



Cambridge Judge Business School

Centre for Risk Studies

CAMBRIDGE RISK BRIEFING

# WELCOME: CAMBRIDGE CORPORATE RISK VISION

Professor Daniel Ralph

Academic Director

Cambridge Centre for Risk Studies

Centre for  
**Risk Studies**



UNIVERSITY OF  
CAMBRIDGE  
Judge Business School



# Cambridge Centre for Risk Studies

## University of Cambridge Judge Business School



- An academic centre for research into systemic risk in business, the economy, and society
- Based in the Business School at University of Cambridge
- Principally supported by funding from corporate supporters
- Engage closely with collaborators and supporters, and have a decade of high business impact from our research outputs



# Cambridge Corporate Risk Management Research

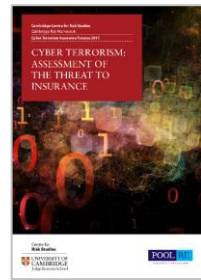
- Risk management practices of major companies - adapting to meet future challenges & opportunities

## The Corporate Protection Gap

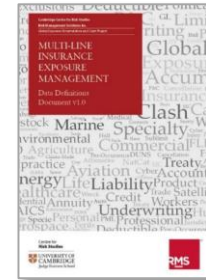
- Corporate risk management and risk transfer needs not currently met by insurance market
- CCRS working to address these emerging gaps and expand insurance offering:



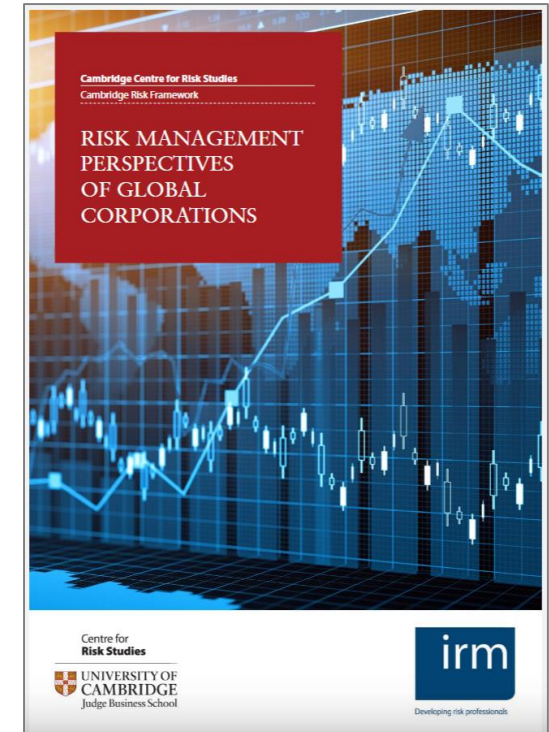
Cyber Insurance



Multi-Line Exposure Data Schema  
Global Exposure Accumulation & Clash



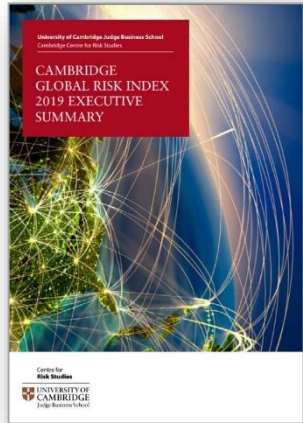
Cyber Terror Insurance





# Downloadable Publications since Jan 2018

<https://www.jbs.cam.ac.uk/faculty-research/centres/risk/publications/>



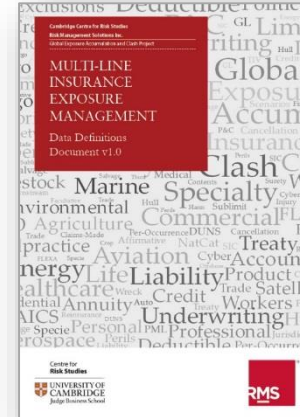
Cambridge Global Risk Index 2019



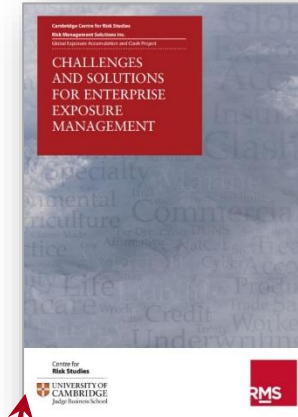
Steering the Course Marine Risk



Globalization and Systemic Risk



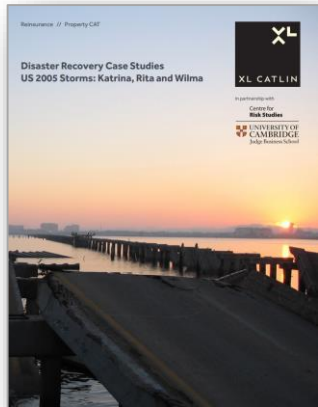
Multiline Insurance Data Schema



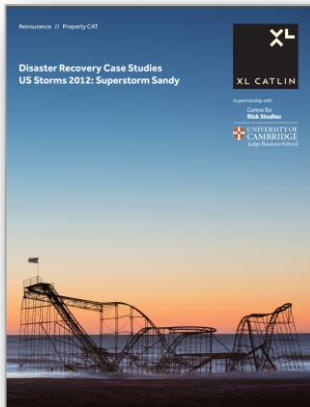
Multiline Insurance Clash Scenarios



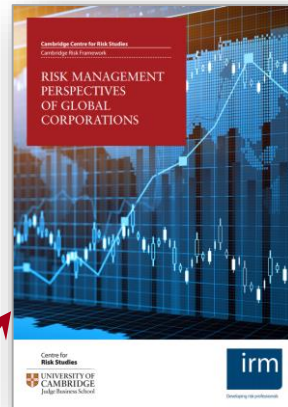
Cyber Risk Outlook 2019



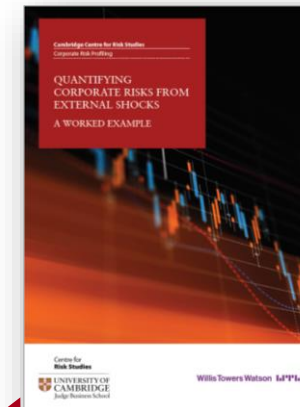
Disaster Recovery HU Katrina 2005



Disaster Recovery HU Sandy 2012



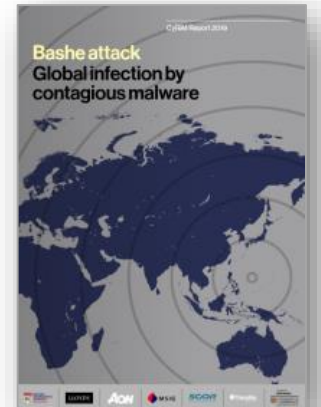
Risk in Major Corporations



External Shocks and Corporate Risk

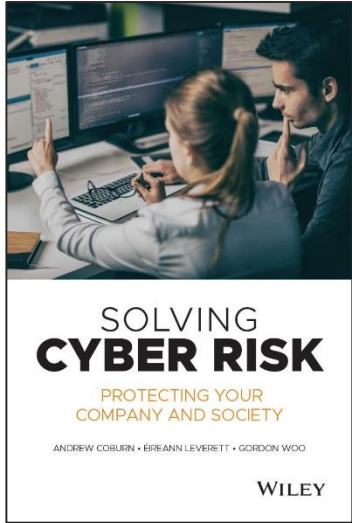


Natural Catastrophes and Market Risk



Bashe Malware Cyber Scenario

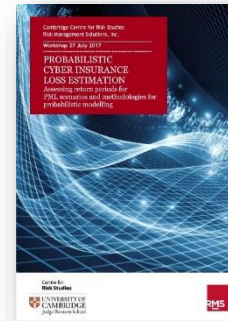
# Cambridge Cyber Risk Research



## Cyber Risk Frameworks

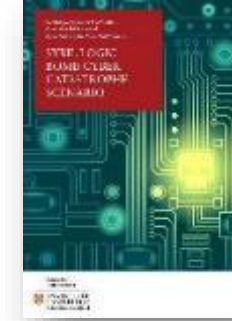


2016  
Exposure Data Schema  
and Accumulation Risk



2018  
Probabilistic  
Cyber Assessment

## Cyber Risk Stress Tests



2014  
Sybil Logic Bomb  
Stress Test  
Scenario



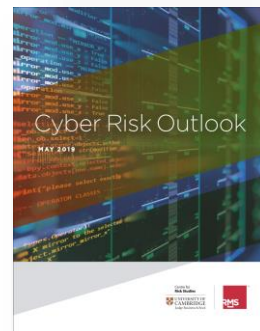
2015  
Business Blackout  
CNI Scenario

## Industry Impact



ACORD

## Cyber Risk Data & Models



2019  
Cyber Risk Outlook



Cyber Data  
Exfiltration



Financial  
Transaction Cyber  
Compromise



Denial-of-Service  
Attack



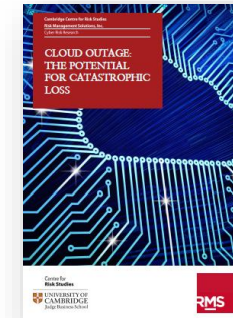
Cyber Extortion

Hackers graduate from personal



Cloud Service  
Provider Failure

## Cyber Risk Analysis



2018  
Cloud Outage: The Potential  
for Catastrophic Loss



2018  
Threat Actors in the  
Cyber Black Economy





Cambridge Judge Business School

Centre for Risk Studies

CAMBRIDGE RISK BRIEFING

# ROBUST APPROACHES TO ASSESSING CORPORATE RISK

Professor Daniel Ralph

Academic Director

Cambridge Centre for Risk Studies

Centre for  
**Risk Studies**

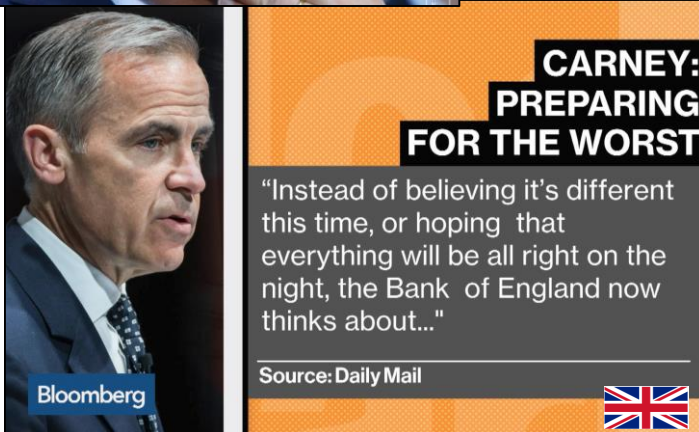


UNIVERSITY OF  
CAMBRIDGE  
Judge Business School



# Current Challenges to the Global Corporate Landscape

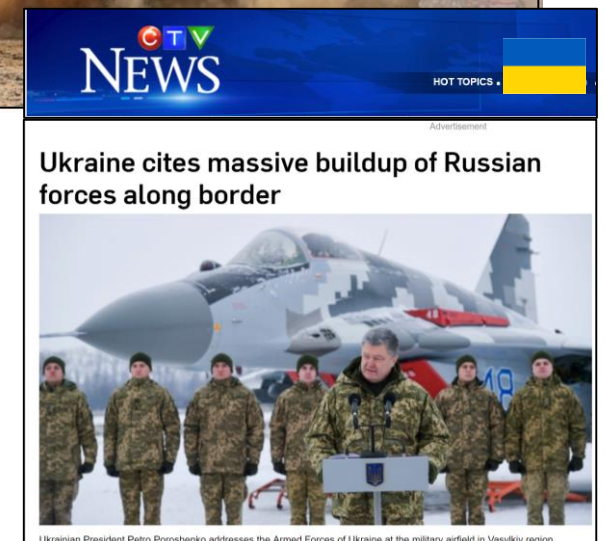
## Populism



## Trade War



## Interstate Conflict



# Corporate Risk Disclosure Requirements

## 10-K Section 1A Risk Factors - United States SEC

- Since 2005, the SEC requires US public companies to disclose "the most significant factors that make the company speculative or risky"



## Risk Register: UK Financial Reporting Council

- UK Corporate Governance Code – from Jan 2019
  - Part 4 Audit, Risk and Internal Control, item 28, requires:

“a **robust assessment** of the company's **emerging and principal risks**, and to confirm in its annual report the procedures in place to **identify emerging risks**, and an explanation of how these are being managed and mitigated ... and **probability** of related events”





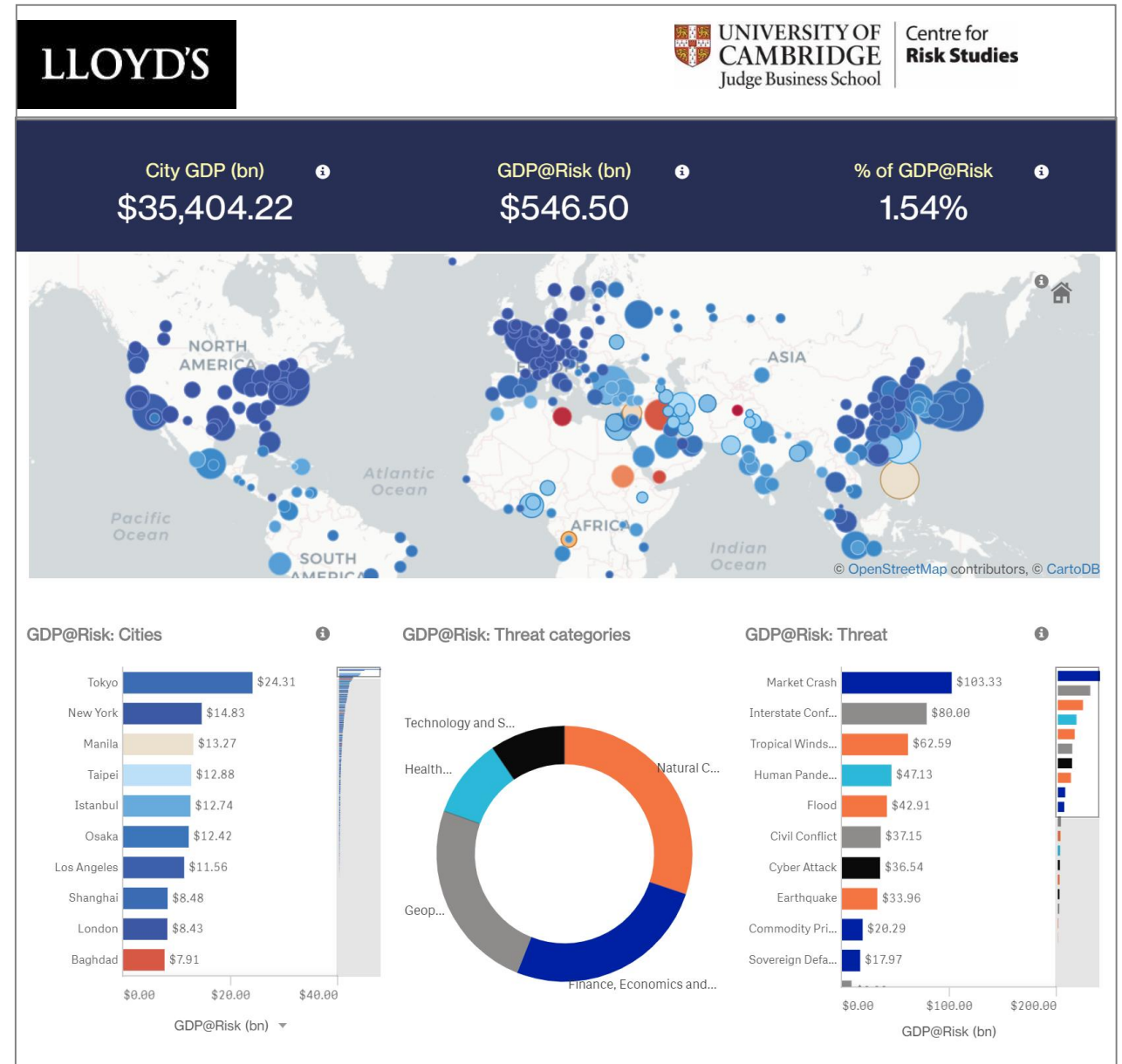
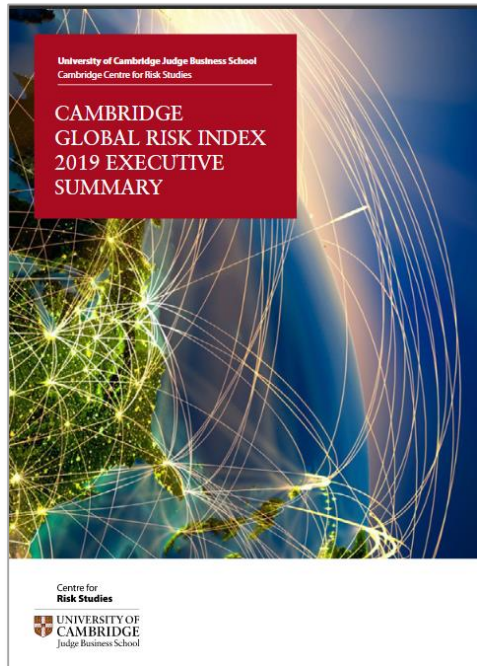
# Cambridge Global Risk Index & Lloyd's City Risk Index

2018 index

<https://cityriskindex.lloyds.com/>

2019 index

[www.jbs.cam.ac.uk/fileadmin/user\\_upload/research/centres/risk/downloads/crs-global-risk-index-exec-summary-2019.pdf](http://www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/risk/downloads/crs-global-risk-index-exec-summary-2019.pdf)



# Cambridge Taxonomy of Business Risks

Financial & Economic	Geopolitical & Security	Technological	Environmental	Social & Humanitarian	Governance & Liability
<b>Macroeconomic</b> <ul style="list-style-type: none"> <li>Market Crash <ul style="list-style-type: none"> <li>Asset Bubble</li> <li>Financial Irregularities</li> </ul> </li> <li>Economic Recession</li> <li>Economic Restriction</li> <li>Trade Sanctions</li> <li>Tariff War</li> <li>Commodity Price Fluctuation</li> <li>Sovereign Crisis Default</li> <li>Investor Sentiment <ul style="list-style-type: none"> <li>Negative Market Outlook</li> </ul> </li> <li>Low Carbon Transition</li> </ul> <b>Competition</b> <ul style="list-style-type: none"> <li>Disruptive Competitor</li> <li>Aggressive Competitor <ul style="list-style-type: none"> <li>Price War</li> </ul> </li> <li>Counterfeit Products</li> </ul> <b>Counterparty</b> <ul style="list-style-type: none"> <li>Creditor Failure</li> <li>Customer/Client Failure</li> <li>Government Failure</li> <li>Supplier Failure <ul style="list-style-type: none"> <li>Supply chain disruptions</li> <li>Bargaining power against suppliers</li> </ul> </li> </ul>	<b>Political &amp; Democratic</b> <ul style="list-style-type: none"> <li>Ideological Shift <ul style="list-style-type: none"> <li>Nationalism</li> <li>Populism</li> <li>Protectionism</li> </ul> </li> <li>Political Shock <ul style="list-style-type: none"> <li>Sudden Leadership Change</li> <li>Regime Change</li> </ul> </li> <li>Political Corruption</li> <li>Nationalisation</li> </ul> <b>Political Violence</b> <ul style="list-style-type: none"> <li>Assassination</li> <li>Terrorism</li> <li>Coup d'État</li> <li>Social Unrest</li> <li>Civil Conflict/Separatism</li> </ul> <b>International Conflict</b> <ul style="list-style-type: none"> <li>Interstate Conflict <ul style="list-style-type: none"> <li>Conventional War</li> <li>Asymmetric War</li> <li>Nuclear War</li> </ul> </li> </ul> <b>Criminal</b> <ul style="list-style-type: none"> <li>Cartel Pressure</li> <li>Organised Crime</li> </ul>	<b>Disruptive Technology</b> <ul style="list-style-type: none"> <li>E-Commerce <ul style="list-style-type: none"> <li>Clicks &amp; Mortar</li> </ul> </li> <li>Gig Economy</li> <li>Robotics &amp; Automation</li> <li>Artificial Intelligence</li> <li>5G Technology</li> <li>Augmented/Virtual Reality</li> <li>Blockchain</li> </ul> <b>Cyber Attack</b> <ul style="list-style-type: none"> <li>Data Exfiltration <ul style="list-style-type: none"> <li>Intellectual Property Loss</li> </ul> </li> <li>Contagious Malware</li> <li>Cloud Service Provider Failure</li> <li>Distributed Denial of Service Attack</li> <li>Financial Transaction Theft</li> <li>Industrial Control System Compromise</li> <li>Internet Service Provider Failure</li> </ul> <b>Infrastructure/System Failure</b> <ul style="list-style-type: none"> <li>Network Disruption</li> <li>Power Outage</li> <li>Satellite System Failure</li> <li>Internet Outage</li> </ul> <b>Industrial Accident</b> <ul style="list-style-type: none"> <li>Explosion</li> <li>Fire</li> <li>Nuclear</li> <li>Pollution</li> </ul>	<b>Sustainability</b> <ul style="list-style-type: none"> <li>Natural Resource Deficiency <ul style="list-style-type: none"> <li>Water</li> <li>Fossil Fuels</li> <li>Raw Materials</li> <li>Biogeochemicals</li> </ul> </li> <li>Food Insecurity</li> <li>Land/ Ocean System Change <ul style="list-style-type: none"> <li>Biodiversity Loss</li> <li>Ecosystem Collapse</li> </ul> </li> <li>Waste and Pollution</li> </ul> <b>Climate Change</b> <ul style="list-style-type: none"> <li>Climate Change</li> <li>Extreme Event Exacerbation</li> <li>Ocean System Change</li> <li>Sea Level Rise</li> </ul> <b>Geophysical</b> <ul style="list-style-type: none"> <li>Earthquake</li> <li>Tsunami</li> <li>Volcanic Eruption</li> </ul> <b>Hydrometeorological</b> <ul style="list-style-type: none"> <li>Drought</li> <li>Electrical Storm</li> <li>Flood</li> <li>Freeze</li> <li>Hail</li> <li>Heatwave</li> <li>Temperate Windstorm</li> <li>Tornado</li> <li>Tropical Cyclone</li> <li>Wildfire</li> </ul> <b>Space</b> <ul style="list-style-type: none"> <li>Solar Storm (CME)</li> <li>Astronomical Impact Event</li> </ul>	<b>Consumer Power</b> <ul style="list-style-type: none"> <li>Shift in Consumer Demand</li> <li>Activism</li> <li>Consumer Boycott <ul style="list-style-type: none"> <li>Commodity Boycott</li> <li>Brand Name Boycott</li> <li>Single Firm Boycott</li> </ul> </li> <li>Transparency of Information <ul style="list-style-type: none"> <li>Supply Chain Provenance</li> </ul> </li> <li>Failure of Brand Management <ul style="list-style-type: none"> <li>Negative Customer Experience</li> <li>Key Influencer Disruption</li> <li>Negative Media Coverage</li> </ul> </li> </ul> <b>Human Resources</b> <ul style="list-style-type: none"> <li>Labour Disputes &amp; Strikes</li> <li>Loss of Key Personnel</li> <li>Failure to Attract Talent</li> <li>Employment Practices</li> <li>Gender &amp; Diversity</li> <li>Communication Failure</li> </ul> <b>Human Capital</b> <ul style="list-style-type: none"> <li>Ageing Population</li> <li>Labour Shortages</li> </ul> <b>Humanitarian</b> <ul style="list-style-type: none"> <li>Poverty</li> <li>Hunger or Famine</li> <li>Inequality <ul style="list-style-type: none"> <li>Welfare System Failure</li> </ul> </li> <li>Mass Migration <ul style="list-style-type: none"> <li>Refugee Crisis</li> </ul> </li> </ul> <b>Infectious Disease</b> <ul style="list-style-type: none"> <li>Plant Epidemic</li> <li>Animal Epidemic</li> <li>Human Epidemic/Pandemic</li> </ul>	<b>Regulation &amp; Liability</b> <ul style="list-style-type: none"> <li>Tightening Fiscal Policy <ul style="list-style-type: none"> <li>Taxation</li> </ul> </li> <li>Non-Compliance <ul style="list-style-type: none"> <li>Violations of Existing Regulation</li> <li>Internal Corruption &amp; Fraud</li> <li>Negligence</li> <li>Emerging Regulation</li> </ul> </li> <li>Revised Accounting Standards</li> <li>Licence Revocation</li> </ul> <b>Contingent Liabilities</b> <ul style="list-style-type: none"> <li>Private Lawsuit</li> <li>Mass Tort</li> <li>Class Action</li> </ul> <b>Strategic</b> <ul style="list-style-type: none"> <li>Strategy Failure <ul style="list-style-type: none"> <li>Divestitures</li> <li>Joint Ventures</li> <li>Mergers &amp; Acquisitions</li> <li>Restructuring</li> </ul> </li> <li>Asymmetric Board <ul style="list-style-type: none"> <li>Rogue CEO</li> </ul> </li> <li>Hostile Takeover</li> <li>Model Failure <ul style="list-style-type: none"> <li>Failure to Forecast Business Future</li> </ul> </li> </ul> <b>Products &amp; Services</b> <ul style="list-style-type: none"> <li>Product Defect/Failure</li> <li>Innovation (R&amp;D) Failure</li> </ul>

Centre for  
Risk Studies



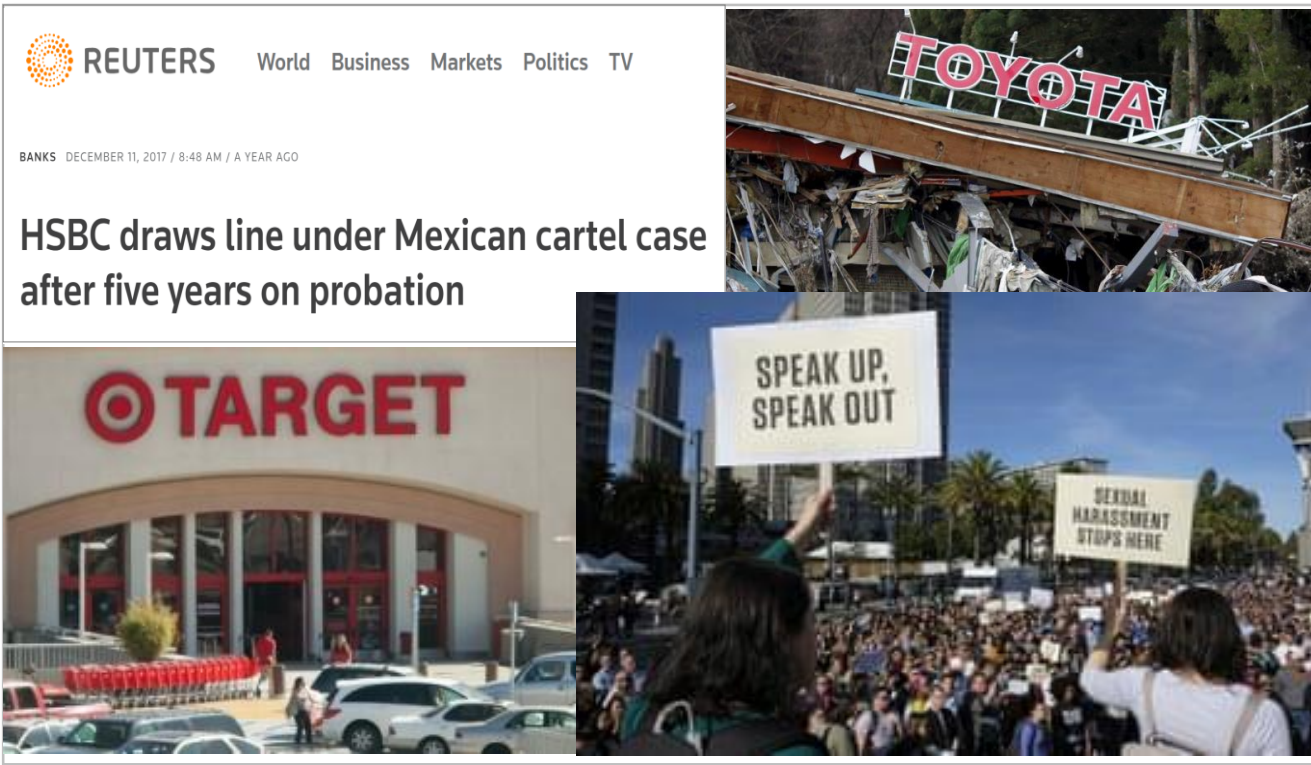
UNIVERSITY OF  
CAMBRIDGE  
Judge Business School



# Cambridge Taxonomy of Business Risks: What is Insured?

Financial & Economic	Geopolitical & Security	Technological	Environmental	Social & Humanitarian	Governance & Liability
<b>Macroeconomic</b> <ul style="list-style-type: none"> <li>Market Crash               <ul style="list-style-type: none"> <li>Asset Bubble</li> <li>Financial Irregularities</li> </ul> </li> <li>Economic Recession</li> <li>Economic Restriction</li> <li>Trade Sanctions</li> <li>Tariff War</li> <li>Commodity Price Fluctuation</li> <li>Sovereign Crisis Default</li> <li>Investor Sentiment               <ul style="list-style-type: none"> <li>Negative Market Outlook</li> </ul> </li> <li>Low Carbon Transition</li> </ul>	<b>Political &amp; Democratic</b> <ul style="list-style-type: none"> <li>Ideological Shift               <ul style="list-style-type: none"> <li>Nationalism</li> <li>Populism</li> <li>Protectionism</li> </ul> </li> <li>Political Shock               <ul style="list-style-type: none"> <li>Sudden Leadership Change</li> <li>Regime Change</li> </ul> </li> <li>Political Corruption</li> <li>Nationalisation</li> </ul>	<b>Disruptive Technology</b> <ul style="list-style-type: none"> <li>E-Commerce               <ul style="list-style-type: none"> <li>Clicks &amp; Mortar</li> </ul> </li> <li>Gig Economy</li> <li>Robotics &amp; Automation</li> <li>Artificial Intelligence</li> <li>5G Technology</li> <li>Augmented/Virtual Reality</li> <li>Blockchain</li> </ul>	<b>Sustainability</b> <ul style="list-style-type: none"> <li>Natural Resource Deficiency               <ul style="list-style-type: none"> <li>Water</li> <li>Fossil Fuels</li> <li>Raw Materials</li> <li>Biogeochemicals</li> </ul> </li> <li>Food Insecurity</li> <li>Land/ Ocean System Change               <ul style="list-style-type: none"> <li>Biodiversity Loss</li> <li>Ecosystem Collapse</li> </ul> </li> <li>Waste and Pollution</li> </ul>	<b>Consumer Power</b> <ul style="list-style-type: none"> <li>Shift in Consumer Demand</li> <li>Activism</li> <li>Consumer Boycott               <ul style="list-style-type: none"> <li>Commodity Boycott</li> <li>Brand Name Boycott</li> <li>Single Firm Boycott</li> </ul> </li> <li>Transparency of Information               <ul style="list-style-type: none"> <li>Supply Chain Provenance</li> </ul> </li> <li>Failure of Brand Management               <ul style="list-style-type: none"> <li>Negative Customer Experience</li> <li>Key Influencer Disruption</li> <li>Negative Media Coverage</li> </ul> </li> </ul>	<b>Regulation &amp; Liability</b> <ul style="list-style-type: none"> <li>Tightening Fiscal Policy               <ul style="list-style-type: none"> <li>Taxation</li> </ul> </li> <li>Non-Compliance               <ul style="list-style-type: none"> <li>Violations of Existing Regulation</li> <li>Internal Corruption &amp; Fraud</li> <li>Negligence</li> <li>Emerging Regulation</li> </ul> </li> <li>Revised Accounting Standards</li> <li>Licence Revocation</li> </ul>
<b>Competition</b> <ul style="list-style-type: none"> <li>Disruptive Competitor</li> <li>Aggressive Competitor               <ul style="list-style-type: none"> <li>Price War</li> </ul> </li> <li>Counterfeit Products</li> </ul>	<b>Political Violence</b> <ul style="list-style-type: none"> <li>Assassination</li> <li>Terrorism</li> <li>Coup d'État</li> <li>Social Unrest</li> <li>Civil Conflict/Separatism</li> </ul>	<b>Cyber Attack</b> <ul style="list-style-type: none"> <li>Data Exfiltration               <ul style="list-style-type: none"> <li>Intellectual Property Loss</li> </ul> </li> <li>Contagious Malware</li> <li>Cloud Service Provider Failure</li> <li>Distributed Denial of Service Attack</li> <li>Financial Transaction Theft</li> <li>Industrial Control System Compromise</li> <li>Internet Service Provider Failure</li> </ul>	<b>Climate Change</b> <ul style="list-style-type: none"> <li>Climate Change</li> <li>Extreme Event Exacerbation</li> <li>Ocean System Change</li> <li>Sea Level Rise</li> </ul>	<b>Human Resources</b> <ul style="list-style-type: none"> <li>Labour Disputes &amp; Strikes</li> <li>Loss of Key Personnel</li> <li>Failure to Attract Talent</li> <li>Employment Practices</li> <li>Gender &amp; Diversity</li> <li>Communication Failure</li> </ul>	<b>Contingent Liabilities</b> <ul style="list-style-type: none"> <li>Private Lawsuit</li> <li>Mass Tort</li> <li>Class Action</li> </ul>
<b>Counterparty</b> <ul style="list-style-type: none"> <li>Creditor Failure</li> <li>Customer/Client Failure</li> <li>Government Failure</li> <li>Supplier Failure               <ul style="list-style-type: none"> <li>Supply chain disruptions</li> <li>Bargaining power against suppliers</li> </ul> </li> </ul>	<b>International Conflict</b> <ul style="list-style-type: none"> <li>Interstate Conflict               <ul style="list-style-type: none"> <li>Conventional War</li> <li>Asymmetric War</li> <li>Nuclear War</li> </ul> </li> </ul>	<b>Infrastructure/System Failure</b> <ul style="list-style-type: none"> <li>Network Disruption</li> <li>Power Outage</li> <li>Satellite System Failure</li> <li>Internet Outage</li> </ul>	<b>Geophysical</b> <ul style="list-style-type: none"> <li>Earthquake</li> <li>Tsunami</li> <li>Volcanic Eruption</li> </ul>	<b>Human Capital</b> <ul style="list-style-type: none"> <li>Ageing Population</li> <li>Labour Shortages</li> </ul>	<b>Strategic</b> <ul style="list-style-type: none"> <li>Strategy Failure               <ul style="list-style-type: none"> <li>Divestitures</li> <li>Joint Ventures</li> <li>Mergers &amp; Acquisitions</li> <li>Restructuring</li> </ul> </li> <li>Asymmetric Board               <ul style="list-style-type: none"> <li>Rogue CEO</li> </ul> </li> <li>Hostile Takeover</li> <li>Model Failure               <ul style="list-style-type: none"> <li>Failure to Forecast Business Future</li> </ul> </li> </ul>
	<b>Criminal</b> <ul style="list-style-type: none"> <li>Cartel Pressure</li> <li>Organised Crime</li> </ul>	<b>Industrial Accident</b> <ul style="list-style-type: none"> <li>Explosion</li> <li>Fire</li> <li>Nuclear</li> <li>Pollution</li> </ul>	<b>Hydrometeorological</b> <ul style="list-style-type: none"> <li>Drought</li> <li>Electrical Storm</li> <li>Flood</li> <li>Freeze</li> <li>Hail</li> <li>Heatwave</li> <li>Temperate Windstorm</li> <li>Tornado</li> <li>Tropical Cyclone</li> <li>Wildfire</li> </ul>	<b>Humanitarian</b> <ul style="list-style-type: none"> <li>Poverty</li> <li>Hunger or Famine</li> <li>Inequality               <ul style="list-style-type: none"> <li>Welfare System Failure</li> </ul> </li> <li>Mass Migration               <ul style="list-style-type: none"> <li>Refugee Crisis</li> </ul> </li> </ul>	<b>Products &amp; Services</b> <ul style="list-style-type: none"> <li>Product Defect/Failure</li> <li>Innovation (R&amp;D) Failure</li> </ul>
			<b>Space</b> <ul style="list-style-type: none"> <li>Solar Storm (CME)</li> <li>Astronomical Impact Event</li> </ul>	<b>Infectious Disease</b> <ul style="list-style-type: none"> <li>Plant Epidemic</li> <li>Animal Epidemic</li> <li>Human Epidemic/Pandemic</li> </ul>	

# Applying Risk Science to Corporate Risk Profiling



How do such events impact your balance sheet?



Scenarios + analytics to quantify balance sheet risk



Centre for  
**Risk Studies**

---



UNIVERSITY OF  
CAMBRIDGE  
Judge Business School