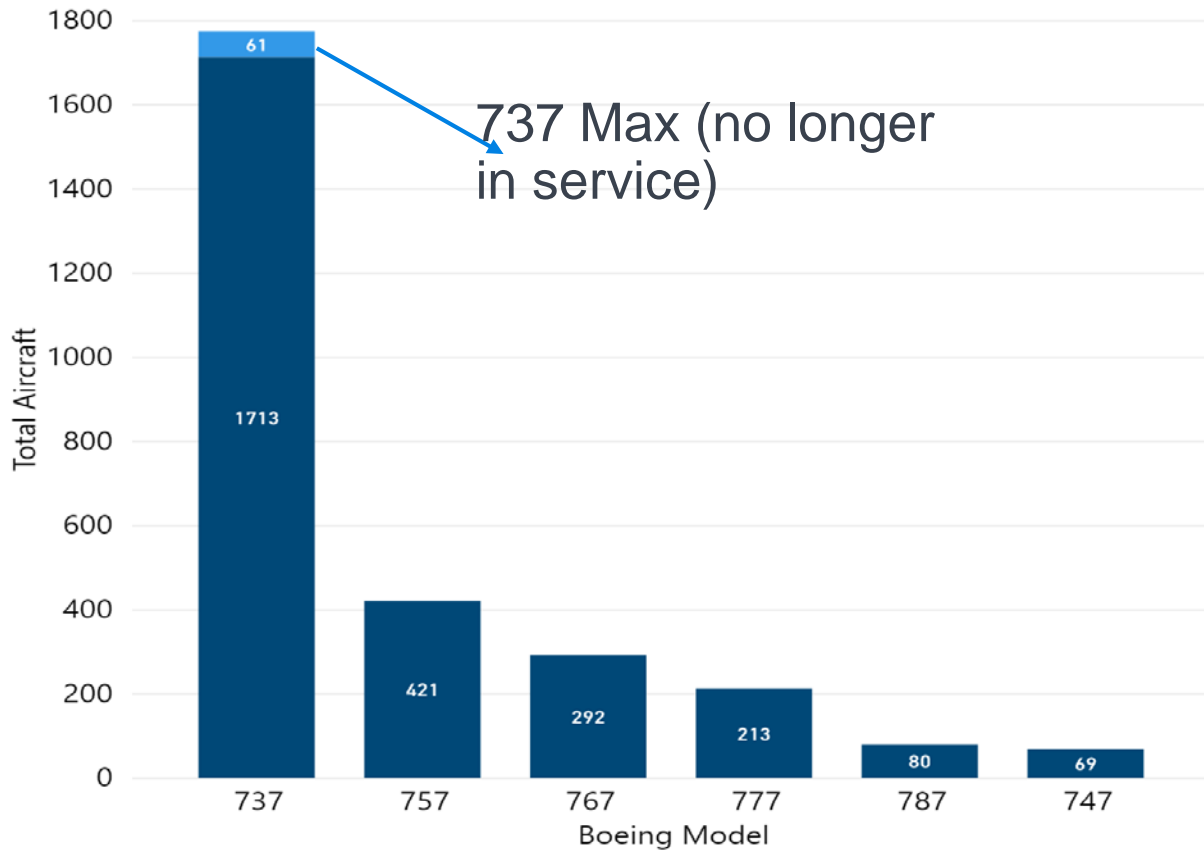
- Dépaçage
- Lex loci delicti (commis)
- Lex fori
- Significant Contacts

# Boeing 737 Max

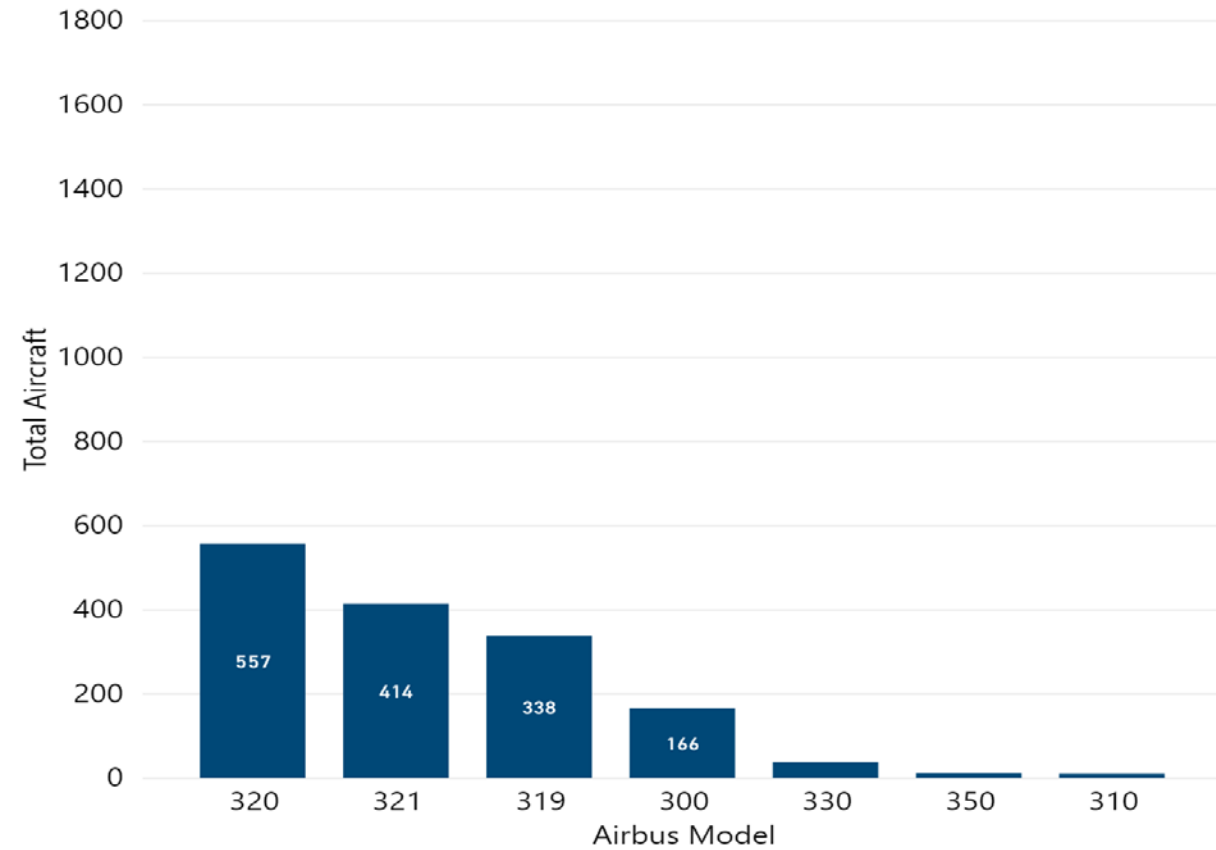


# United States – Aircraft Model By Major Manufacturer 2018

Boeing Aircraft in Operation by Model

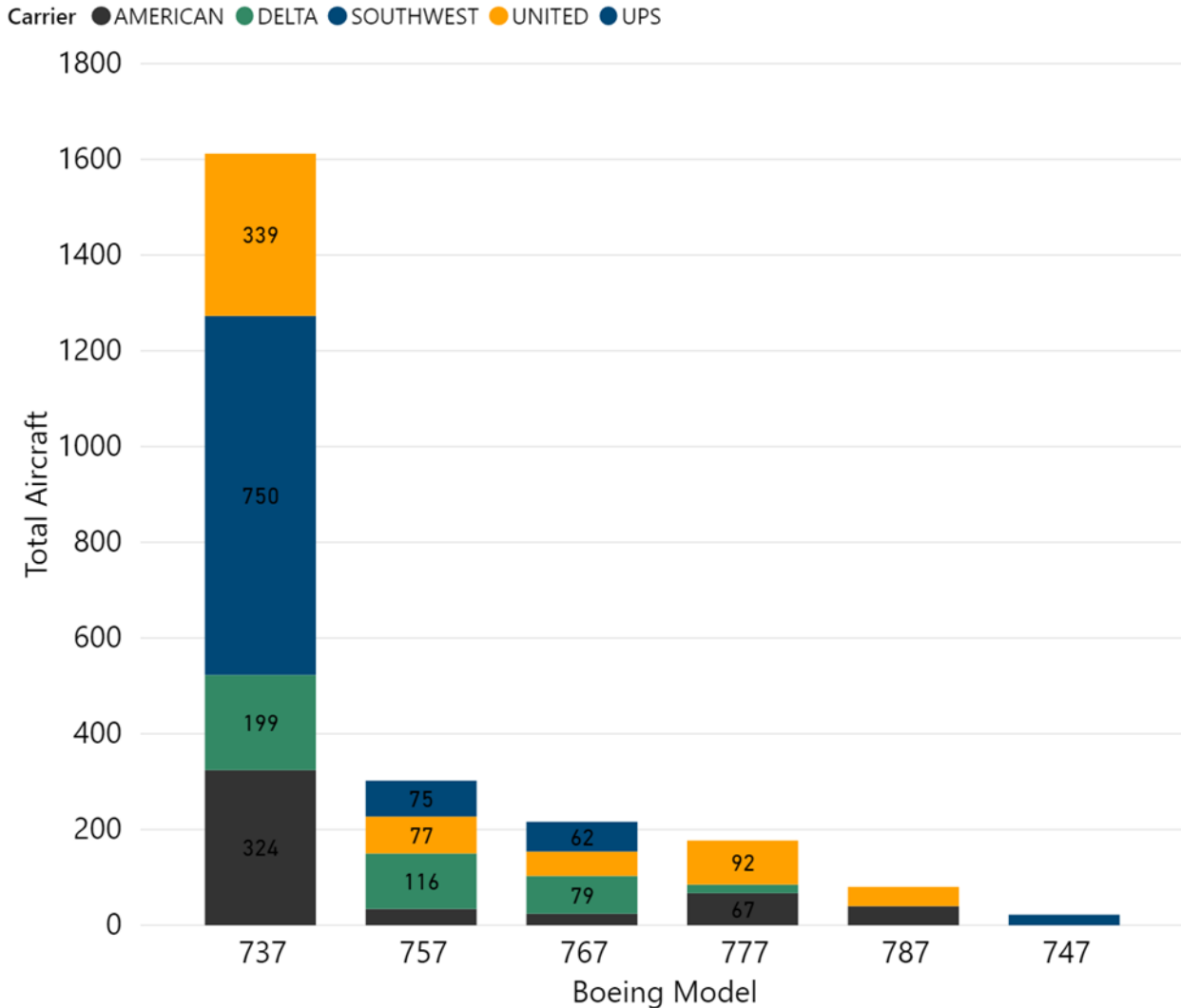


Airbus Aircraft in Operation by Model

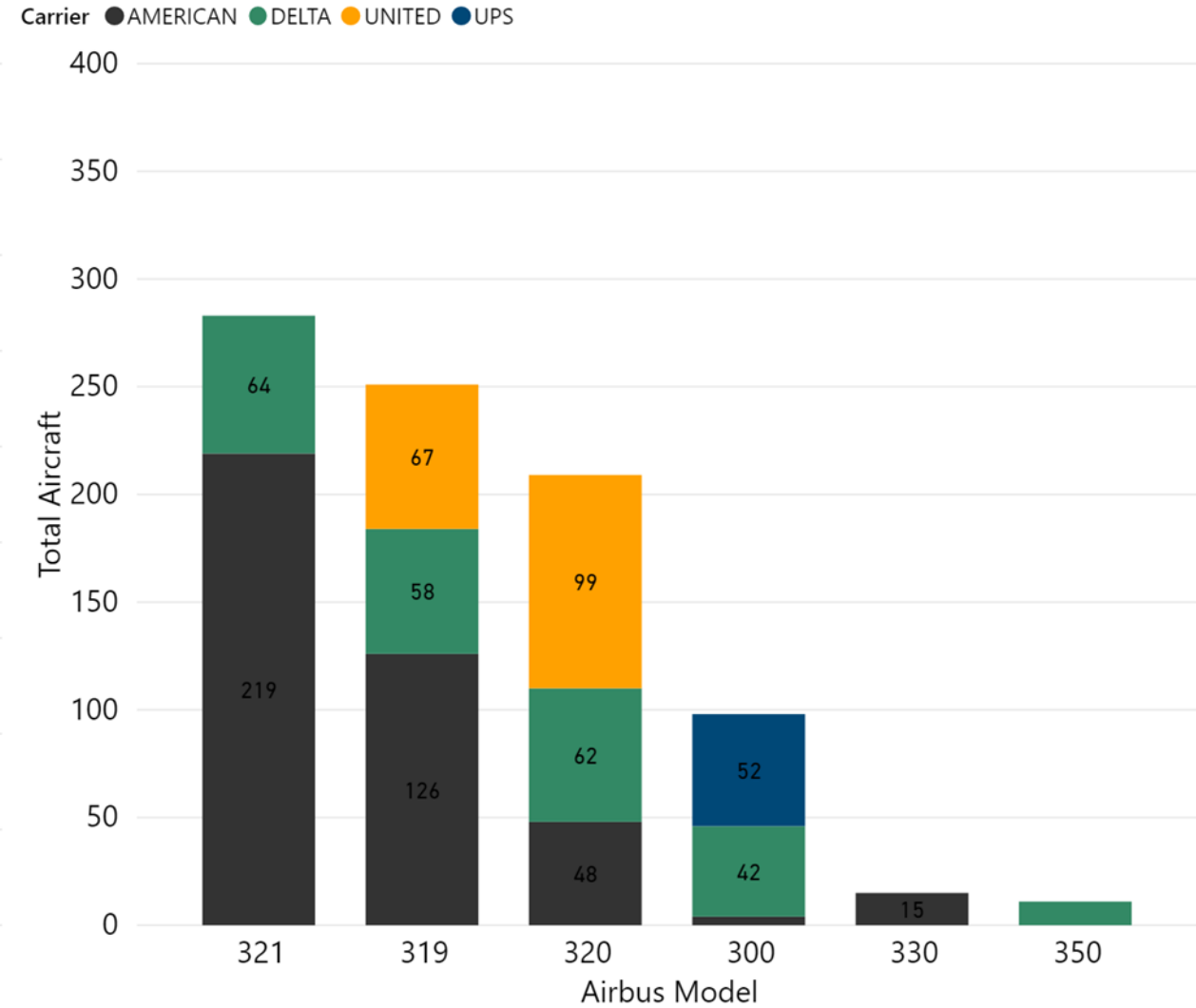


Data from The Bureau of Transportation Statistics

## Boeing Aircraft in Operation by Carrier



## Airbus Aircraft in Operation by Carrier



Data from The Bureau of Transportation Statistics



## Beginning of 737 Max

- “During spring of 2011, American Airlines was ready to place an order for hundreds of new, fuel-efficient jets from Airbus”
- “Boeing ditched idea of developing new passenger plane... Instead it decided to update its workhorse 737”
- “The timeline was extremely compressed,” the engineer said. “It was go, go, go.”
- “Limit changes to hopefully avert a requirement that pilots spend time training in a flight simulator before flying the Max.”
- “The push for automation was a philosophical shift for Boeing, which for decades wanted to keep pilots in control of the planes as much as possible. Airbus, by comparison, tended to embrace technology, putting computers in control. Pilots who preferred the American manufacturer even had a saying: “If it’s not Boeing, I’m not going.””

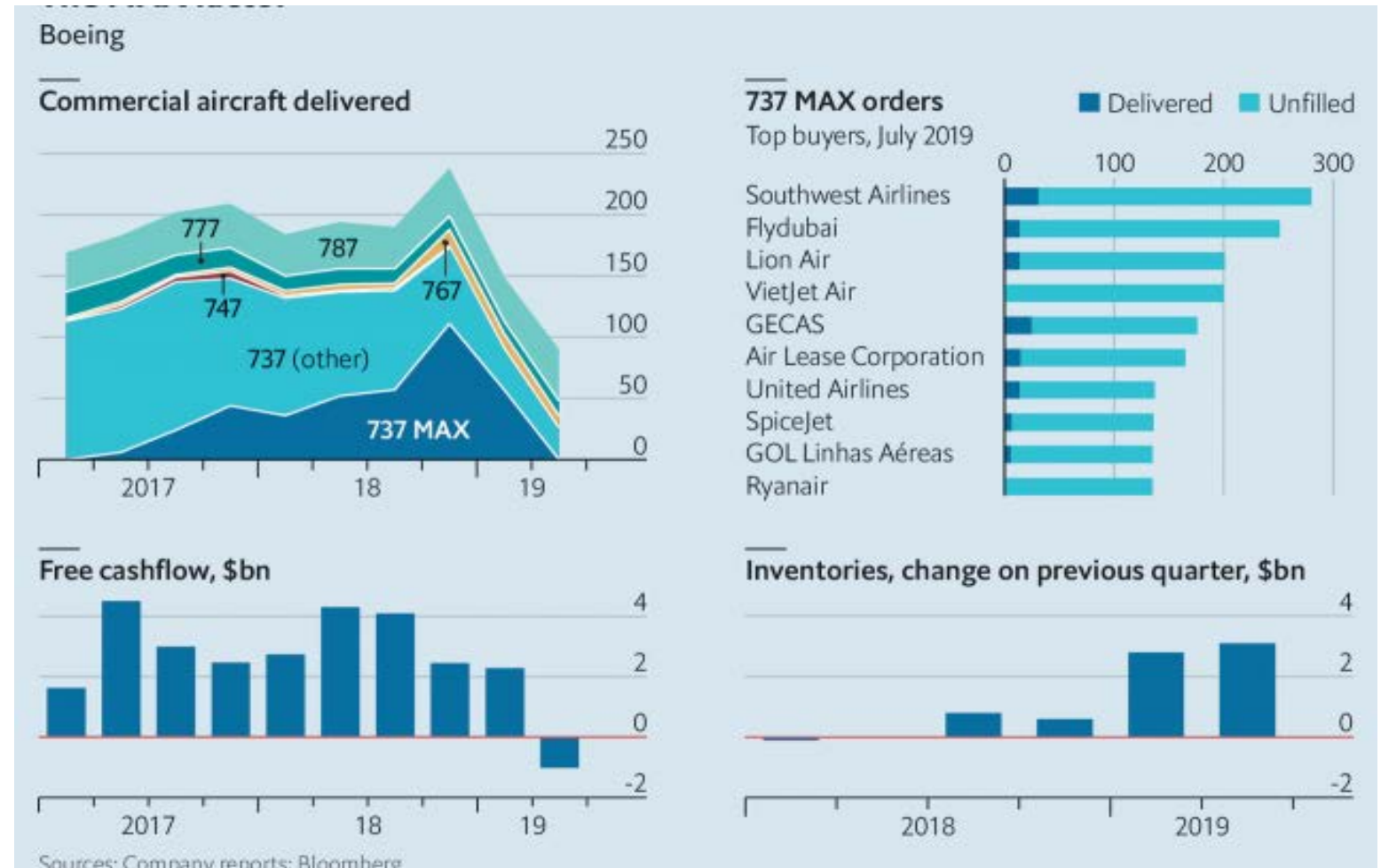
Source: NY Times “Boeing was ‘Go,Go,Go’ to Beat Airbus With the 737 Max” 03/23/19

## Grounding of 737 Max

- Lion Air Flight 610 crashes killing 189; October 29, 2018
- Ethiopian Airlines Flight 302 crashes killing 157; March 10, 2019
- During March 2019 all countries ground 737 Max planes

# Impact of 737 Max Grounding

- 5,000 737 Max orders since 2011 and 390 delivered
- Southwest – cancelled thousands of flights- \$175M hit in 2Q
- American Airlines scrapped 115 flights a day - \$350M hit in 2019
- Boeing stock lost 25% of value



Source: The Economist “Boeing’s troubles cost the aerospace industry \$4B a quarter” August, 2, 2019

# Insurance Impact of 737 Max

- “Boeing ... set aside \$4.9B for compensation for angry airlines..” - The Economist
- Boeing says charges tied to 737 Max Grounding to reach \$8 Billion” – NY Times
- Reinsurance broker Willis Re said in its report on April 1 reinsurance renewals that the grounding claim "could potentially be the largest ever non-war claim the market has incurred" and that it could "erode three to four years' worth of reinsurers' global excess of loss premium" in aerospace. – S&P Global Market Intelligence
- Boeing’s product liability limit = \$2.5B – S&P Global Market Intelligence
  - \$500M sublimit for grounding liability – S&P Global Market Intelligence
- Claims from Lion Air and Ethiopian Air crashes
- Grounding claims from Airlines
- Boeing sued by more than 400 pilots in class action over 737 Max...

# **Actuarial Considerations**

# Reserving for Attritional Claims

- Description
  - Defined as claims under some large dollar value (i.e \$100 Million Market Loss)
  - More predictable than major events, can use loss history to predict future losses
  - Separate losses by line (airlines, products, etc) and by hull or liability
- Methodology
  - Traditional Actuarial triangles and methods
  - Incurred and paid LDF, BF and pure premium methods
- Issues
  - Hull losses can have substantial salvage/subrogation (LDF less than unity)
  - Changing net retentions and policy limits
  - Implementation of trends - frequency (safety), severity and exposure

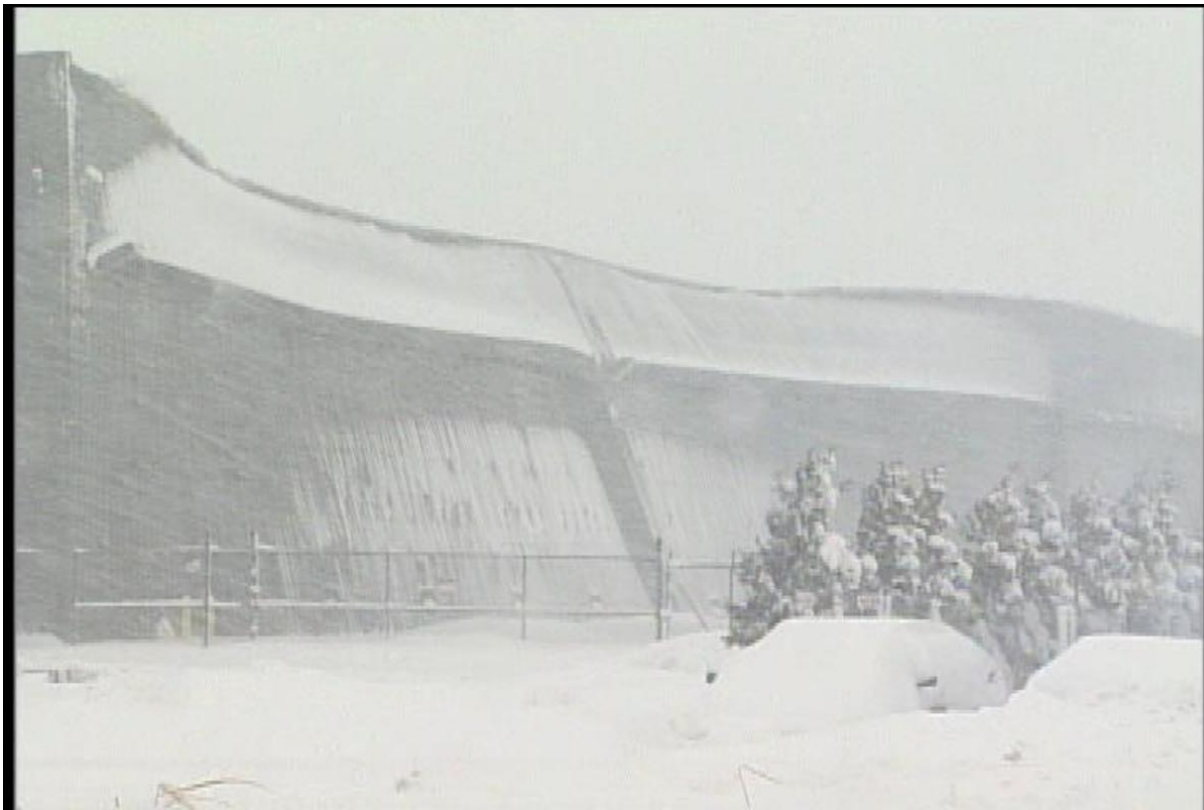
# Increasing Severities

- **Jury awards \$116M for 3 National Air Cargo pilots' families (Cook County)**
  - two 12-ton M-ATVs and three 18 ton Cougars loaded on plane
  - Insufficient straps to tie down and overloaded
  - <https://www.youtube.com/watch?v=7sUWC2jfjql>
- **\$100M settlement in helicopter crash (burn victim - Colorado)**
  - believed to be the highest pre-trial settlement in U.S. history at \$100 million.
- **Boeing Loses Bid to Toss \$2.2M Decompression Injury Award**
  - “claims that she suffered post-traumatic stress disorder after the decompression and emergency landing of a 757 jetliner”
- **Jury Awards \$148M to Dancer Paralyzed in O'Hare Shelter Collapse – settled for \$155M**
  - “The payout will be covered by the city's insurance and not taxpayers.” – LOL!



# Aviation Multi-Party Major Events

- Hangar Collapse at Dulles (who's to blame?)





# Aviation Multi-Party Major Events

- Hangar fire in Belgium (who's to blame?)



# Aviation Multi-Party Major Events

- Air France Flight 447 (who's to blame?)
- Flight recorders not found until two years after accident



# Actuarial Considerations

- Reserving for Major Events
  - Need to exclude major events as these claims develop differently than attritional claims
  - Claims are “event driven” – no need to reserve for crashes that didn’t happen
  - Reserve amounts shift between airlines and manufacturers; legal rulings can significantly change total liability
  - Salvage and Subrogation can be substantial
  - Liable parties may enter into sharing agreements to minimize legal costs and preserve on-going relationships

# Example of Major Event Development Between Insureds

	Development Period					
	<u>12</u>	<u>24</u>	<u>36</u>	<u>48</u>	<u>60</u>	<u>72-Ult</u>
Total Market Loss	100	100	100	100	100	100
Total Market Loss - Split by Segment						
Airline Reported Losses	100	100	75	75	75	50
Products Reported Losses	0	0	25	25	25	50
Total Reported Losses	100	100	100	100	100	100
Company 1 writes 15% Airline and 5% Products						
Airline Reported Losses	15	15	11.25	11.25	11.25	7.5
Products Reported Losses	0	0	1.25	1.25	1.25	2.5
Total Reported Losses	15	15	12.5	12.5	12.5	10
Age - to - Age LDF	1.000	0.833	1.000	1.000	0.800	1.000
Cumulative LDF	0.667	0.667	0.800	0.800	0.800	1.000
Company 2 writes 5% Airline and 15% Products						
Airline Reported Losses	5	5	3.75	3.75	3.75	2.5
Products Reported Losses	0	0	3.75	3.75	3.75	7.5
Total Reported Losses	5	5	7.5	7.5	7.5	10
Age - to - Age LDF	1.000	1.500	1.000	1.000	1.333	1.000
Cumulative LDF	2.000	2.000	1.333	1.333	1.333	1.000



# Thank you

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