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The Never Ending Era of Uncertainty:

Managing Risk in a Volatile World

Northeast Business and Economics Association

Port Jefferson, NY

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Download at www.iii.org/presentations

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Thank You: Bob and Rachel Hartwig (aka Dad and Mom)

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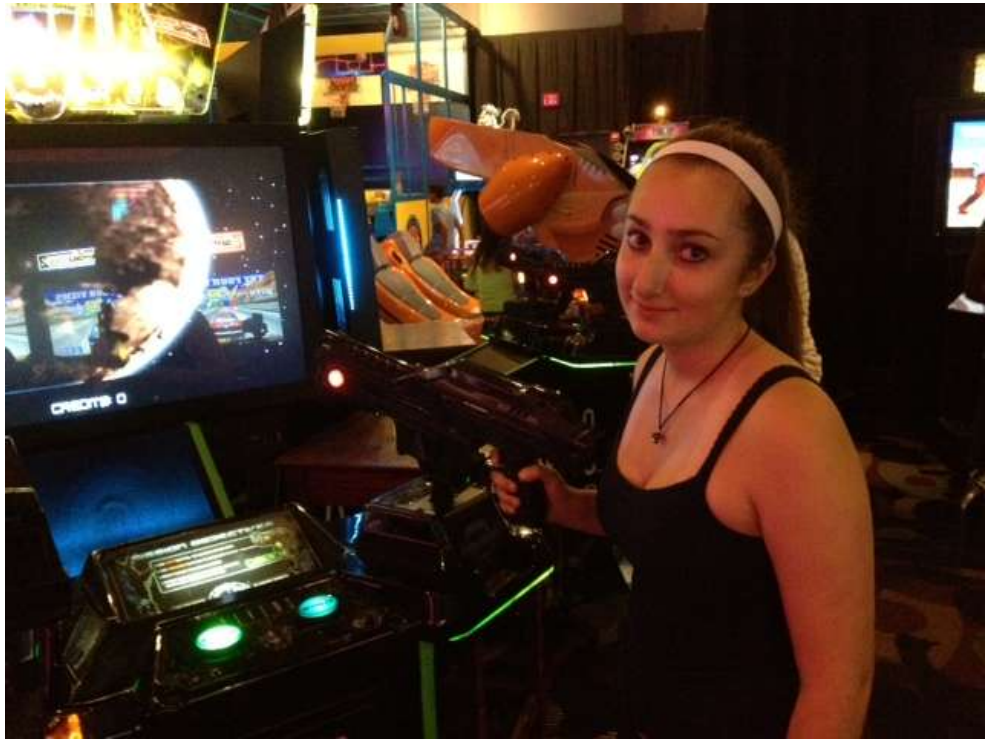

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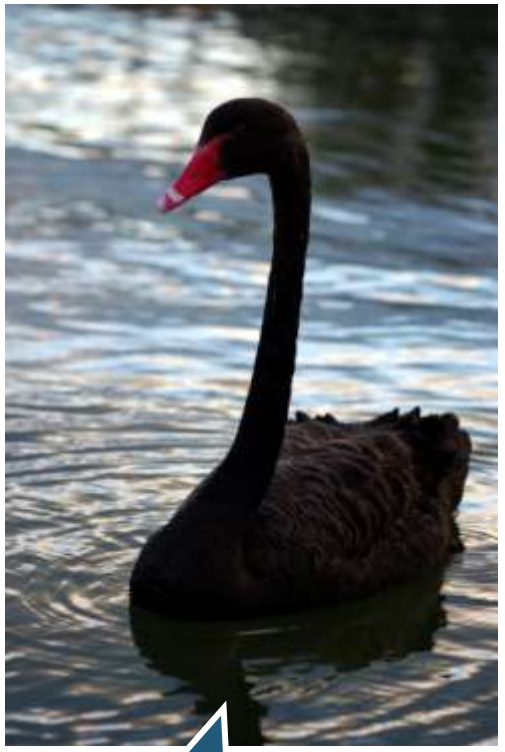
What in the World Is Going On?

Is the World Becoming a Riskier, More Uncertain Place?

All Major Categories of Risk Influence Economies on a Global Scale

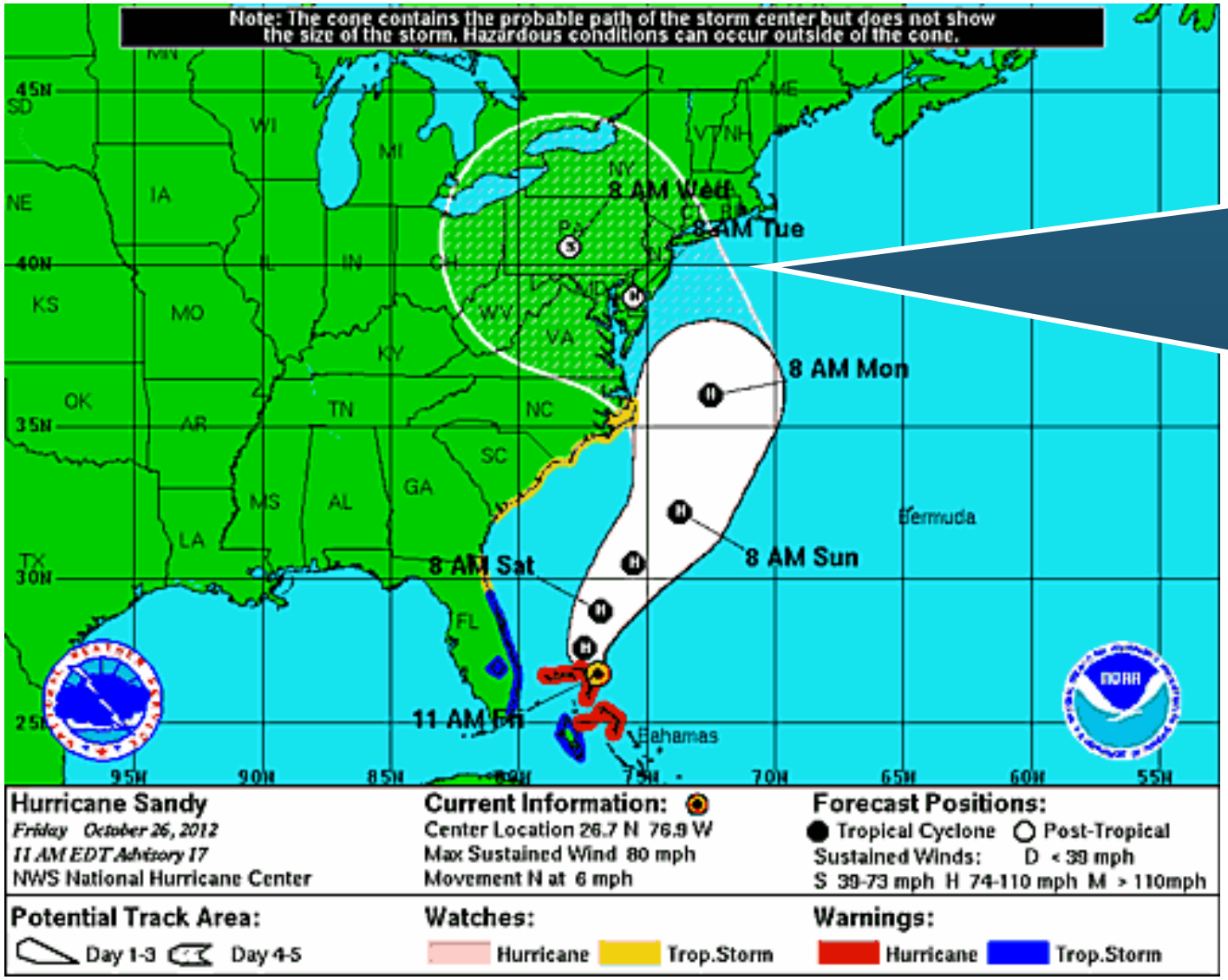
Uncertainty, Risk and Fear Abound

- Never Ending Echoes of the Financial Crisis
- European Sovereign Debt & Eurozone Crises
- The "Fiscal Cliff": US Debt and Budget Crisis
- Unintended Consequences of (Over)Regulation
- "Hard Landing" in China
- Housing Crisis
- Political Gridlock: US, Europe
- Political Upheaval in the Middle East
- Resurgent Terrorism Risk
- Diffusion of Weapons of Mass Destruction
- Cyber Attacks
- Record Natural Disaster Losses
- Climate Change
- Environmental Degradation
- Income Inequality
- *Insomnia???*



Are "Black Swans" everywhere or does it just seem that way?

Hurricane Sandy: Storm of Historic Proportions?



Hurricane Sandy is just the latest in a long list of unusual and severe weather events. What is the cause? Can the risk of events like Sandy be managed?

Source: NOAA (as of 11 AM Oct. 26, 2012); Insurance Information Institute.

5 Major Categories for Global Risks, Uncertainties and Fears

1. **Economic Risks**
2. **Geopolitical Risks**
3. **Environmental Risks**
4. **Technological Risks**
5. **Societal Risks**

While risks can be broadly categorized, none are mutually exclusive

Source: World Economic Forum, *Global Risks 2012*; Insurance Information Institute.

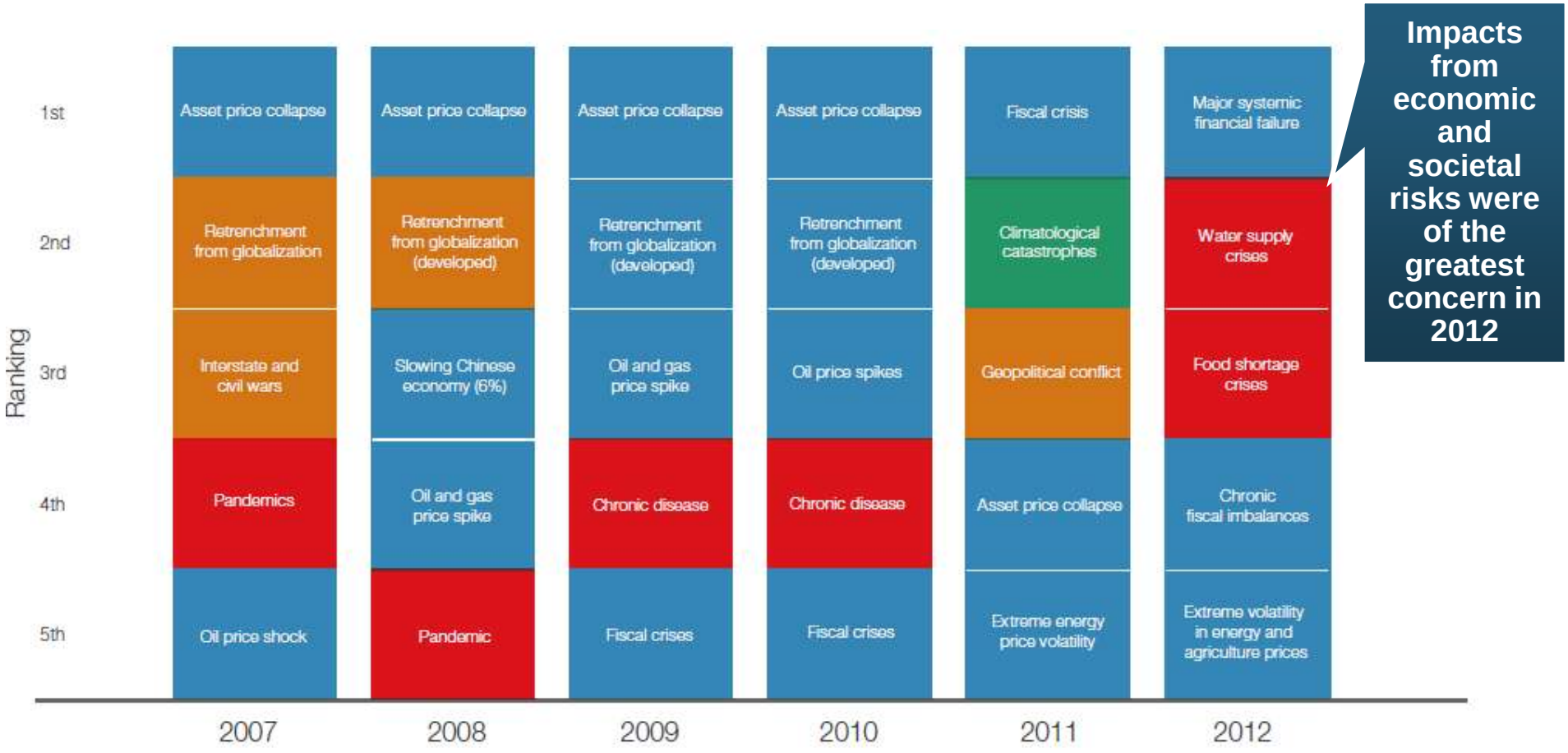
Top 5 Global Risks in Terms of *Likelihood*, 2007—2012

In 2012, concerns over income disparity and fiscal imbalances displaced weather and water concerns, as ranked by likelihood

Concerns Shift Considerably Over Short Spans of Time. Shift in 2012 to Economic Risks and Away from Environmental Risks

Source: World Economic Forum, *Global Risks 2012*; Insurance Information Institute.

Top 5 Global Risks in Terms of *Impact*, 2007—2012



Impacts from economic and societal risks were of the greatest concern in 2012

Concerns Over the Impacts of Economics Risks Remained High in 2012, but Societal Risks Displaced Environmental Risks

Source: World Economic Forum, *Global Risks 2012*; Insurance Information Institute.

Economic Risk: Foremost on the Minds in "Advanced" Economies

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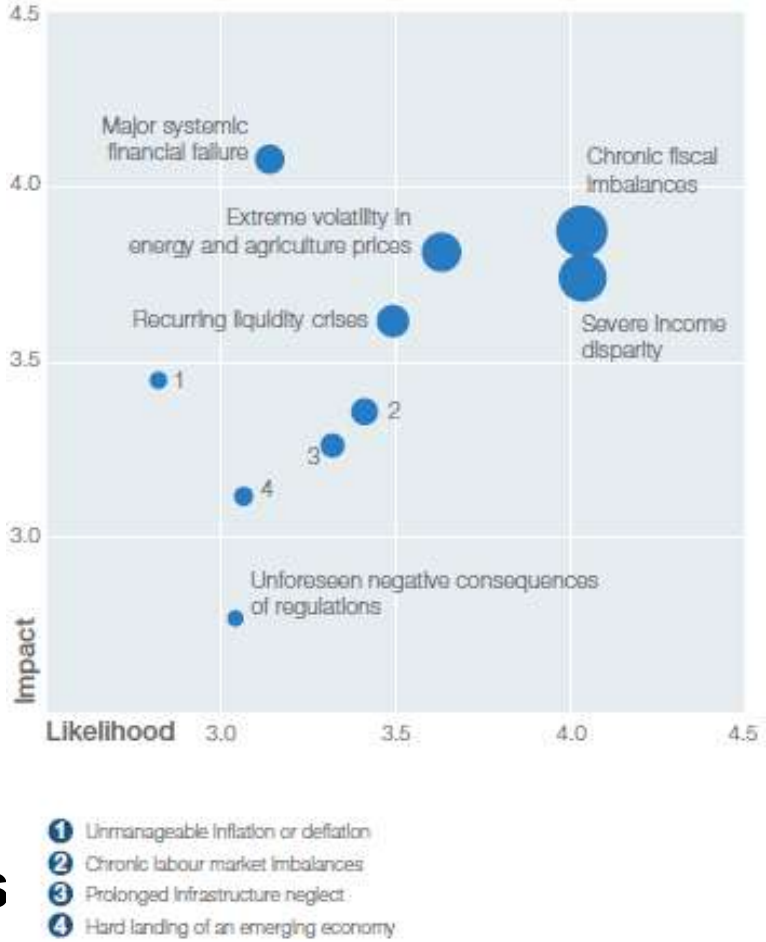
Economic Risks

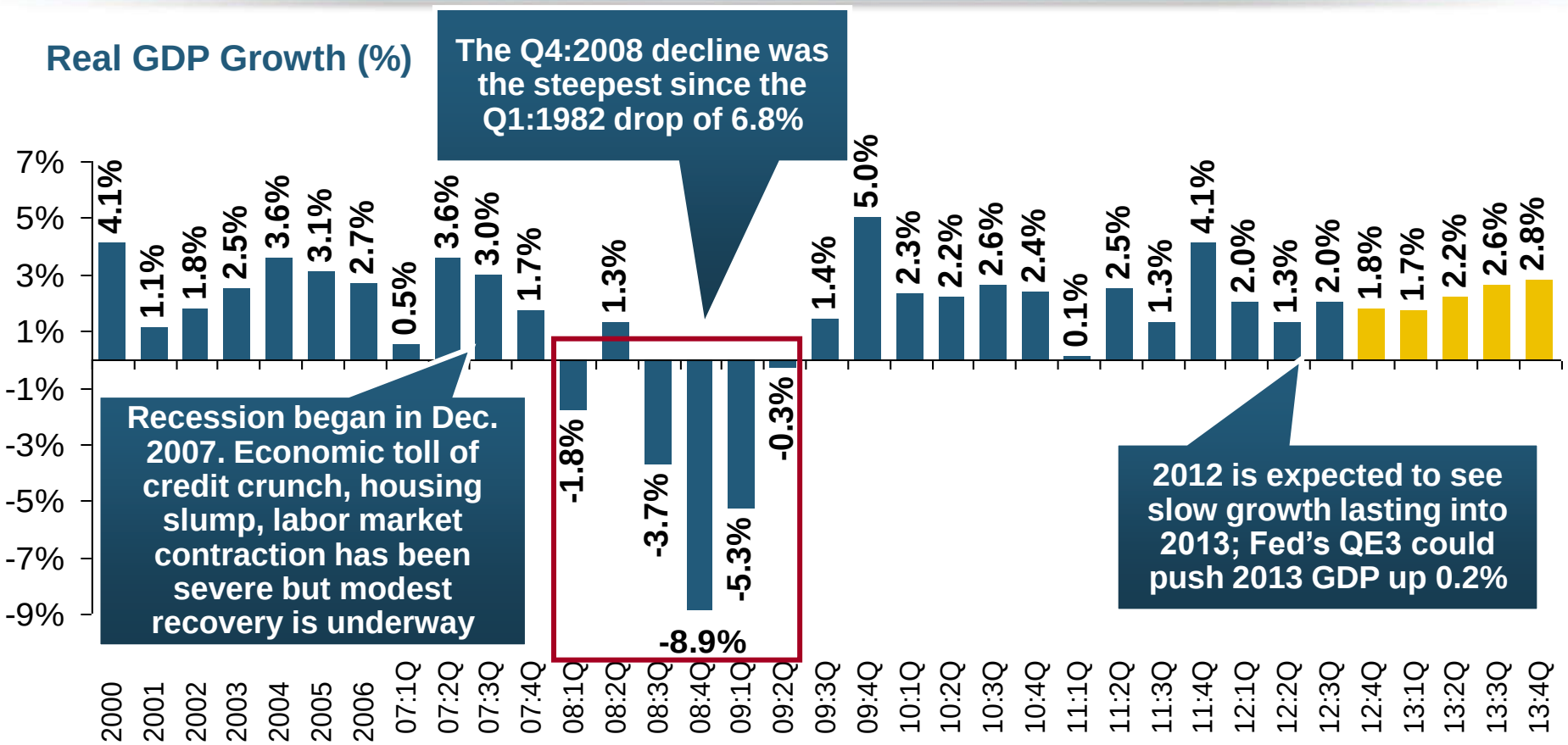
- Chronic fiscal imbalances
- Severe income disparity
- Extreme volatility in energy and food prices
- Recurring liquidity crises
- Major systemic failure
- Adverse unintended consequences of regulation
- Unmanageable in/deflation
- Chronic labor mkt. imbalances
- Hard landing of emerging economy

Economic Risk Landscape



Source: World Economic Forum, *Global Risks 2012*; Insurance Information Institute.

US Real GDP Growth*

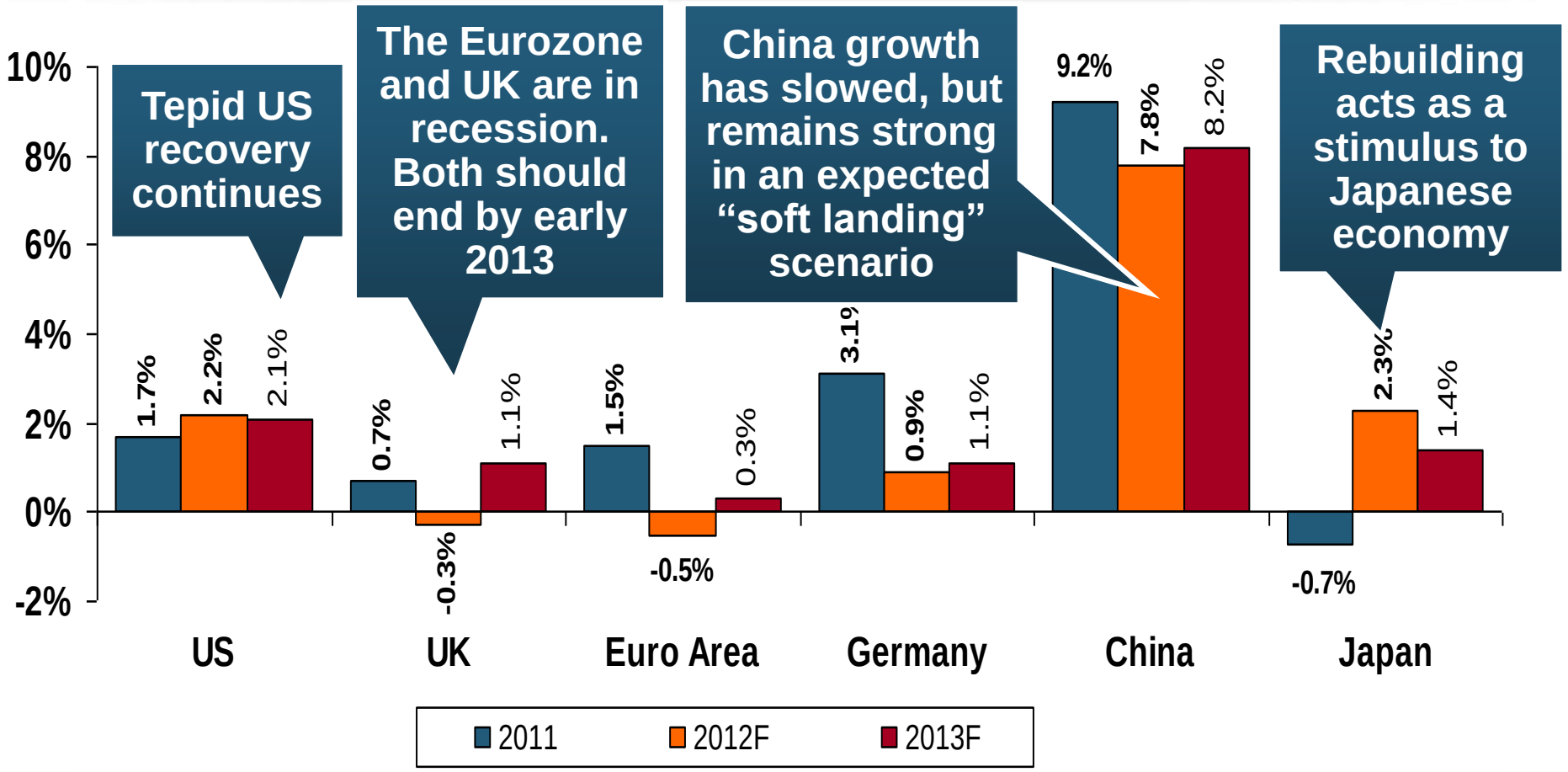


Slow Growth Is Likely to Persist Well into 2013. Recession Will Be Averted Barring a Total Political Failure Pushing Us Over the "Fiscal Cliff"

* Estimates/Forecasts from Blue Chip Economic Indicators.

Source: US Department of Commerce, Blue Economic Indicators 10/12; Insurance Information Institute.

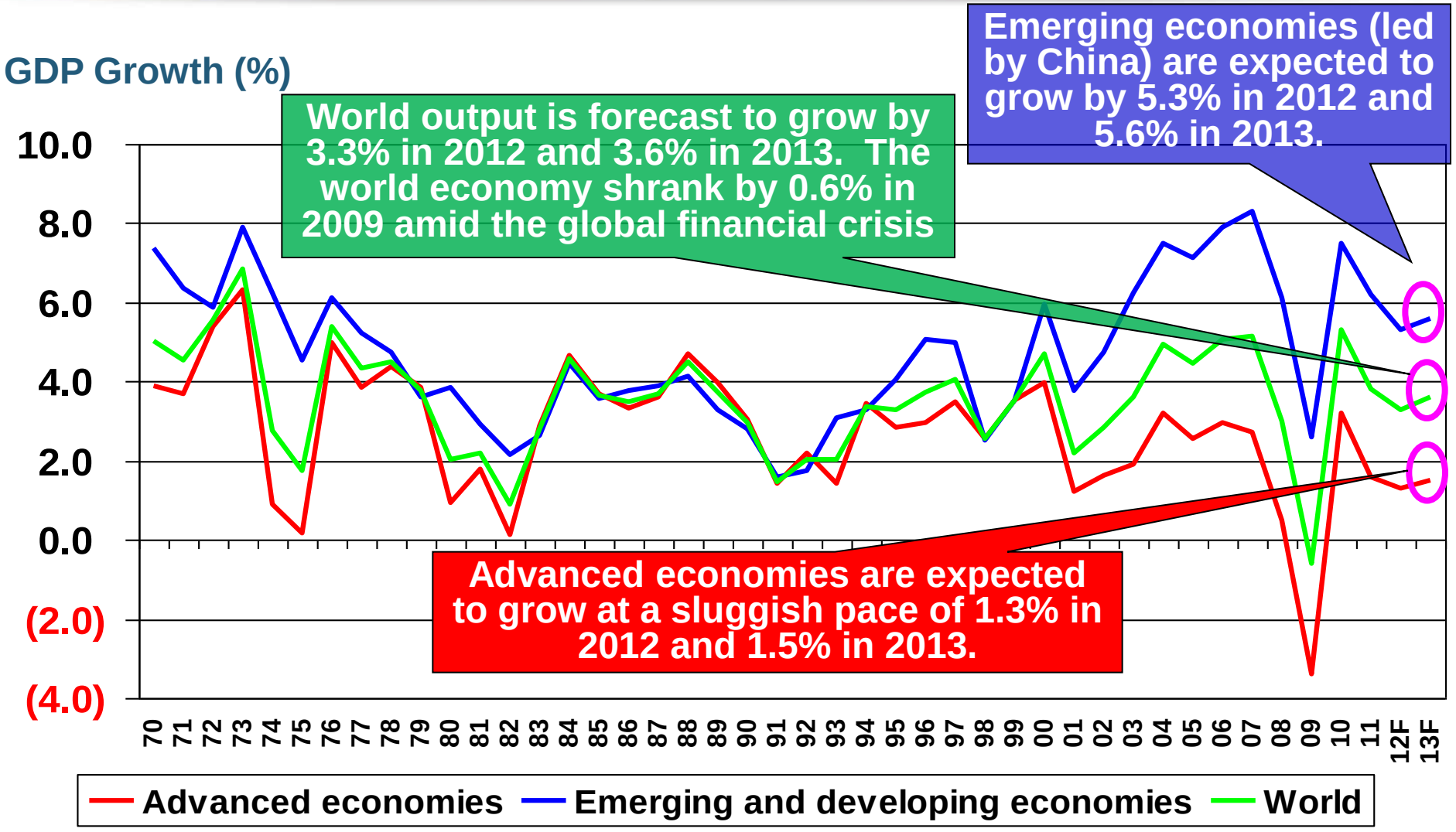
Real GDP Growth Forecasts: Major Economies: 2011 – 2013F



Growth Prospects Vary Widely by Region: Stabilizing in the US, Mild Recession in the Eurozone, A "Soft Landing" in China and India, Reconstruction Stimulus in Japan and Modest Growth in America's Largest Trading Partners—Canada and Mexico.

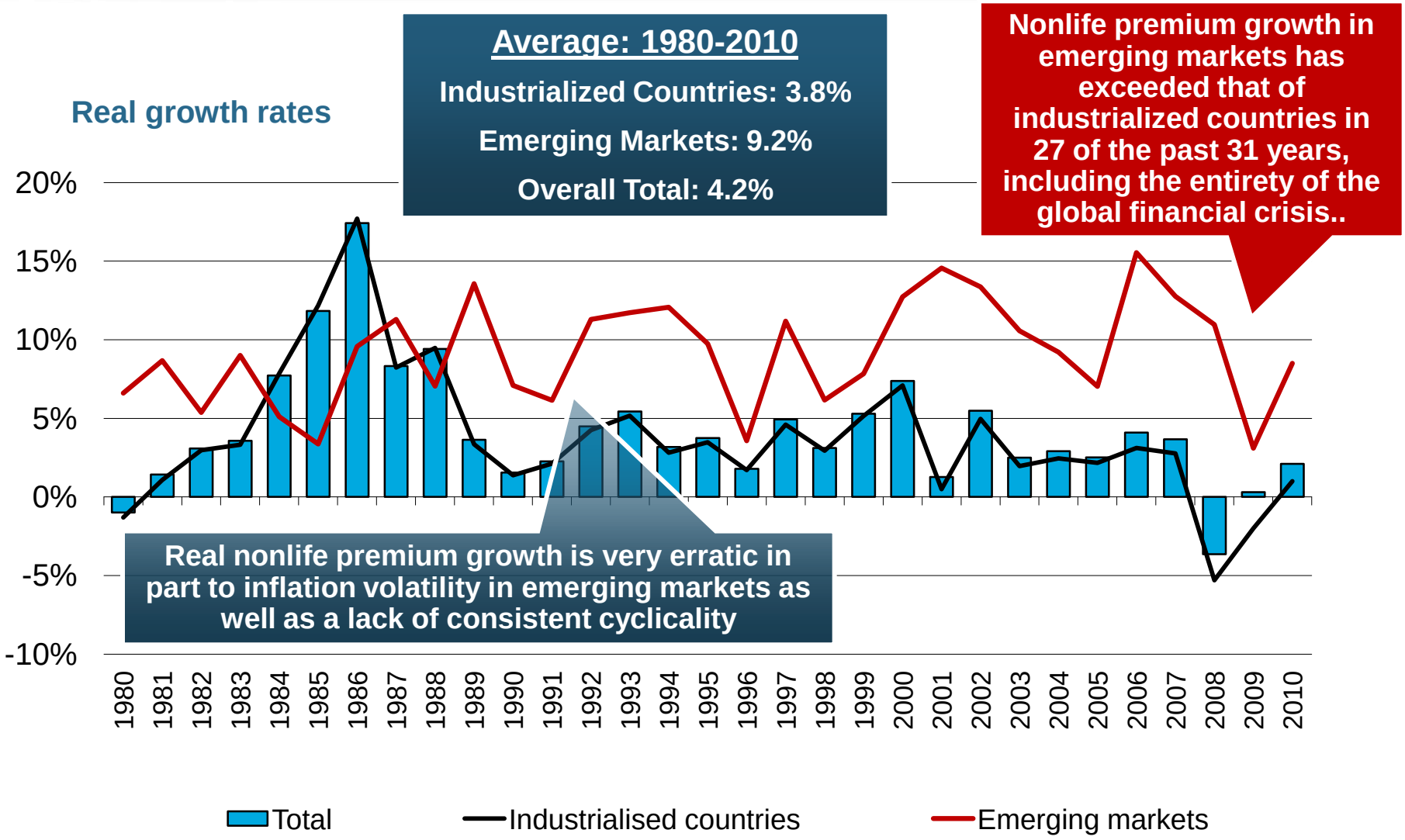
Sources: Blue Chip Economic Indicators (9/2012 issue); Insurance Information Institute.

GDP Growth: Advanced & Emerging Economies vs. World, 1970-2013F



Source: International Monetary Fund, *World Economic Outlook* , Oct. 2012; Ins. Info. Institute.

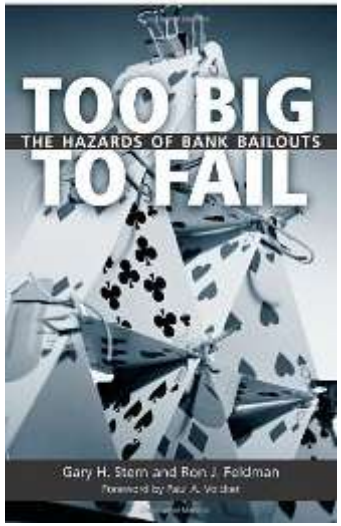
Global Real (Inflation Adjusted) Nonlife Premium Growth: 1980-2010



Source: Swiss Re, *sigma*, No. 2/2010.

Regulatory Risk: Financial Sector in Consumed with Post-Crisis Concerns

- **Capital Adequacy, Quality, Liquidity, Leverage, Prudential Oversight**
- **Dodd-Frank**
- **Basel III**
- **Solvency II**
- **Systemic Importance**
  - **US**
  - **Global**



Source: Insurance Information Institute.

Geopolitical Risk: Foremost on the Minds in "Emerging" Economies

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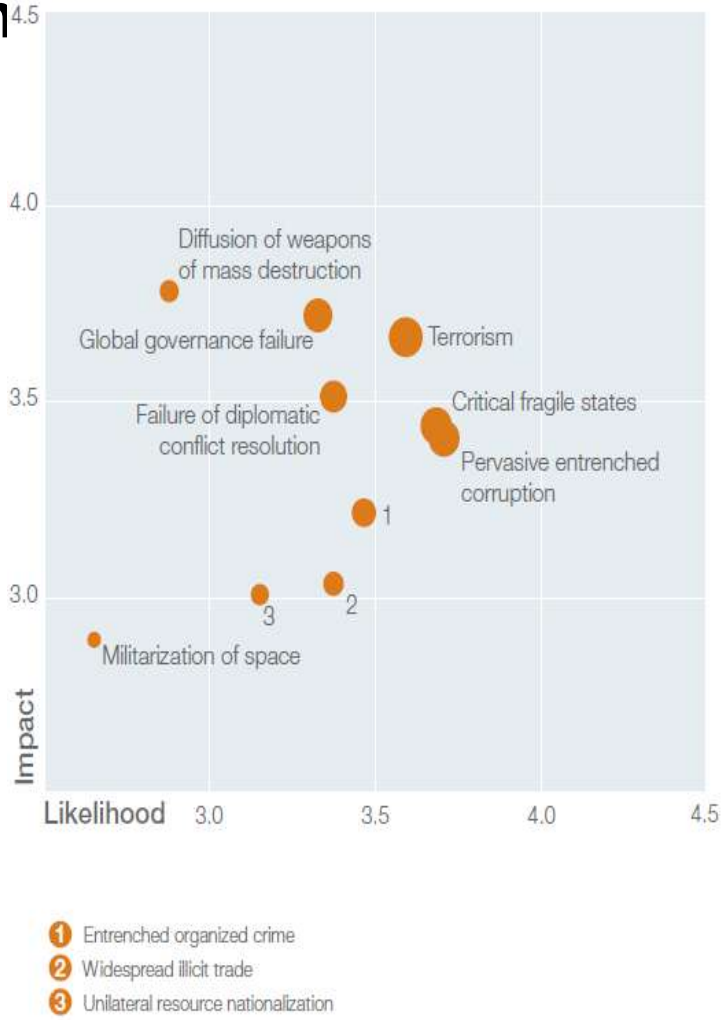
Geopolitical Risks

- Pervasive entrenched corruption
- Critical fragile states
- Terrorism
- Failure of diplomatic conflict resolution
- Global governance failure
- Entrenched organized crime
- Widespread illicit trade
- Diffusion of WMD
- Unilateral resource nationalization
- Militarization of space

Geopolitical Risk Landscape



Source: World Economic Forum, *Global Risks 2012*; Insurance Information Institute.

Political Risk in 2011/12: Greatest Business Opportunities Are Often in Risky Nations

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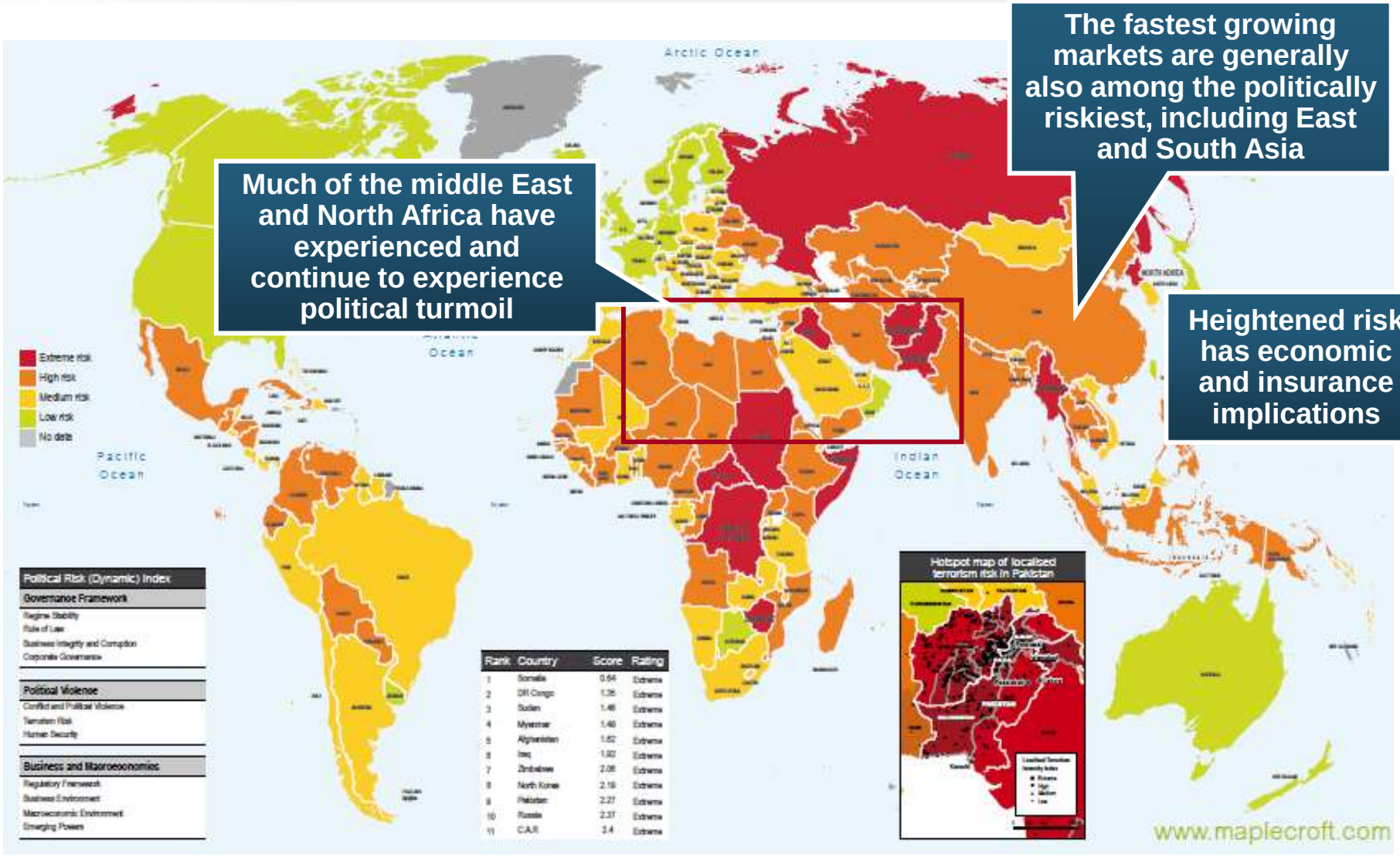

Source: Maplecroft

The "Arab Spring" Has Increased Uncertainty in an Already Volatile Part of the World

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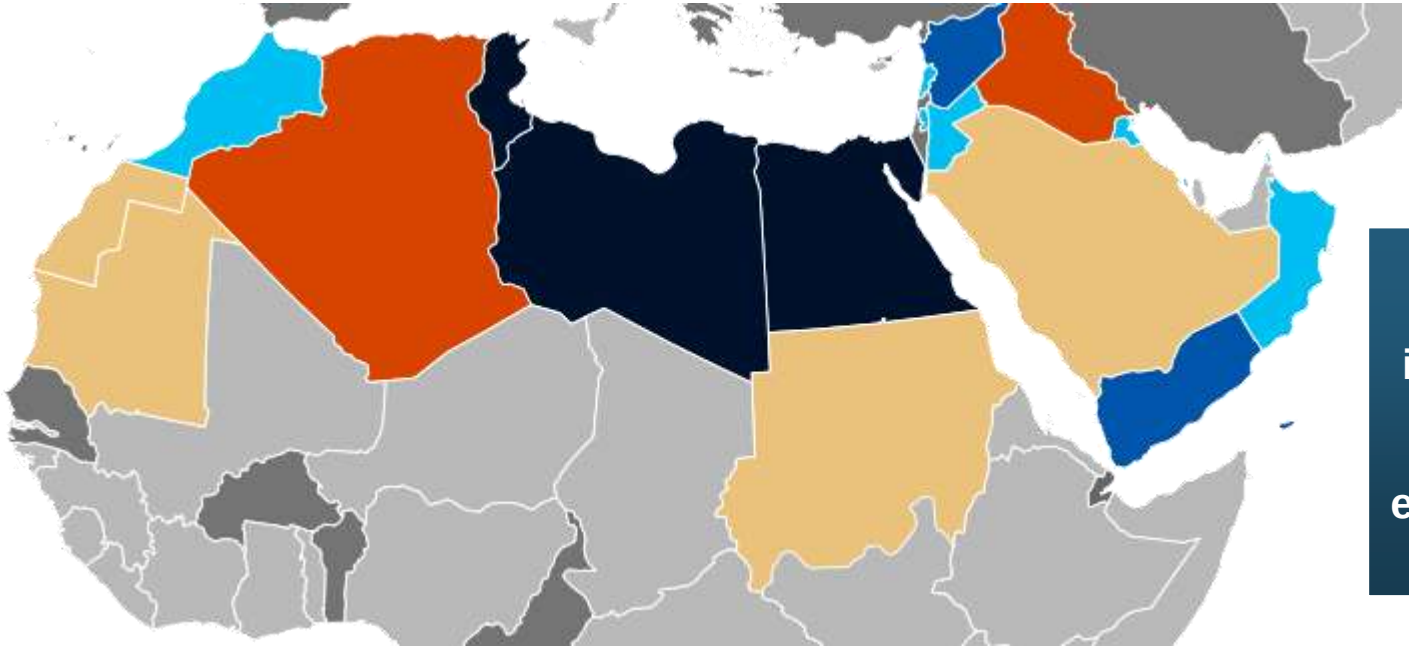
Arab Spring
الربيع العربي

Some energy-rich nations have been among the most unstable in 2011/12

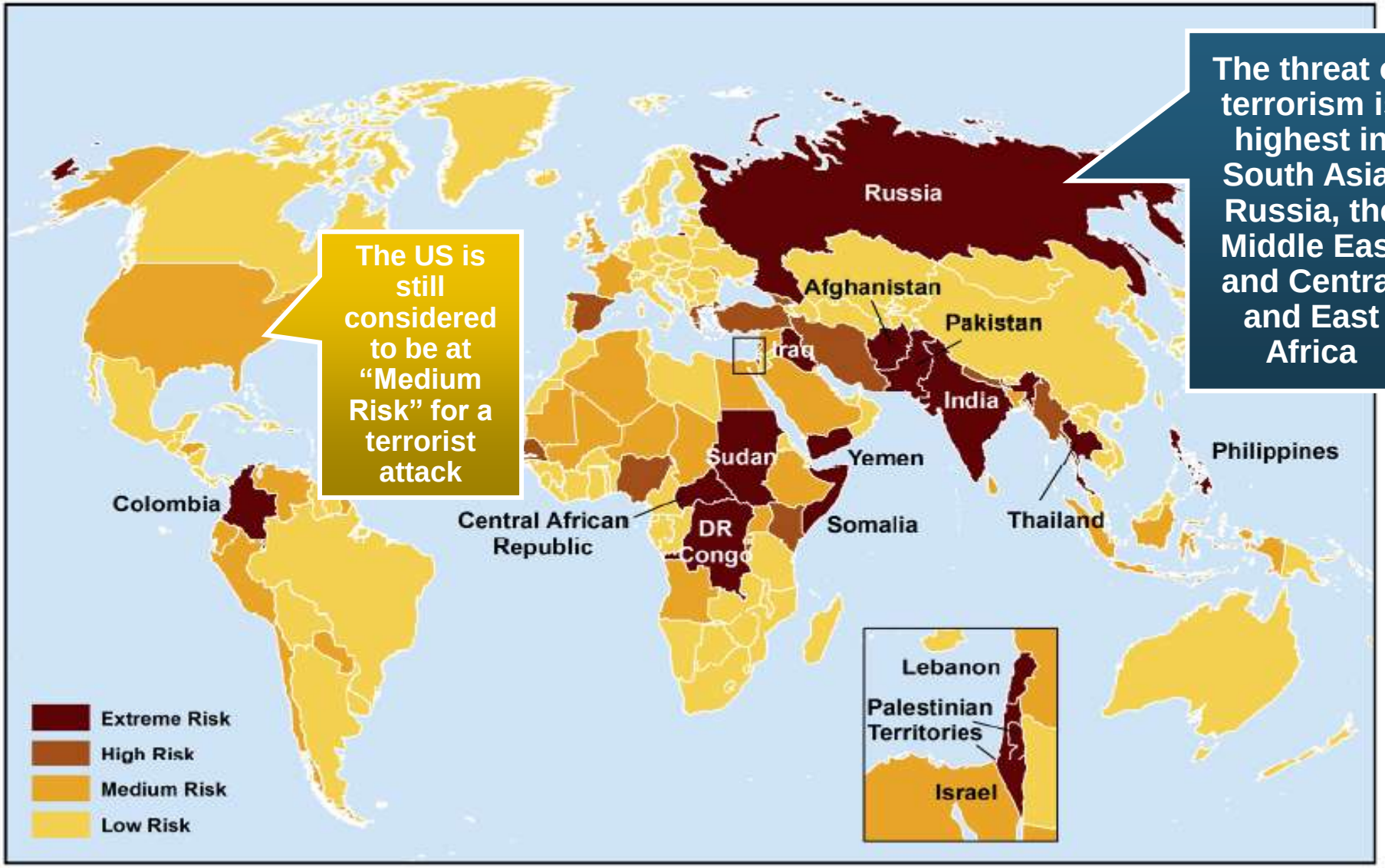


Longer-run, significant investment and insurance opportunities exist throughout the region

Government overthrown
Sustained civil disorder and governmental changes
Protests and governmental changes
Major protests
Minor protests
Protests outside the Arab world

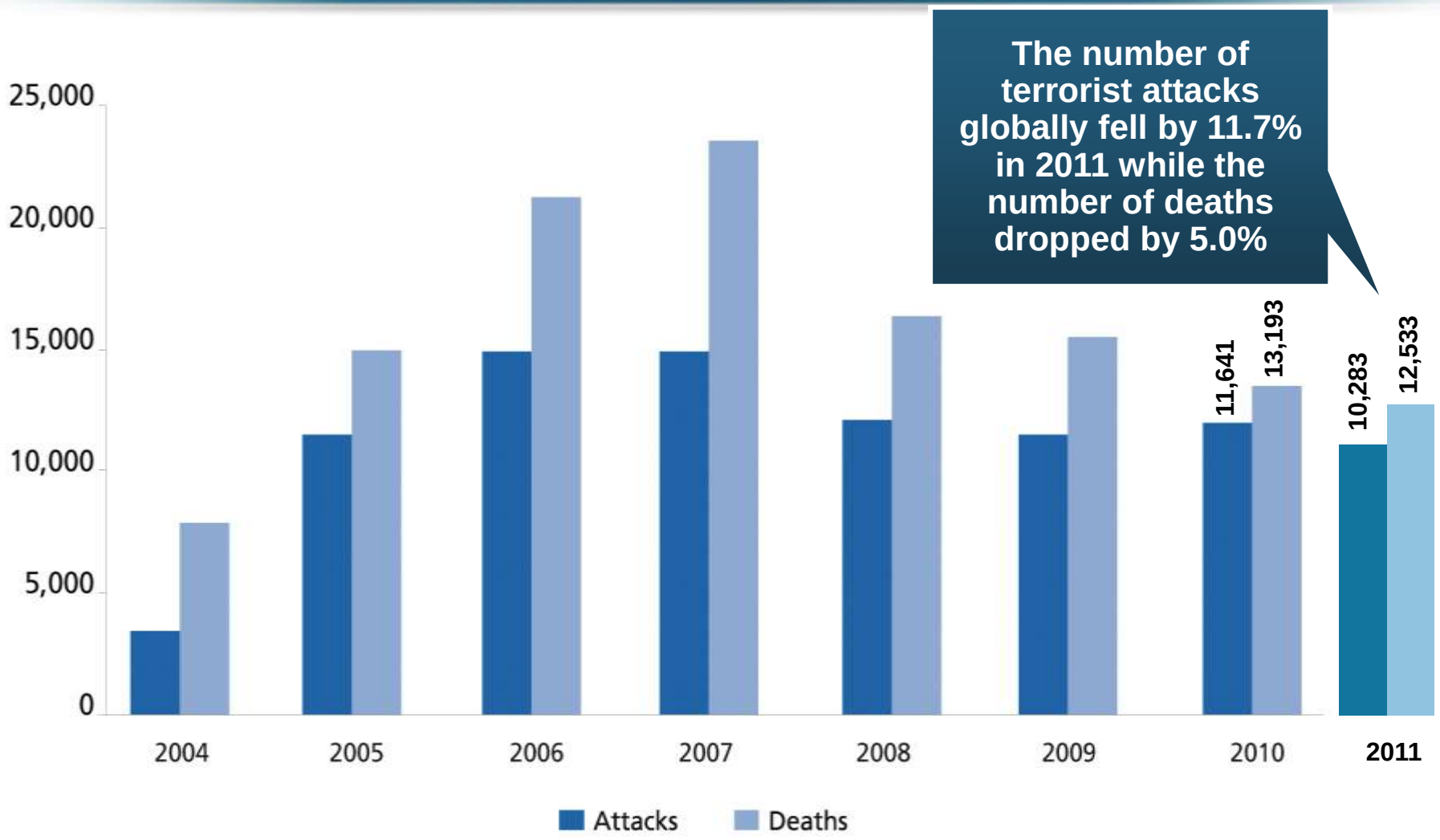
Source: Wikipedia as of Nov. 7, 2011; Insurance Information Institute research.

Terrorist Risk Index, 2011



Sources: Maplecroft Terrorism Risk Index; Guy Carpenter; Insurance Information Institute.

Global Terrorist Attacks and Deaths, 2004-2011



Sources: National Counterterrorism Center, *2011 Report on Terrorism;* Guy Carpenter; Insurance Information Institute.

Frequent Reminders of Terrorist Threat: New and Old

In Oct. 2012, the FBI arrested a 21-year old Bangladeshi man who wanted to bomb the NY Federal Reserve building in Lower Manhattan

Freedom Tower under construction in Oct. 2012. Insurance money is the primary source of funds for rebuilding the WTC site

Sources: Insurance Information Institute.

Loss Distribution by Type of Insurance from Sept. 11 Terrorist Attack ($ 2011)

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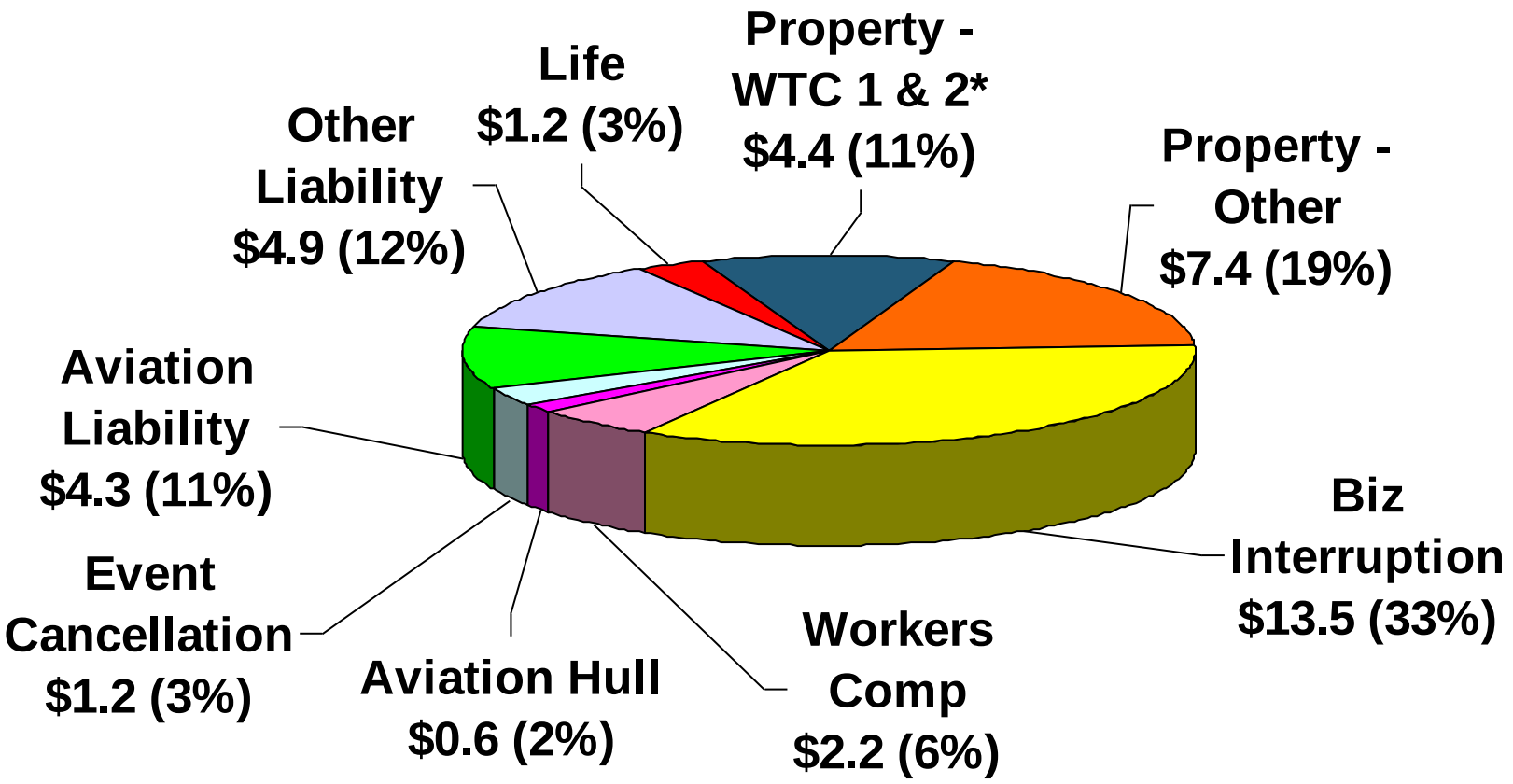
($ Billions)



Total Insured Losses Estimate: $40.0B**

*Loss total does not include March 2010 New York City settlement of up to $657.5 million to compensate approximately 10,000 Ground Zero workers or any subsequent settlements.

**$32.5 billion in 2001 dollars.

Source: Insurance Information Institute.

Terrorism Violates Traditional Requirements for Insurability

Requirement	Definition	Violation
Estimable Frequency	•Insurance requires large number of observations to develop predictive rate-making models (an actuarial concept known as credibility)	•Very few data points •Terror modeling still in infancy, untested. •Inconsistent assessment of threat
Estimable Severity	•Maximum possible/ probable loss must be at least estimable in order to minimize "risk of ruin" (insurer cannot run an unreasonable risk of insolvency though assumption of the risk)	•Potential loss is virtually unbounded. •Losses can easily exceed insurer capital resources for paying claims. •Extreme risk in workers compensation and statute forbids exclusions.

Source: Insurance Information Institute

Terrorism Violates Traditional Requirements for Insurability (cont'd)

Requirement	Definition	Violation
Diversifiable Risk	•Must be able to spread/distribute risk across large number of risks •"Law of Large Numbers" helps makes losses manageable and less volatile	•Losses likely highly concentrated geographically or by industry (e.g., WTC, power plants)
Random Loss Distribution/ Fortuity	•Probability of loss occurring must be purely random and fortuitous •Events are individually unpredictable in terms of time, location and magnitude	•Terrorism attacks are planned, coordinated and deliberate acts of destruction •Dynamic target shifting from "hardened targets" to "soft targets" •Terrorist adjust tactics to circumvent new security measures •Actions of US and foreign govts. may affect likelihood, nature and timing of attack

Source: Insurance Information Institute

Environmental Risk: Vulnerability and Susceptibility Vary Across Globe

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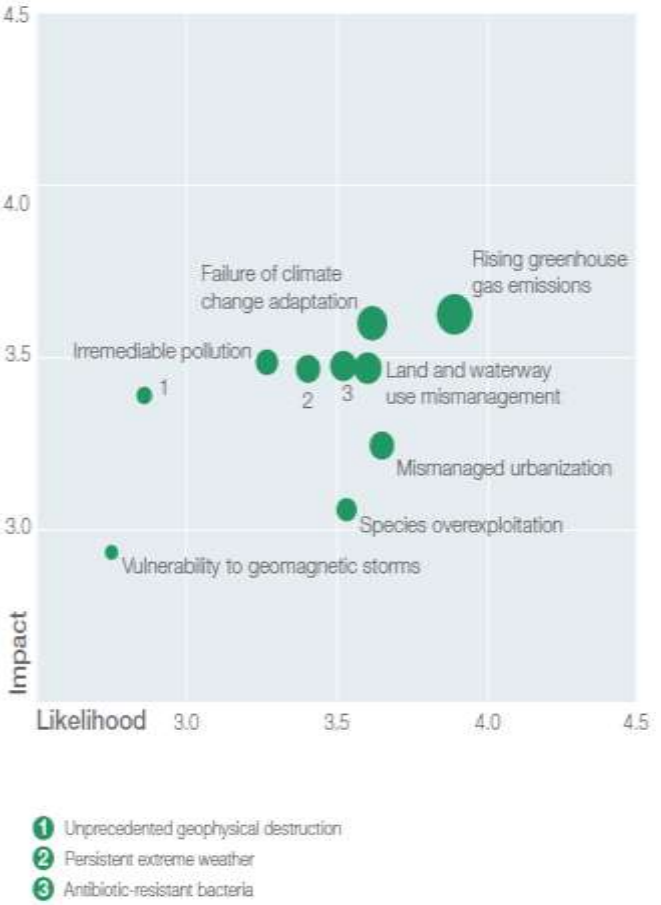
Environmental Risks

- Rising greenhouse gas emissions
- Failure of climate change adaptation
- Land/water use mismanagement
- Mismanaged urbanization
- Antibiotic-resistant bacteria
- Persistent extreme weather
- Species overexploitation
- Irremediable pollution
- Vulnerability to geomagnetic storms

Environmental Risk Landscape



Source: World Economic Forum, *Global Risks 2012*; Insurance Information Institute.

Top 16 Most Costly World Insurance Losses, 1970-2011**

(Insured Losses, 2011 Dollars, $ Billions)

Taken as a single event, the Spring 2011 tornado and thunderstorm season would likely become the 5th costliest event in global insurance history

5 of the top 14 most expensive catastrophes in world history have occurred within the past 2 years

*Average of range estimates of $35B - $40B as of 1/4/12; Privately insured losses only.

**Figures do not include federally insured flood losses.

Sources: Swiss Re *sigma 1/2011*; Munich Re; Insurance Information Institute research.

Global Catastrophe Loss Summary: 2011 Was a Global Record Breaker

- **2011 Was the *Highest* Loss Year on Record for Economic Losses Globally**
  - Extraordinary accumulation of severe natural catastrophe: Earthquakes, tsunami, floods and tornadoes are the primary causes of loss
- **$380 Billion in *Economic* Losses Globally (New Record)**
  - New record, exceeding the previous record of $270B in 2005
- **$105 Billion in *Insured* Losses Globally**
  - 2011 losses were 2.5 times 2010 insured losses of $42B
  - Second only to 2005 on an inflation adjusted basis (new record on a unadjusted basis)
  - Over 5 times the 30-year average of $19B
- **$72.8 Billion in *Economic* Losses in the US**
  - Represents a 129% increase over the $11.8 billion amount through the first half of 2010
- **$35.9 Billion in *Insured* Losses in the US Arising from 171 CAT Events**
  - Fifth highest year on record
  - Represents 51% increase over the $23.8 billion total in 2010

Source: Munich Re; Insurance Information Institute.

Natural Loss Events, 2011

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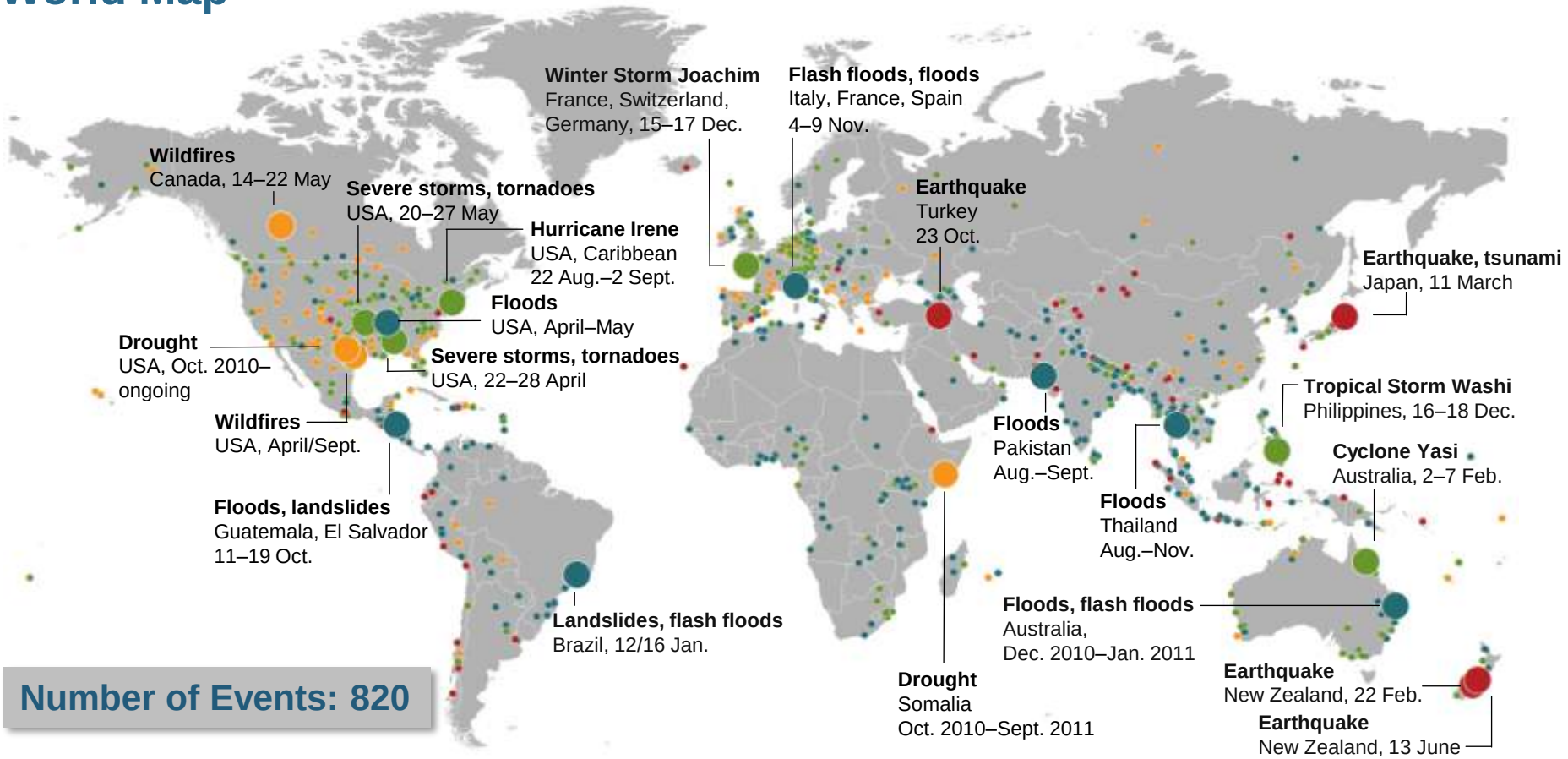
World Map



Number of Events: 820

- ○ **Natural catastrophes**
- ◯ **Selection of significant loss events (see table)**
- ● **Geophysical events** (earthquake, tsunami, volcanic activity)
- ● **Meteorological events** (storm)
- ● **Hydrological events** (flood, mass movement)
- ● **Climatological events** (extreme temperature, drought, wildfire)

Source: MR NatCat*SERVICE*

Natural Catastrophes Worldwide 2011

Insured losses US$ 105bn - Percentage distribution per continent

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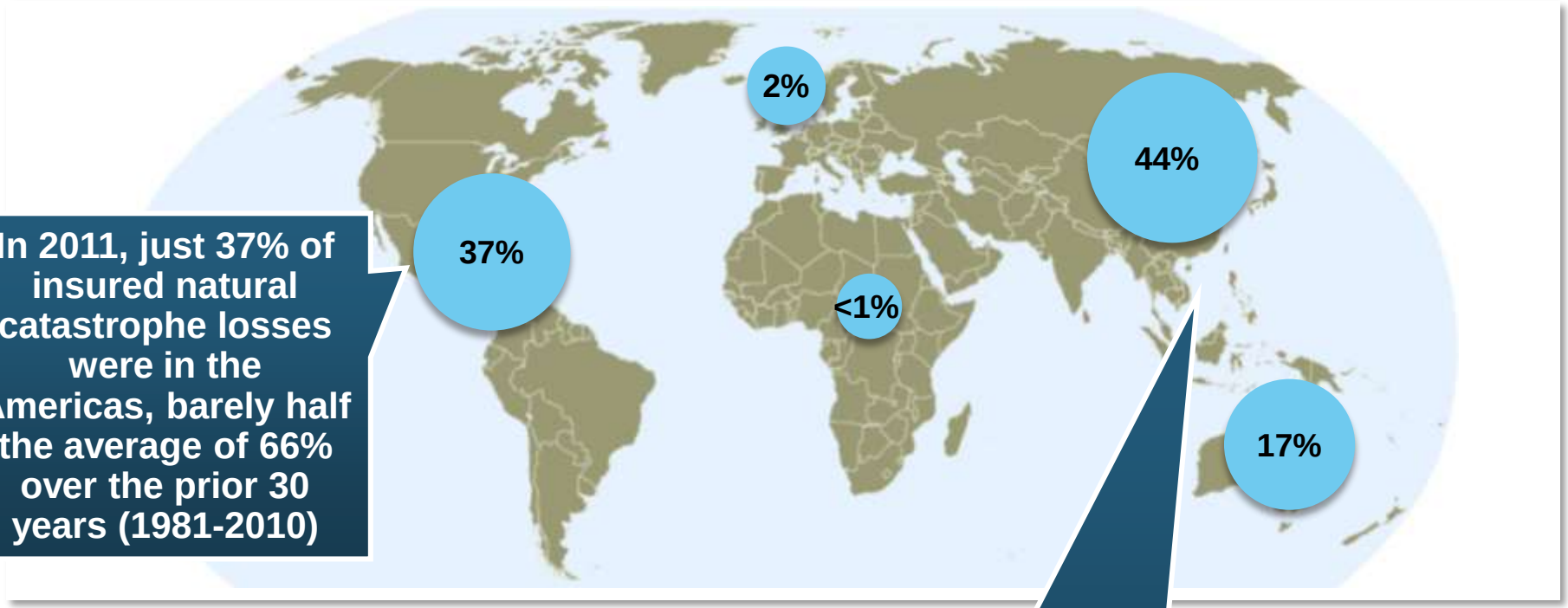

In 2011, just 37% of insured natural catastrophe losses were in the Americas, barely half the average of 66% over the prior 30 years (1981-2010)

Continent	Insured losses US$ m
America (North and South America)	40,000
Europe	2,000
Africa	Minor damages
Asia	45,000
Australia/Oceania	18,000

In 2011, 61% of insured natural catastrophe losses were in the Asia/Pacific region, nearly 3.5 times the average of 13% over the prior 30 years (1981-2010)

Source: MR NatCat*SERVICE*

28

Natural Catastrophes Worldwide 1980 – 2011
Insured losses US$ 870bn - Percentage distribution per continent

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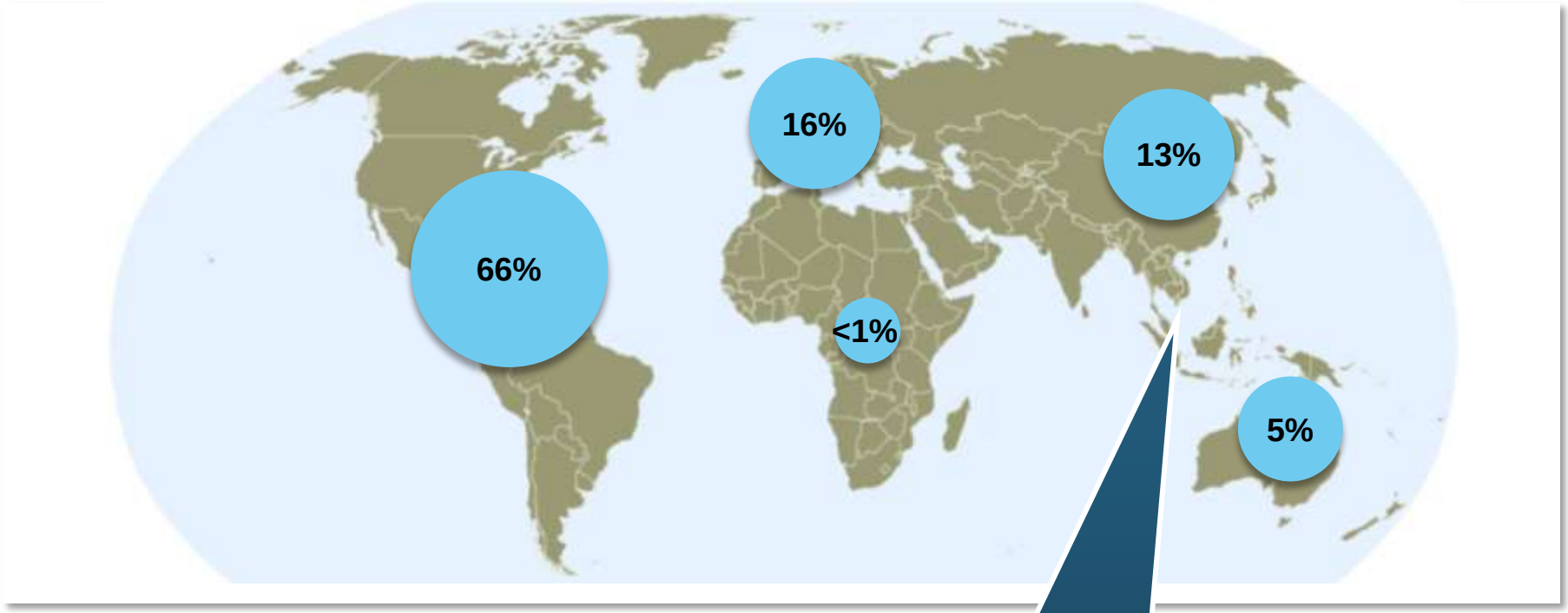

Continent	Insured losses US$ m
America (North and South America)	566,000
Europe	146,000
Africa	2,000
Asia	115,000
Australia/Oceania	41,000

In 2011, 61% of natural catastrophe losses were in the Asia/Pacific region, nearly 3.5 times the average of 13% over the prior 30 years (1981-2010)

Source: MR NatCat*SERVICE*

29

US Insured Catastrophe Losses

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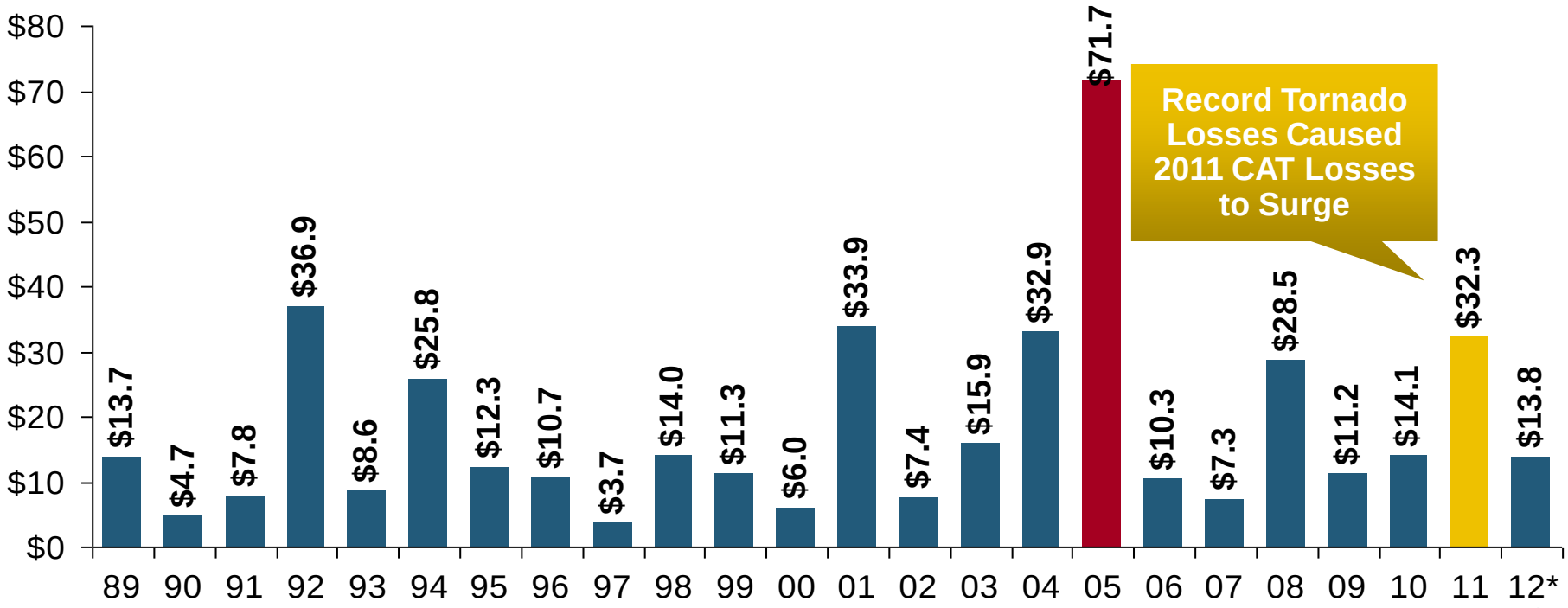
($ Billions, 2011 Dollars)



US CAT Losses in 2011 Were the 5th Highest in US History on An Inflation-Adjusted Basis

H1 2012 CAT losses were down $11.9B or 49% from $24.4B in H1 2011

*PCS figure for H1 2012 (stated in 2012 dollars).

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.

Top 14 Most Costly Disasters in U.S. History

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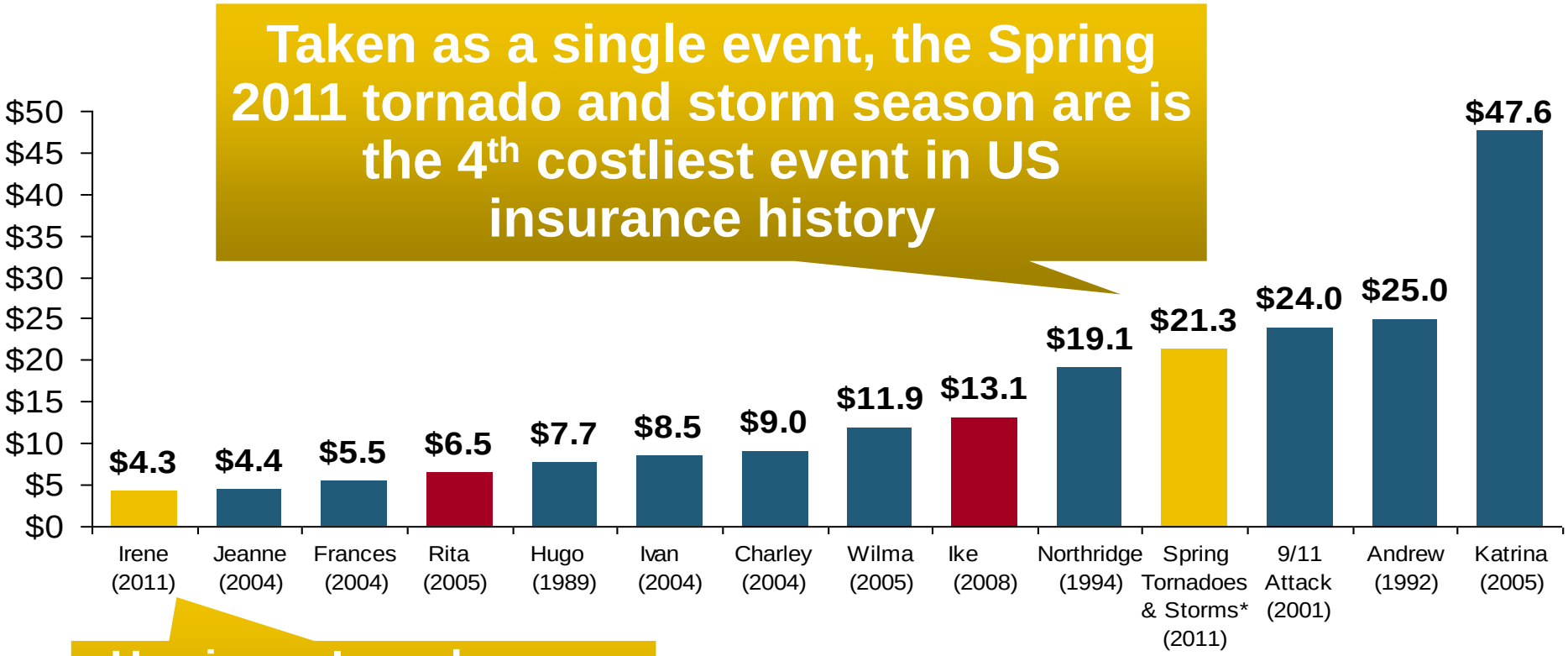
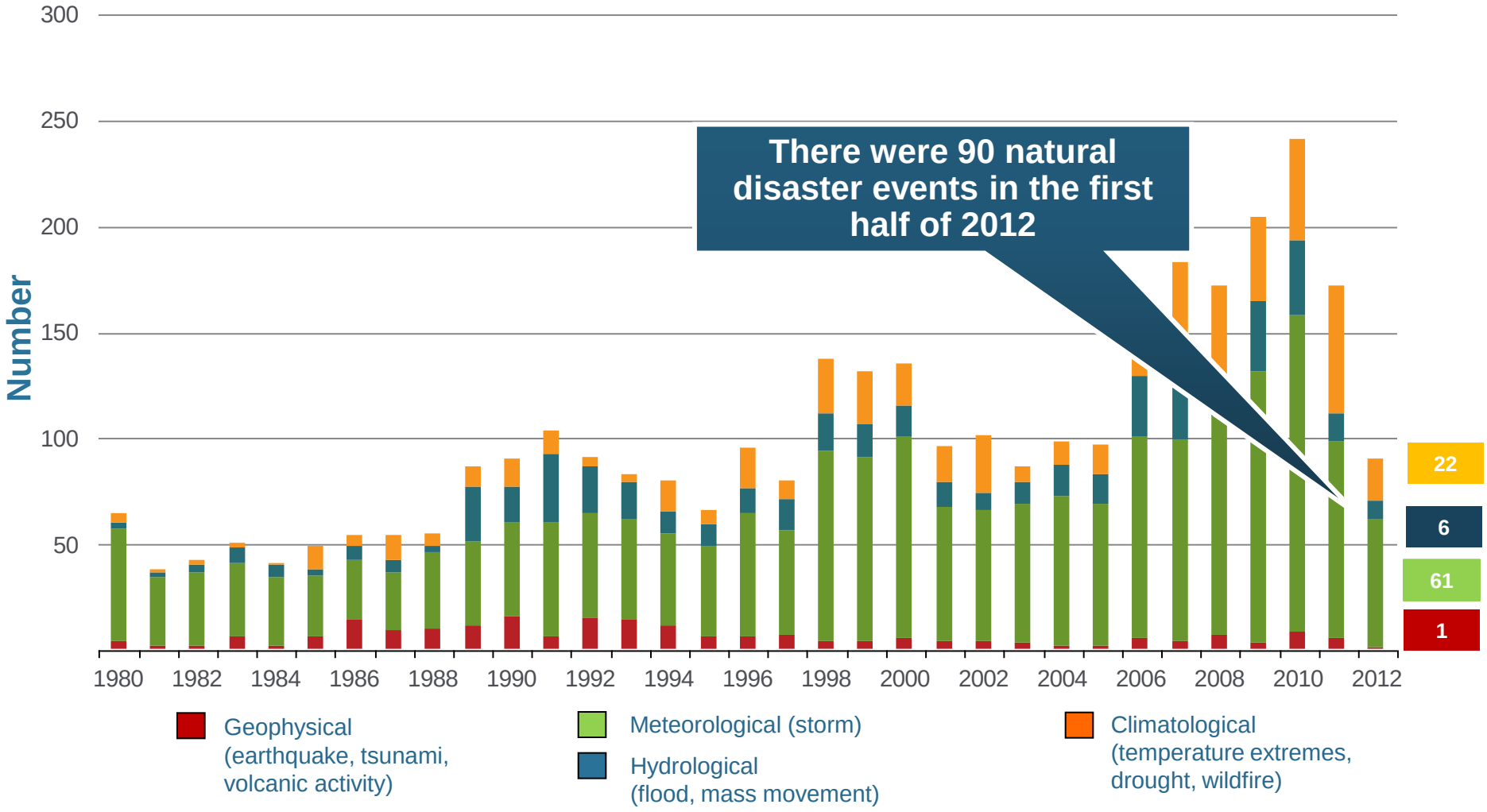
(Insured Losses, 2011 Dollars, $ Billions)



*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.

Natural Disasters in the United States, 1980 – 2012:H1

Number of Events (Annual Totals 1980 – 2011 and First Half 2012)



Source: MR NatCat*SERVICE*

Losses Due to Natural Disasters in the US, 1980–2011 (Overall & Insured Losses)

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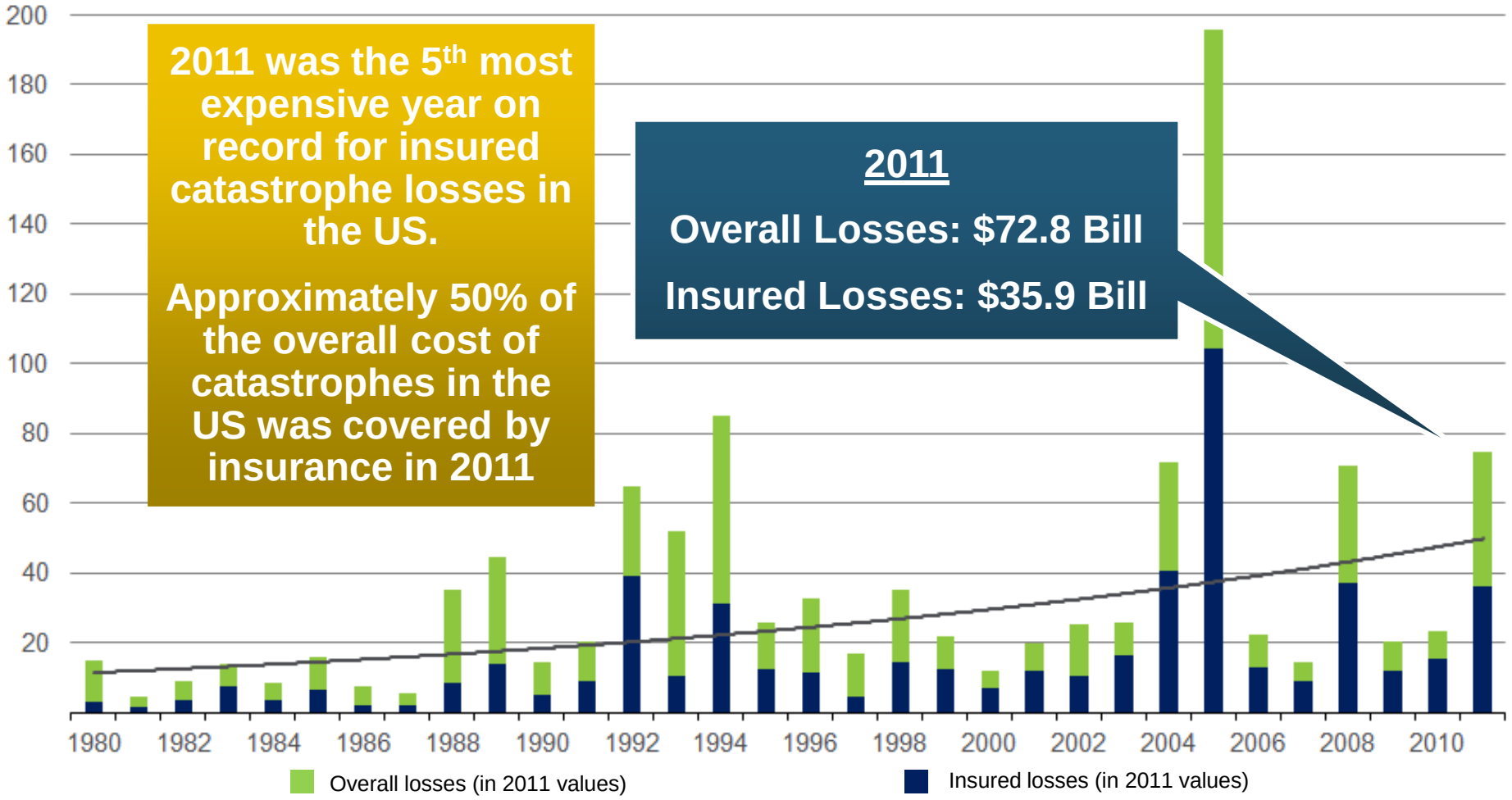
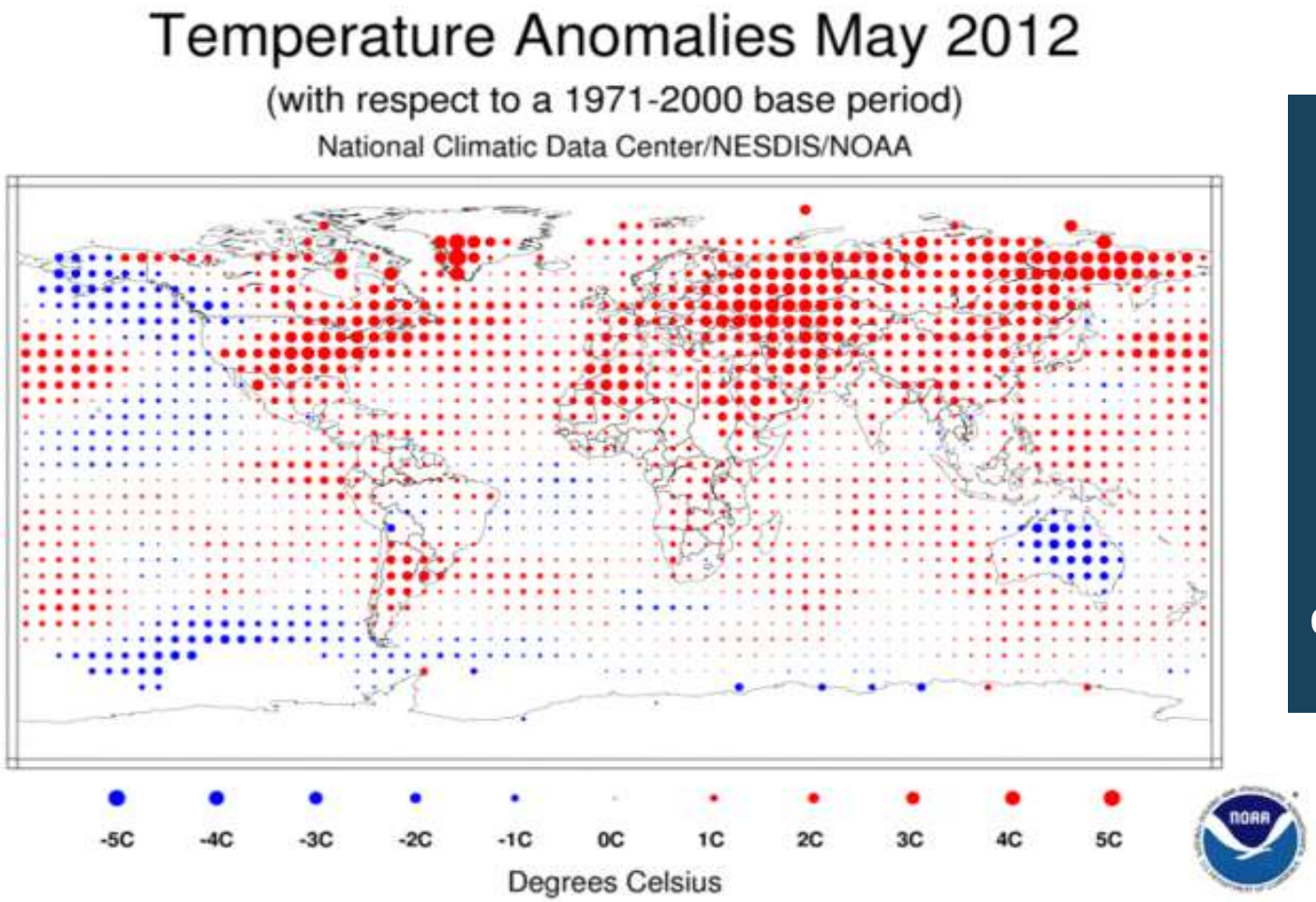
(Overall and Insured Losses)

(2011 Dollars, $ Billions)



Source: MR NatCat*SERVICE*

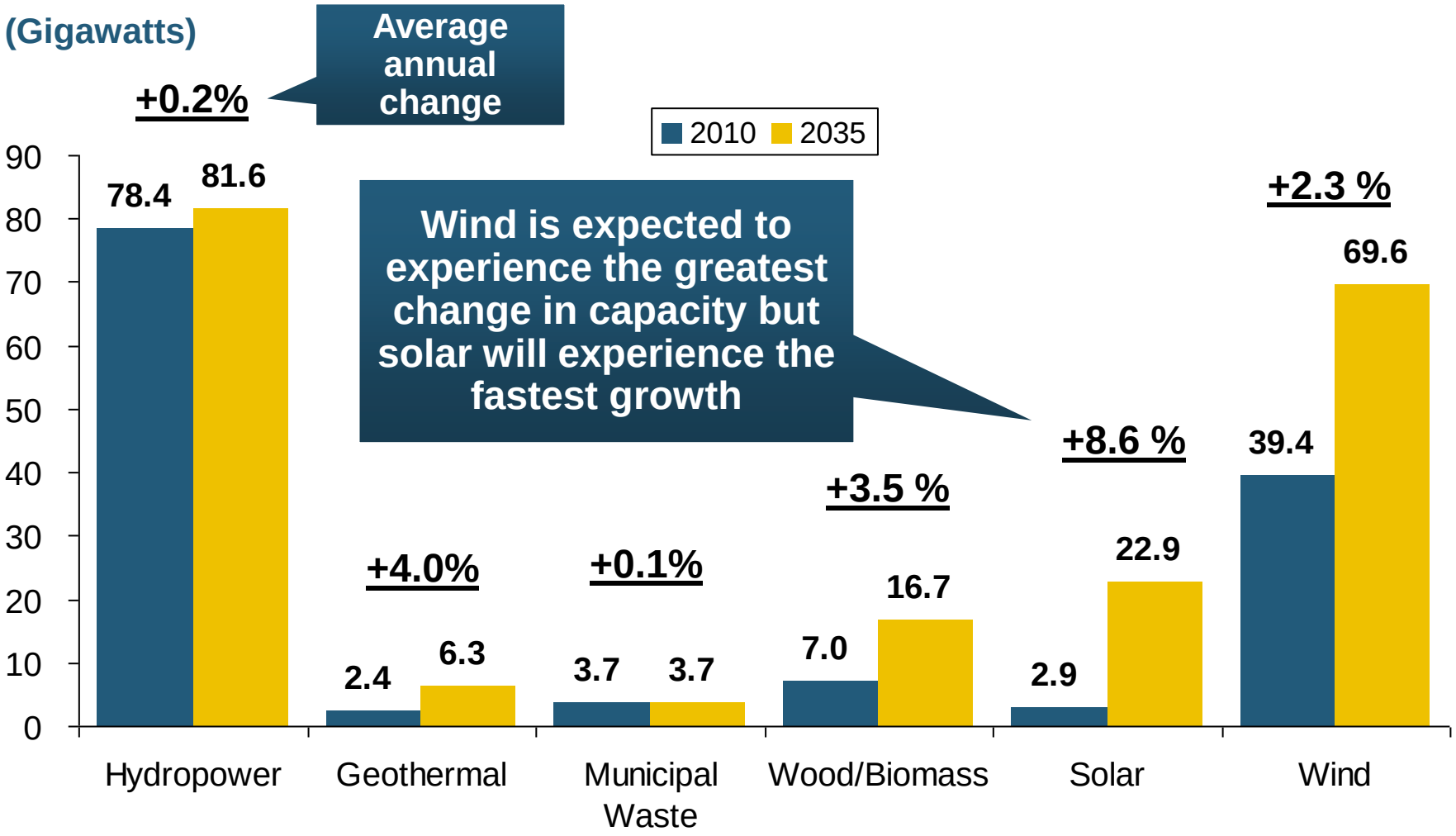
Global Temperature Anomolies, May 2012



Northern hemisphere land and ocean temperature for May 2012 was the all-time warmest on record, at 0.85 degrees C (1.53 degrees F) above average

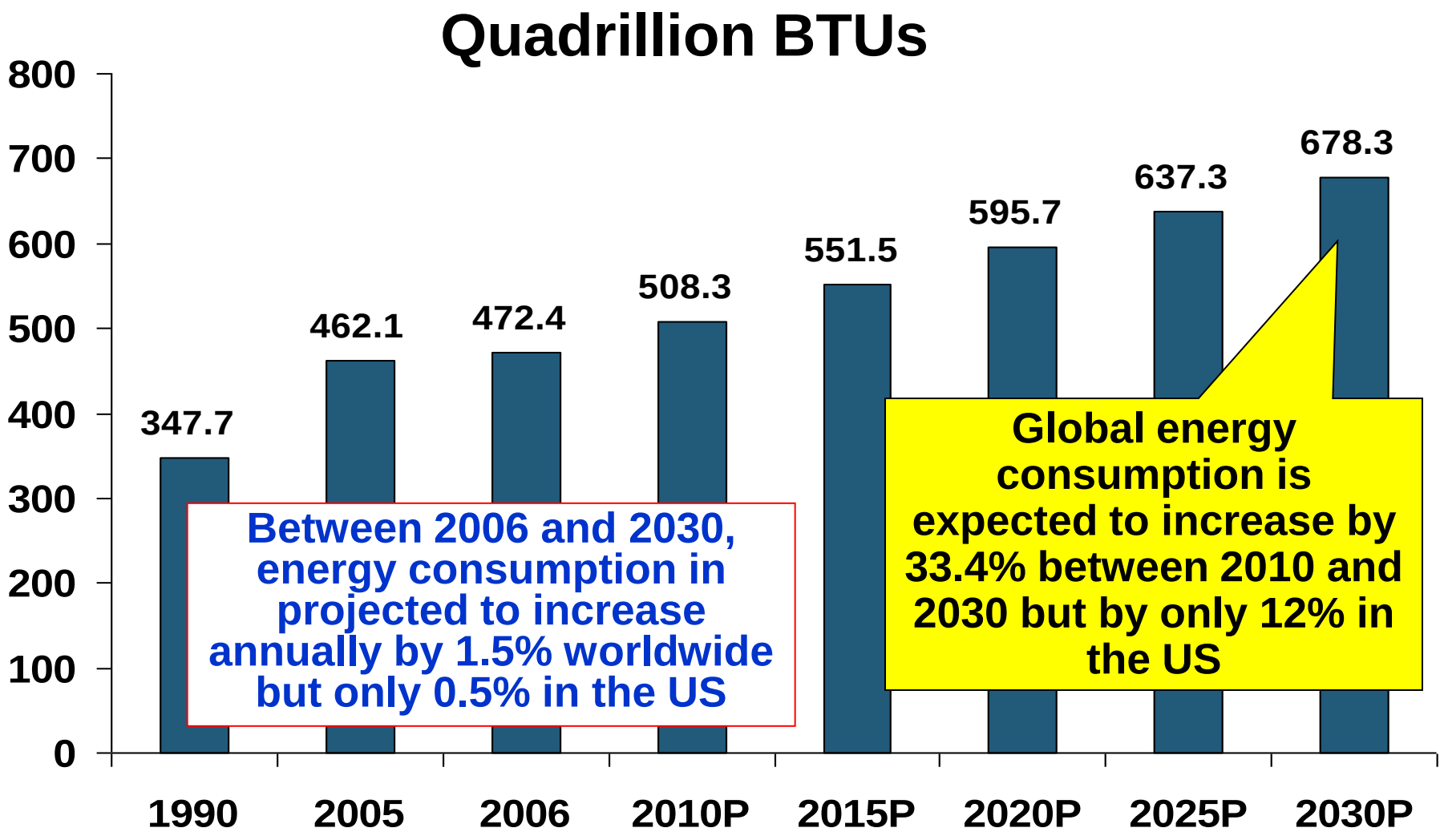
Source: NOAA

U.S. Renewable Energy Net Summer Capacity & Avg. Ann. Change, by Source, 2010 – 2035P



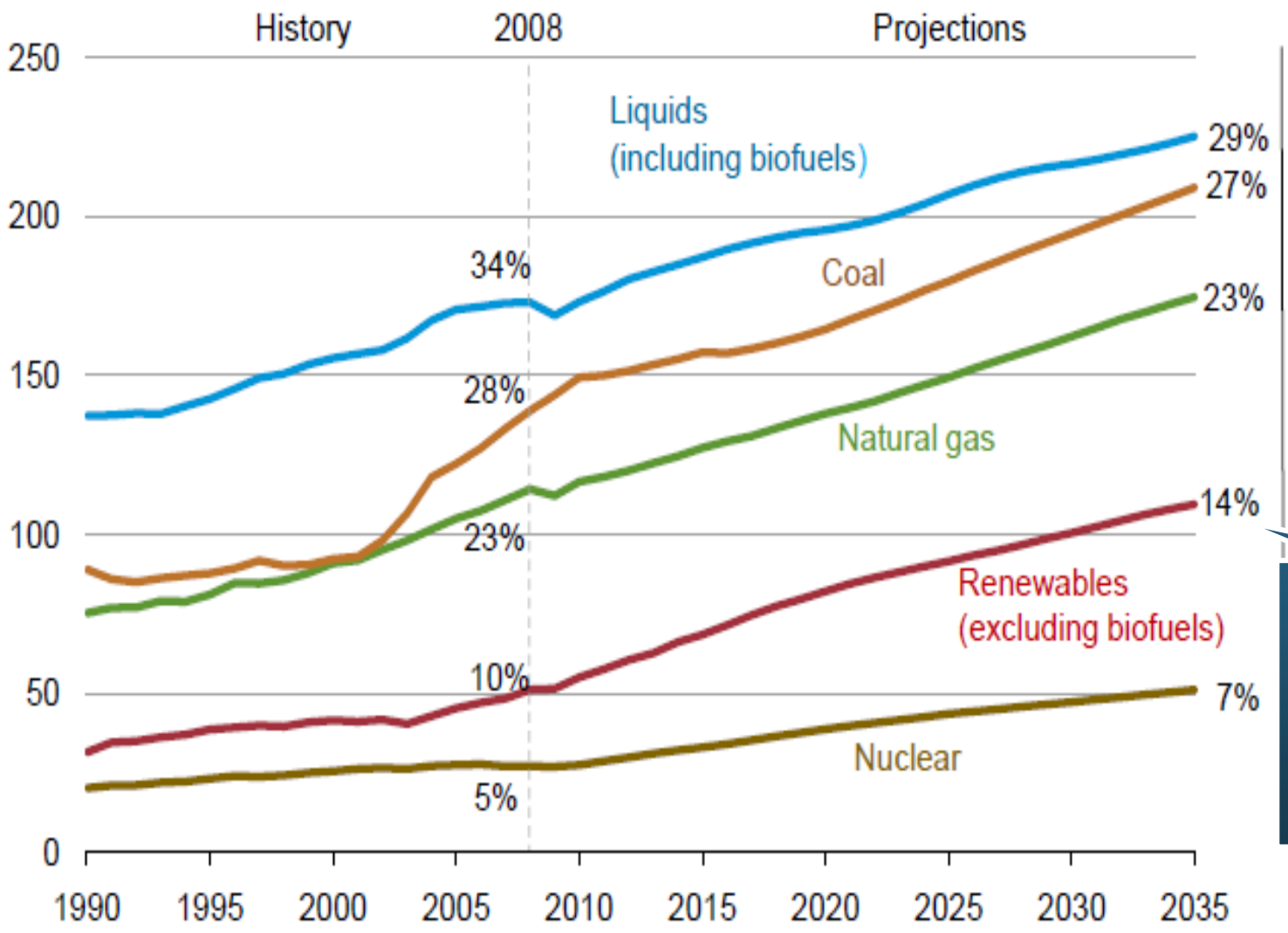
Source: US Energy Information Administration, *Annual Energy Outlook 2012,* Appendix A16; Insurance Information Institute.

World Primary Energy Consumption, 1990-2030P



Source: Energy Information Administration, *2009 International Energy Outlook*, Insurance Information Institute.

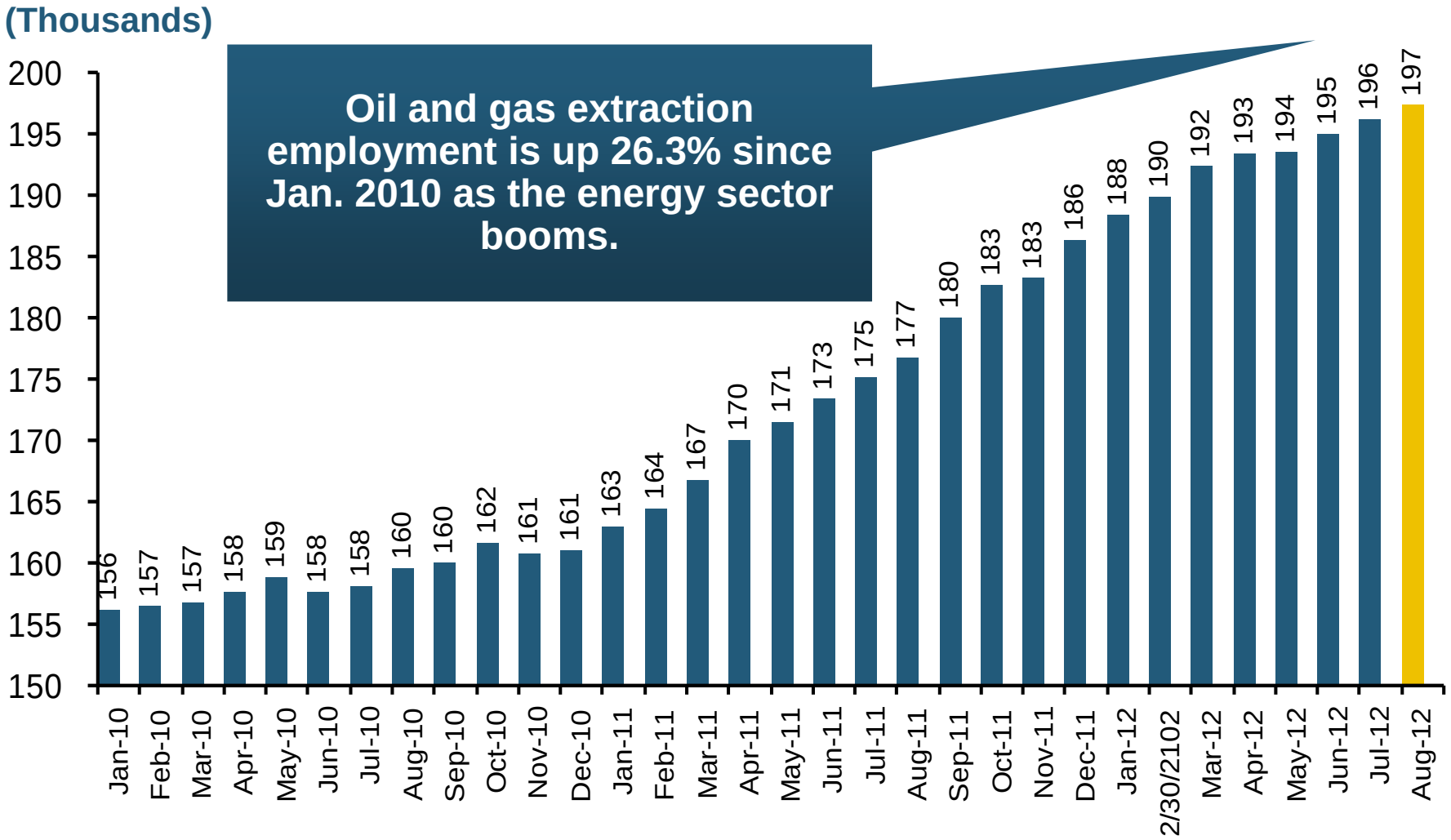
World Energy Consumption by Fuel, 1990—2035F



Renewables will account for 14% of global energy consumption by 2035, up from 20% in 2008

Source: US Energy Information Administration, *International Energy Outlook 2011;* Insurance Information Institute.

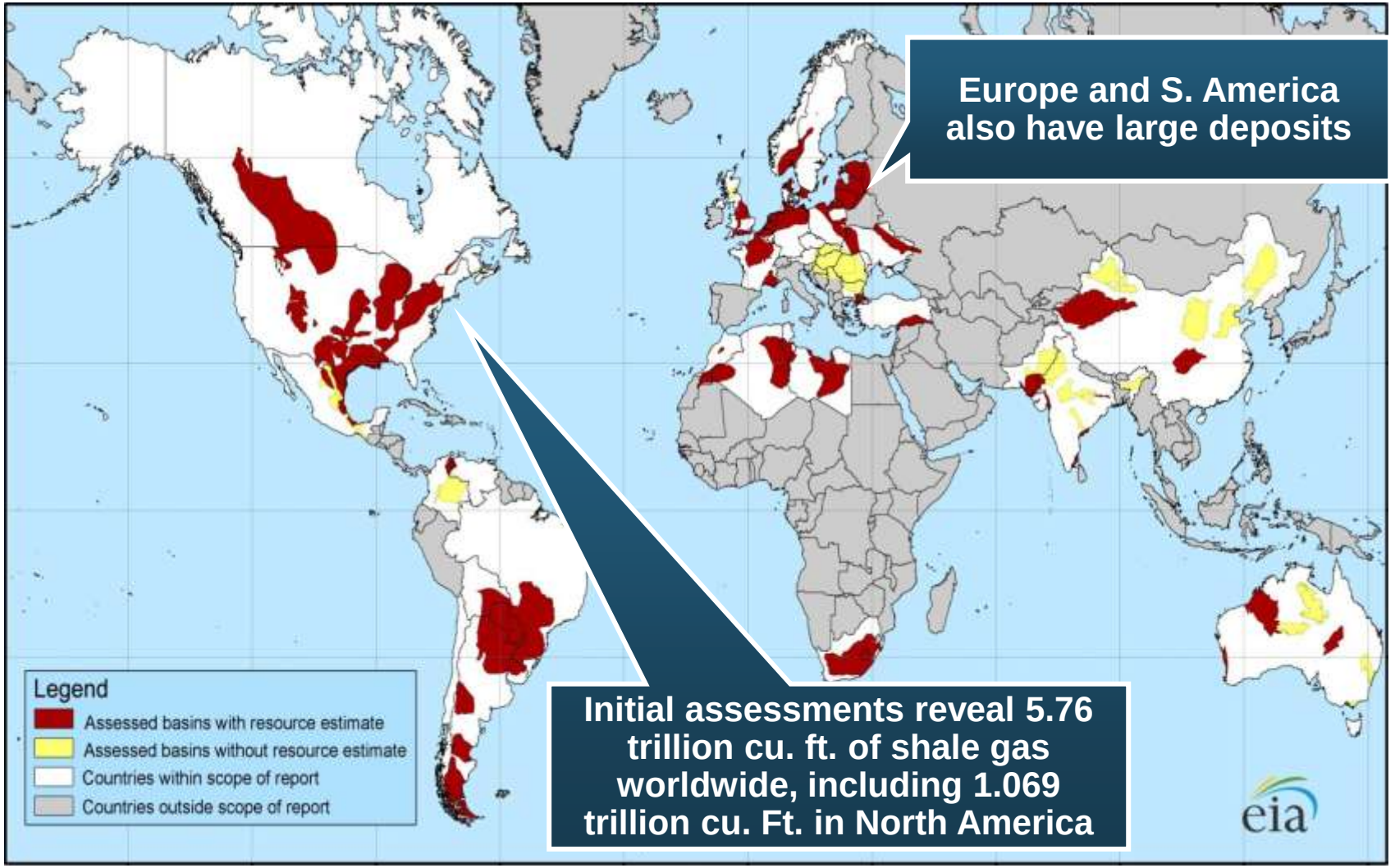
Oil & Gas Extraction Employment, Jan. 2010—August 2012*



*Seasonally adjusted

Sources: US Bureau of Labor Statistics at http://data.bls.gov; Insurance Information Institute.

Distribution of Major Shale Deposits: 5.76 Tr. Cu. Ft. in 48 Shale Basins in 32 Countries



Source: US Energy Information Administration; Insurance Information Institute.

Technological Risks: Vulnerability and Susceptibility Vary Across the Globe

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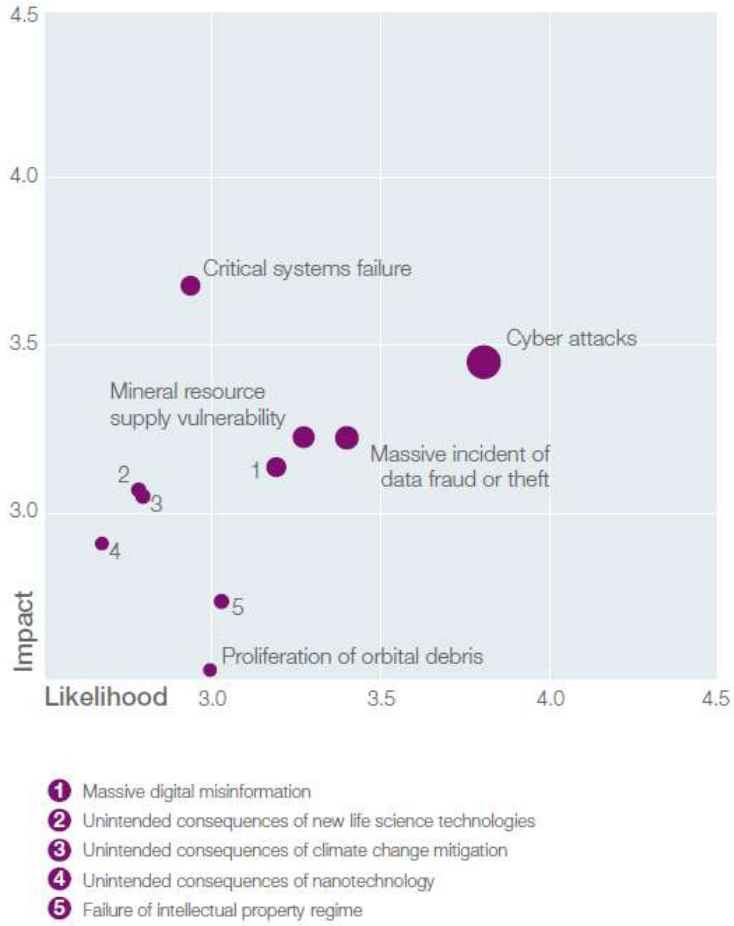
- **Technological Risks**
  - Cyber attacks
  - Massive data fraud/theft
  - Mineral resource supply vulnerability
  - Massive digital misinformation
  - Unintended consequences of new life sciences technologies
  - Unintended consequences of climate change mitigation
  - Unintended consequences of nanotechnology

Technological Risk Landscape



Source: World Economic Forum, *Global Risks 2012*; Insurance Information Institute.

Cyber Risk Threat Spectrum: Terrorism is a Concern

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Threat	Resources	Methods	Objectives	Examples
Nation-state, sleeper insiders	High	Highly targeted	Strategic sabotage	Stuxnet
Advanced persistent threat	High	Targeted, manual remote control	IP theft	Aurora, Ghostnet
Persistent threat	Medium	Targeted, manual remote control	IP theft, defacement	Night Dragon, "Anonymous"
Disgruntled insider with access to ICS	Low	Targeted: social engineering	Sabotage	Maroochy
Insider with access to IT network	Low	Targeted: social engineering	Sabotage	IT examples
Organized crime	Medium	Highly volume, automated	Identity theft	Zeus, Conflicker

Combination of cyber attack with inside access

Highly targeted (low volume) attacks; Dedicated afford to do harm

- **Stuxnet: Autonomous Attack Sabotaging Iranian Uranium Enrichment Facilities**
  - **Likely created by US and Israeli intelligence services**
  - **Based on deep insider intelligence, planted deep inside perimeter using USB sticks**
- **Advanced Persistent Threats (APT) = Manual Control**
  - **Human-powered, but demonstrated ability to penetrate almost any defense**

Sources: Waterfall Security Solutions.

Societal Risks: Vulnerability and Susceptibility Vary Across the Globe

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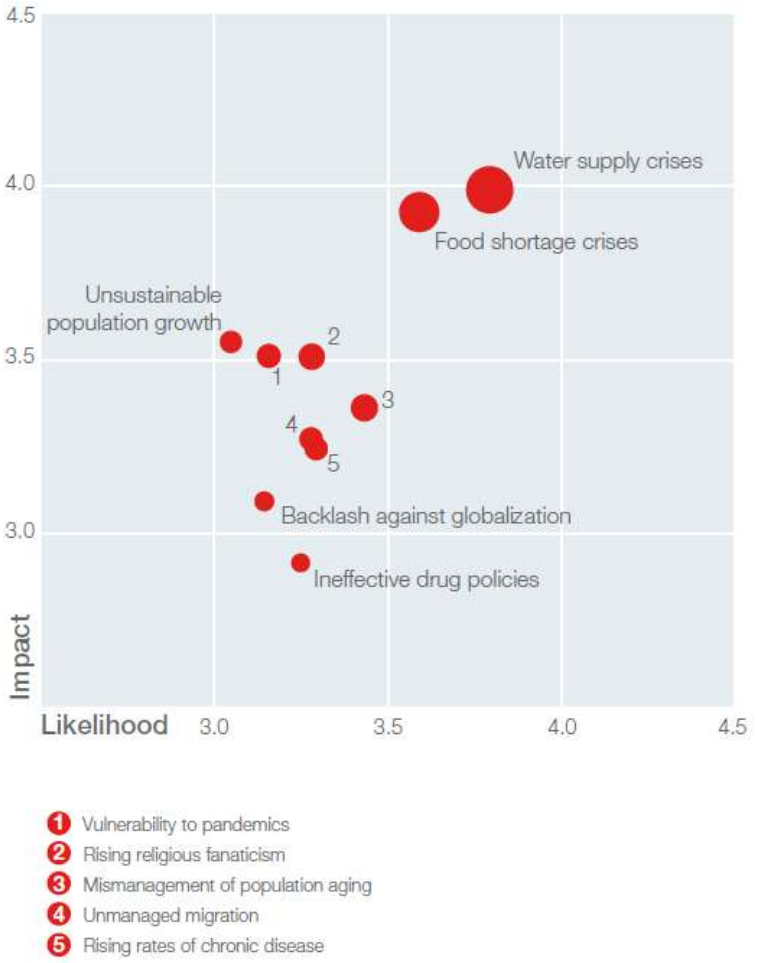
Societal Risks

- Water supply crisis
- Food shortage crisis
- Rising religious fanaticism
- Vulnerability to pandemics
- Unmanaged migration
- Mismanagement of population aging
- Unsustainable population growth
- Backlash against globalization
- Ineffective drug policies

Societal Risk Landscape



Source: World Economic Forum, *Global Risks 2012*; Insurance Information Institute.

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Summary & Conclusions

SO…

Is the World Really a Riskier Place?

Reasons for Optimism, Causes for Concern in the Insurance Industry

- **No Shortage of Local & Global Threats—Same Throughout Human History and the "Human Struggle" Will Never End**
  - Economic insecurity
  - Geopolitical instability
  - Natural and manmade disasters
- **But by Many Objective Measures Humans Are Much Better Off than at any Time in History**
  - Lifespan
  - Standard of living
  - Education
- **But Many of These Advances Are Fragile**
  - Many historical examples of societal collapses
- **Good News: World Will Likely Avoid Falling into Another Global Recession**
- **But…It Is Still Unclear if Humans Can Successfully Manage Global Threats in a Cooperative Manner**
  - Interconnectedness through trade, finance, technology, intellectual exchange, natural resources and climate is unparalleled in human history

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