

University of Cambridge Judge Business School

Cambridge Centre for Risk Studies

CAMBRIDGE PROSPECTUS ON RISK MANAGEMENT: INCREASING BUSINESS RESILIENCE

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School



The Cambridge Centre for Risk Studies conducts business-relevant research in collaboration with leading international companies across numerous sectors.
Selected research supporters include:



HOW CAN COMPANIES BE MORE RESILIENT TO RISKS?

As we enter the 2020s, the dangers of being unprepared for change seem greater than the world has seen for many decades. Companies are preparing for these risks, due to technological, climatic and geopolitical disruption and the rising pressures for transparency from society and regulators. The Cambridge Centre for Risk Studies collaborates with companies – making our research specifically business relevant. We gain insights into the context of a corporate's key principal and strategic risks and we use scenarios to look forward – not to predict but to manage an organisation's capacity to be resilient even in a volatile environment.

Cambridge has developed a series of resources for addressing business risk. Our vision is to work with managers in providing tools for recognising and managing risks which are external to the normal management processes of a company. Our focal themes include systemic and emerging risks; these are difficult to codify and assess in terms of management priorities and resources.

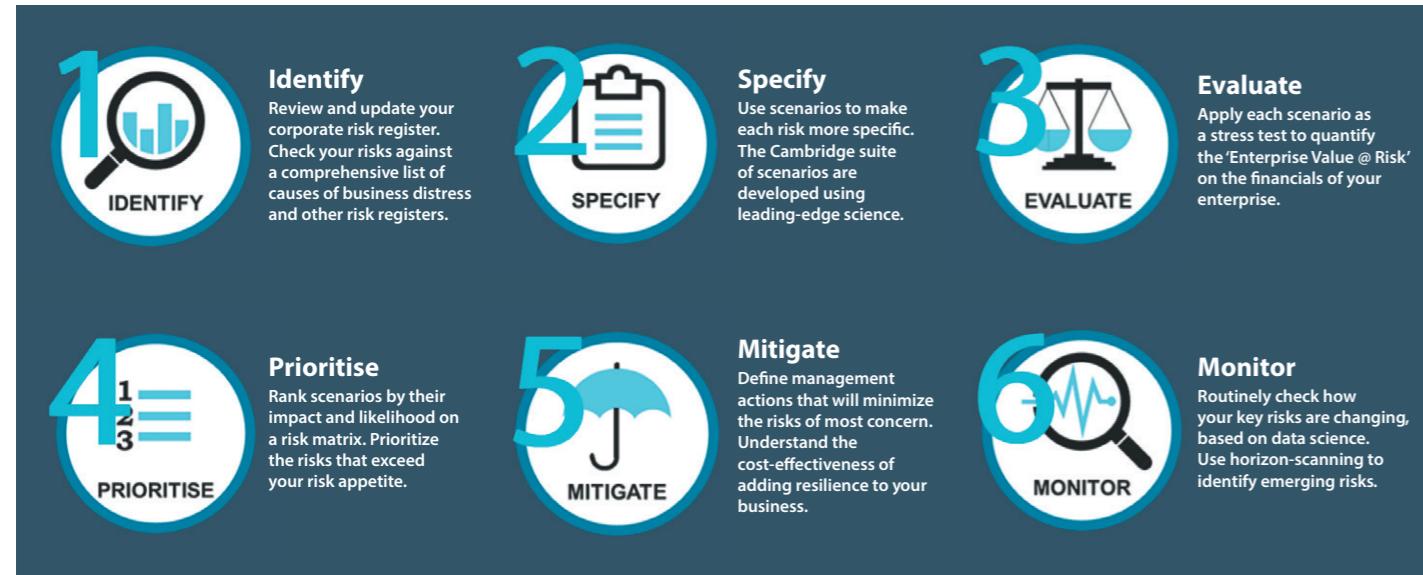
Cambridge Business Risk Hub is a business-ready platform that hosts our risk management collateral including a Taxonomy of Business Risks, Suite of Scenario Stress Tests, Global Risk Indices, Business Intelligence Reports, corporate risk mitigations, and other outputs. This prospectus describes Cambridge's research-based offerings that allow for a more comprehensive view of risks for businesses.



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CAMBRIDGE RISK METHODOLOGY FOR MANAGING CORPORATE RISKS

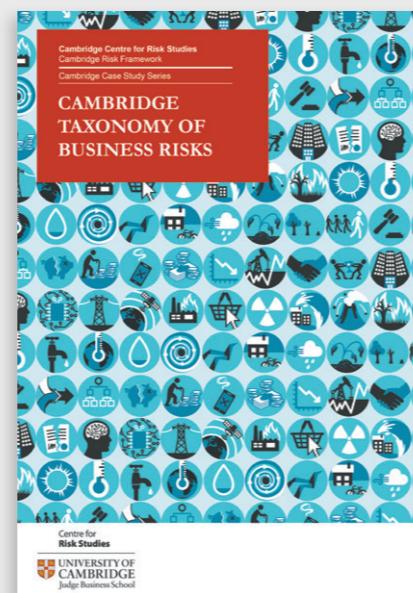


A comprehensive risk study comprises the six steps. This methodology includes a business risk taxonomy, scenario stress tests to assess risk exposures and the value of mitigations, and a realtime monitoring component to track future changes.

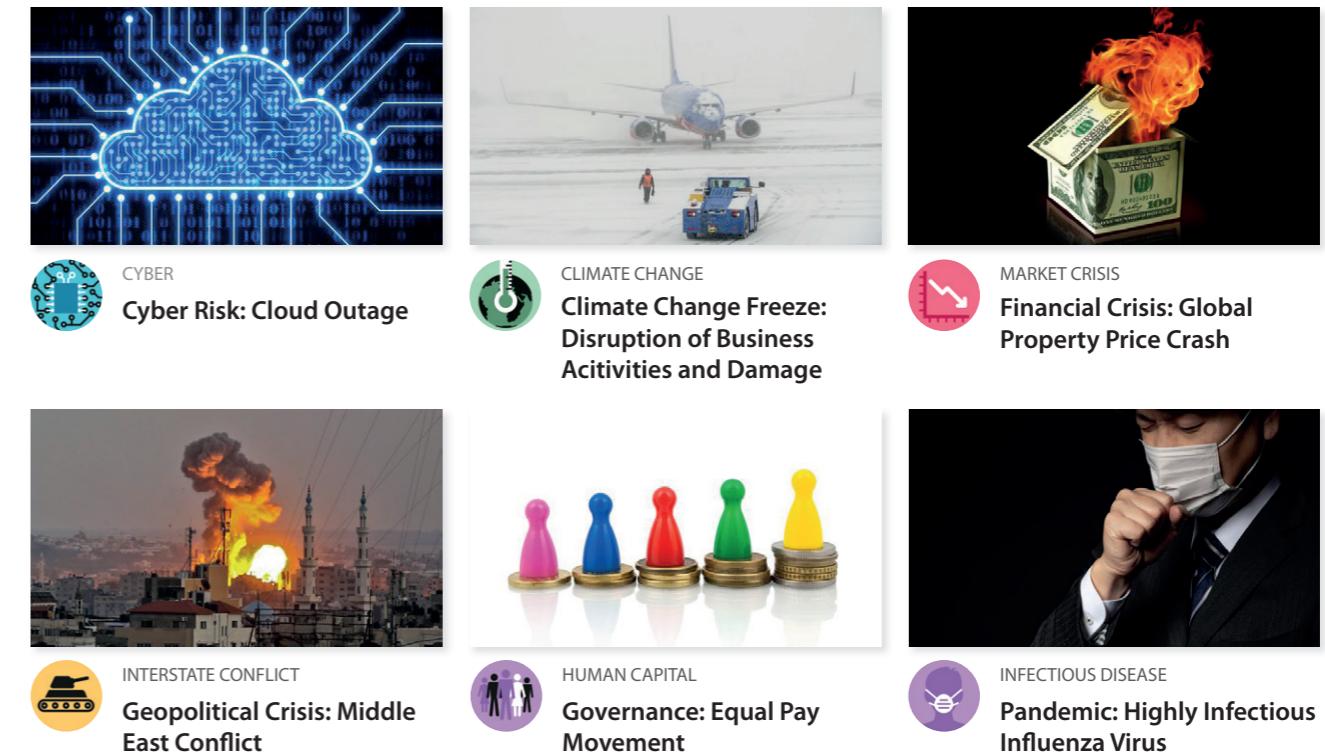
CAMBRIDGE TAXONOMY OF BUSINESS RISKS

Organisations find value in referencing a comprehensive register of risks as part of their risk management processes. The Cambridge Taxonomy of Business Risks spans the range of threats that could potentially impact a business. It helps identify emerging risks and creates a common language for communicating risks.

The Taxonomy is organized into six broad classes of risks: Financial; Geopolitical; Technology; Social; Environmental; and Governance. It is derived from several areas of study: observations of actual examples of causes of corporate distress (Cambridge Corporate Distress Catalogue); reviews of the self-declared risk registers made public by companies in their regulatory filings (Cambridge Risk Register Resource); and extensive literature review and analysis of causes of economic and social disruption throughout a long period of history. Full details are described in *Cambridge Taxonomy of Business Risks*.



CAMBRIDGE SUITE OF BUSINESS RISK SCENARIOS



Are scenarios part of your company's risk management planning? Scenarios are valued by management for developing and capturing creative thinking about plausible futures and challenging the business-as-usual mentality in the context of risks.

These strategic and operational stress tests can form the basis for organisational risk assessments and facilitate reporting, management, and mitigation of risks; and ultimately rationalise investment in resilience. Corporate boards also find scenarios useful when reviewing the emerging and principal risks of companies.

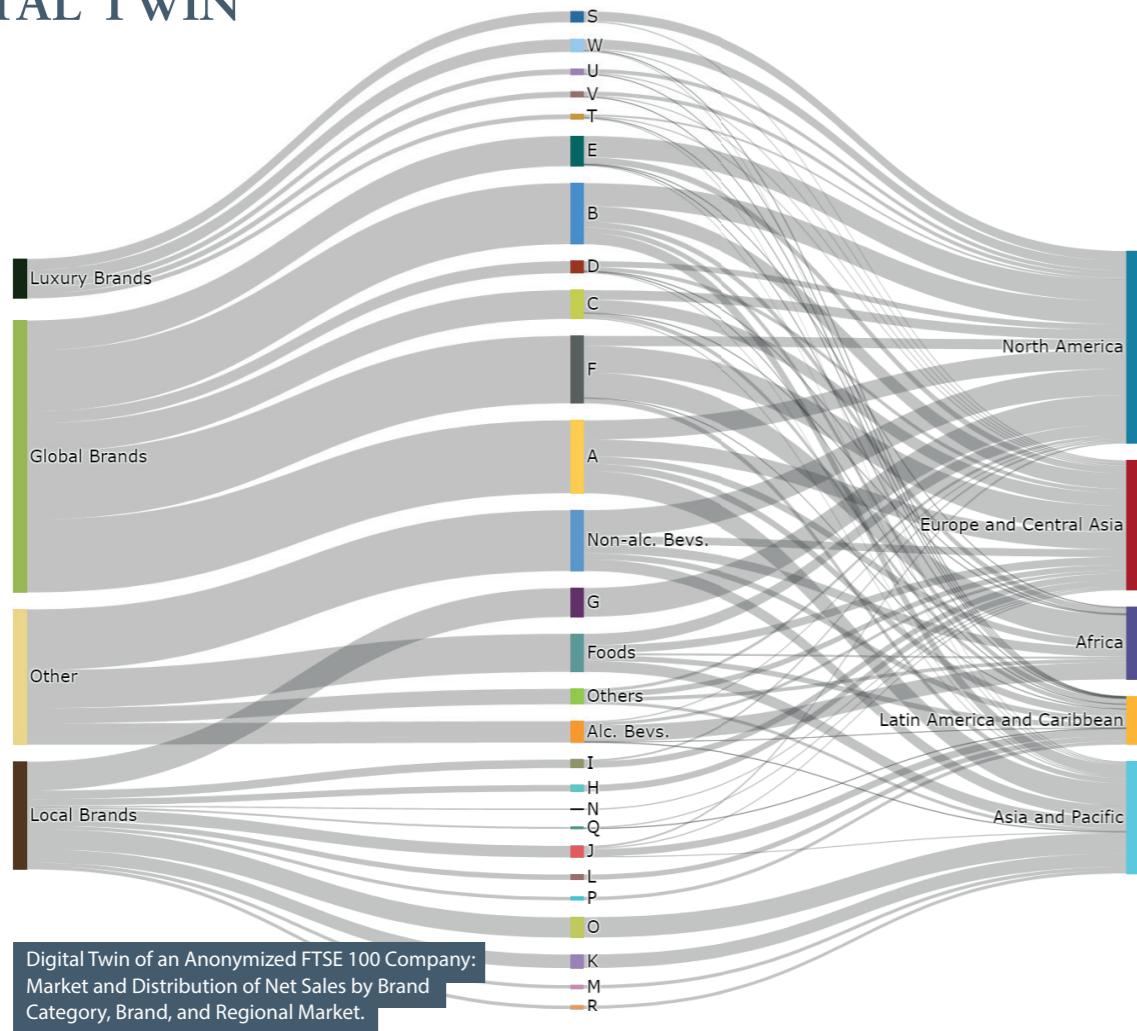
Cambridge presents a selection of scenarios referenced by risk and strategy groups in global companies to stress test their own plans and balance sheets. A scenario highlights a risk type within our Taxonomy. Access the **Cambridge Suite of Business Risk Scenarios** to help stress test your company.

CAMBRIDGE TAXONOMY OF BUSINESS RISKS



ANALYSING SCENARIO IMPACTS

A COMPANY AND ITS DIGITAL TWIN



Strategy groups are increasingly factoring in emerging risks to road-test their plans using scenario sets. While a risk lens can offer focus, it is not always clear how to align this view with measurable business relevant. A Digital Twin of a company can help translate a company's "stresses" referred to as principal risks to provide a quantified view of real balance sheet consequences. The ability to exercise a digital rendition of a company can allow for faster stress testing against a broad range of scenarios. We propose five key attributes for a Digital Twin of a company that best allow for a quantitative risk picture:

- Balance sheet and future five-year future cash flow
- Market and distributions
- Product mappings
- Production and manufacturing footprints
- Supply chain deconstruction

MEASURING QUANTITATIVE IMPACTS OF RISK SCENARIOS ON A COMPANY

Impact of Risk Scenarios on a Company's Balance Sheet

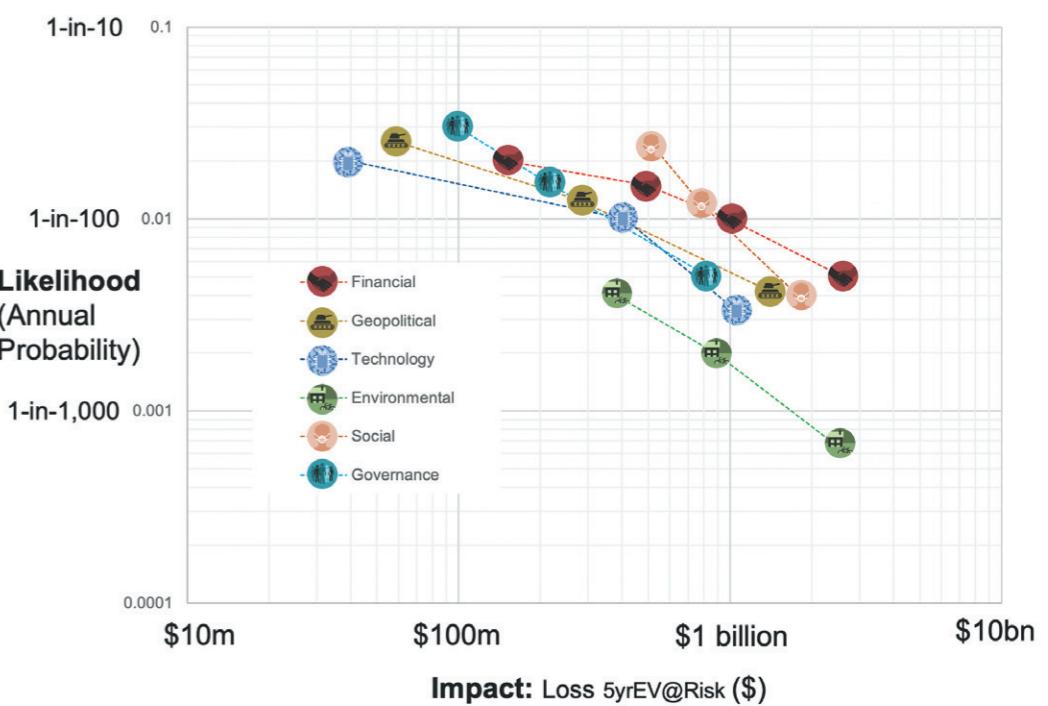


Scenario analysis can produce quantitative results from a balance sheet perspective. A given scenario can be overlayed onto a company's Digital Twin. This union allows for a logic-tree approach to assessing how causal processes triggered by the scenario will affect key components of the financial balance sheet of the company. A baseline view of the balance sheet is compared to post-scenario results. The difference between the two represents the impact of the scenario.

RISK APPETITE AND TOLERANCE

How do you discuss risk appetite and tolerance? Overlays of scenario results provide a quantitative view of a scenario likelihood and impact on a company. Risk appetite is defined by the level of loss, relative to the likelihood of it occurring. This enhanced risk matrix brings objectiveness when engaging in strategic and operational discussions.

The criteria for risk tolerance are not purely financial. Some types of risks may be more acceptable than others qualitatively. Risks that are associated with potential rewards to a company – operating in a high risk country that generates high margin business for example – may have a higher risk tolerance.



RISK MITIGATION ACTIONS

A clear risk picture and effective management actions go hand-in-hand. Risk mitigation actions take two types:

- Threat-specific: Efforts to diffuse the company's vulnerability to an identified driver of risk
- Resilience-strengthening: Generic measures to improve the ability of the company to withstand shocks from any source

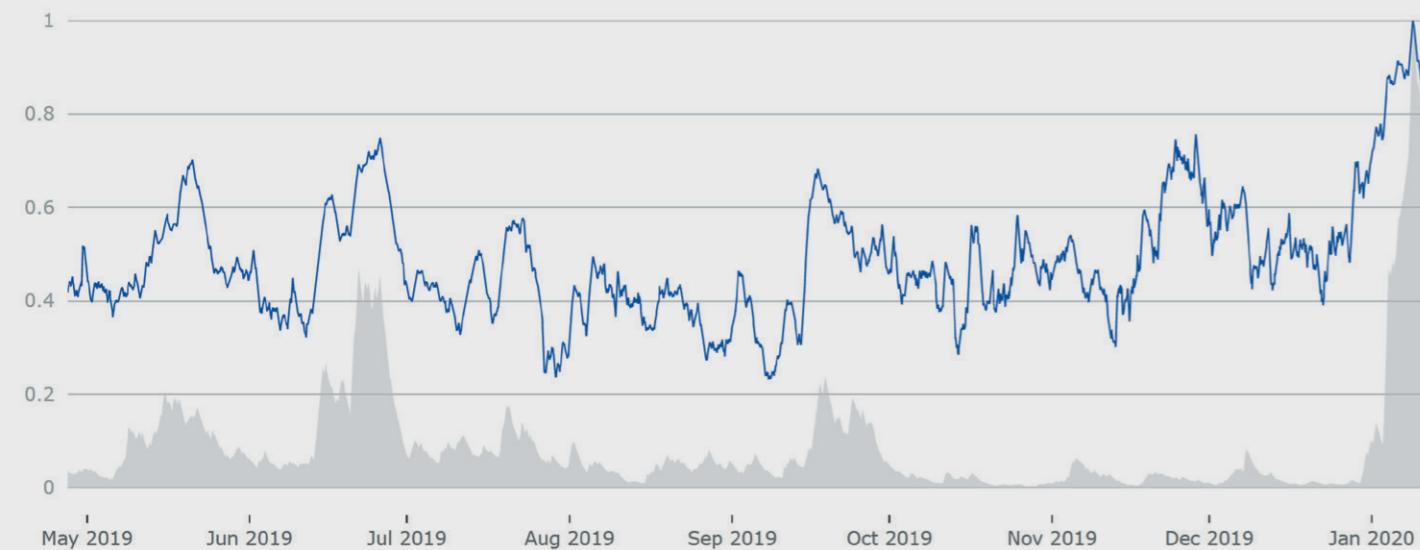
For many companies, tariff wars with countries supplying critical raw materials could be catastrophic. Proposed management plans to reduce the potential consequences might include alternate sourcing, in which case, this new attribute would be reflected within the risk matrix. Additional costs and reduced margins incurred by switching suppliers would be visible against the baseline risks.

Effects of management action can reduce the strategic and catastrophic risks identified by the analysis, and bring them down below the risk tolerance thresholds mandated by senior management.

CAMBRIDGE RISK ALERTS

How does your company gain insights into a changing world and risk landscape? Using a risk lens, our analysts evaluate news events and update risk profiles to manage a company's risks.

Risk Alerts: Iran vs US Geopolitical Tensions



The other risks that have been identified as 'Risks of Concern' are put on a monitor watch, to be reassessed every three months. The likelihood of each of these scenarios is reviewed on a routine basis. Options for greater intervention could be exercised should the likelihood and consequences of these risks increase significantly to put them over the defined tolerance level. The power of mitigation actions and further management planning could then be realised.

CAMBRIDGE RISK METHODOLOGY

The Cambridge Risk Methodology uses quantitative analysis to illustrate the balance sheet impact of defined scenarios on the digital twin of a company. The methodology makes it possible to quantify risk exposure in comparison to risk appetite, and build the data and analytics to monitor a firm's performance relative to its risk appetite thresholds. This approach enables an integrated view across all risks facing an organisation.

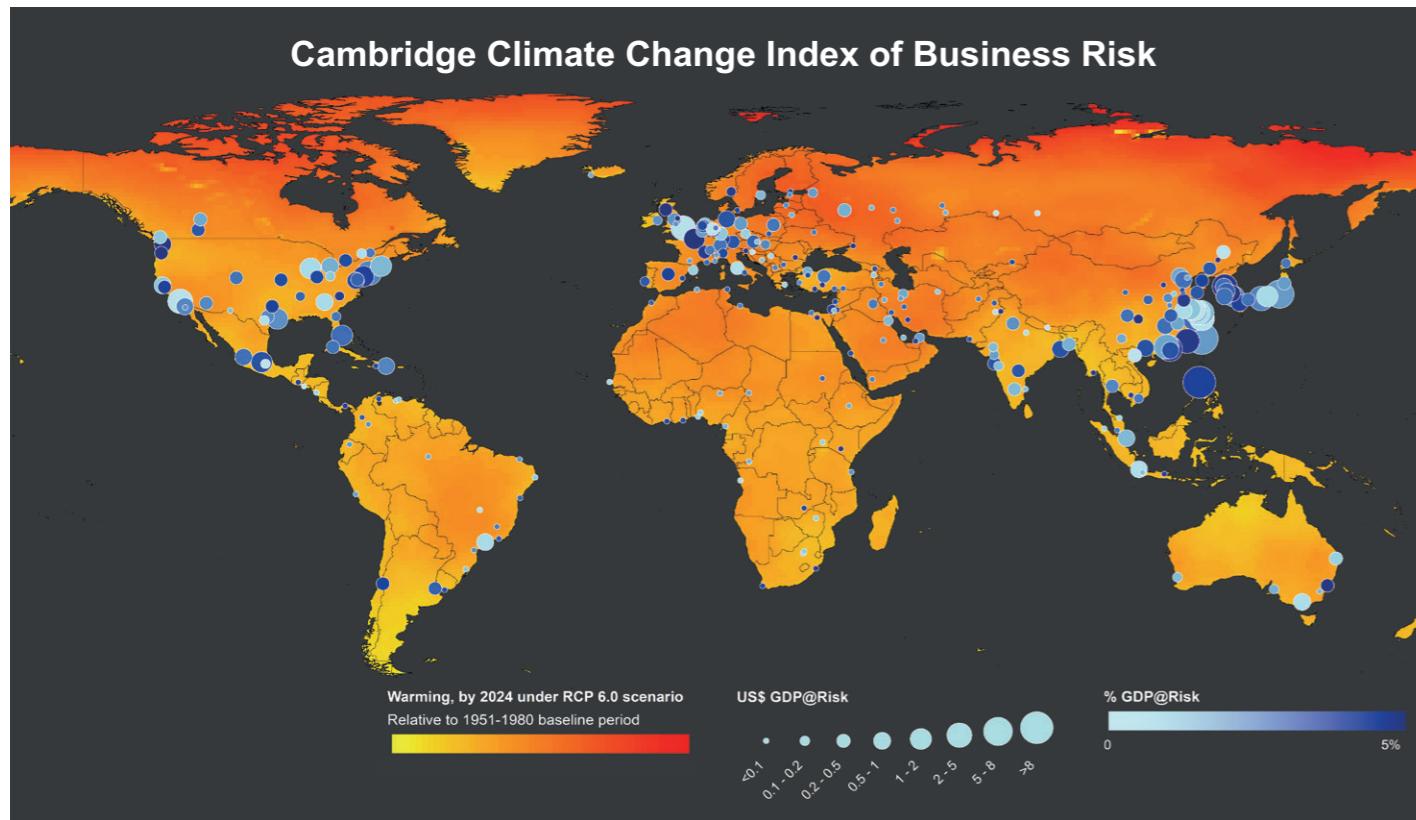
Related publications and case studies referencing the Cambridge Risk Methodology include:

- *Risk Management for the Consumer Sectors*
- *Scenario Applications: Stress Testing Companies in the Energy Value Chain*
- *Risk Management Perspectives of Global Corporations*



A SPOTLIGHT ON KEY RESEARCH THEMES

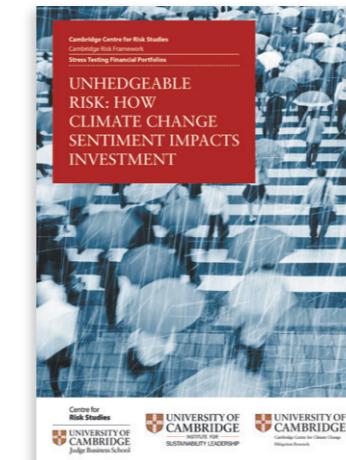
BUSINESS RISK FROM CLIMATE CHANGE



The business risk from Climate Change is a growing concern for companies. The business community seeks to better understand the realities of climate change on their business that go far past their corporate social responsibility initiatives. The Cambridge Risk Methodology and its Climate Change Business Risk Index contribute objective measures to the physical, transition, and liability elements of business risk.

Cambridge collaborates with companies to better understand these factors: actions to undertake for sustainability, and commercial and competitive reasons, regulatory requirements, potential liabilities they may face, and meeting societal expectations. Many are considering their corporate social responsibility and accountability to shareholders, customers, and other stakeholders. An increasing number of companies are participating in the Task Force for Climate-related Financial Disclosures (TCFD) to consider and disclose their climate-related risks.

The application and analysis of various climate related scenarios are described in *Unhedgeable Risk: How Climate Change Sentiment Impacts Investment*



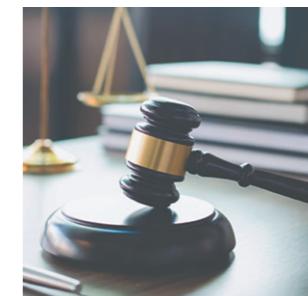
Cambridge Toolkit for Business Risk from Climate Change



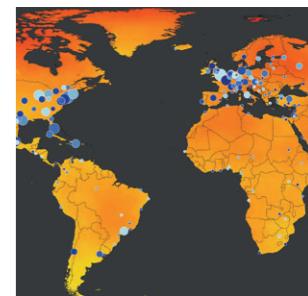
Physical Risk Disruption Models



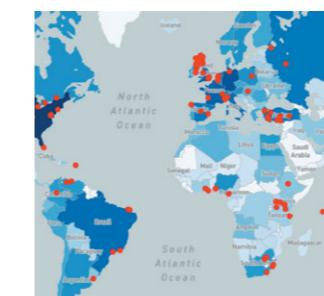
Transition Risk Scenario Suite



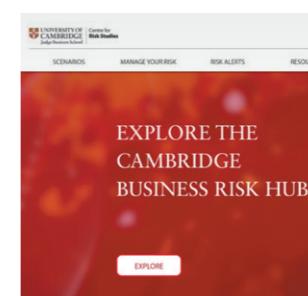
Liability Risk Scenario Suite



Climate Change Business Risk Index



Digital Twin Schema Corporate Data Standard for Input Information



Cloud-Based Analysis Platform



Dashboard Interface for Company Clients

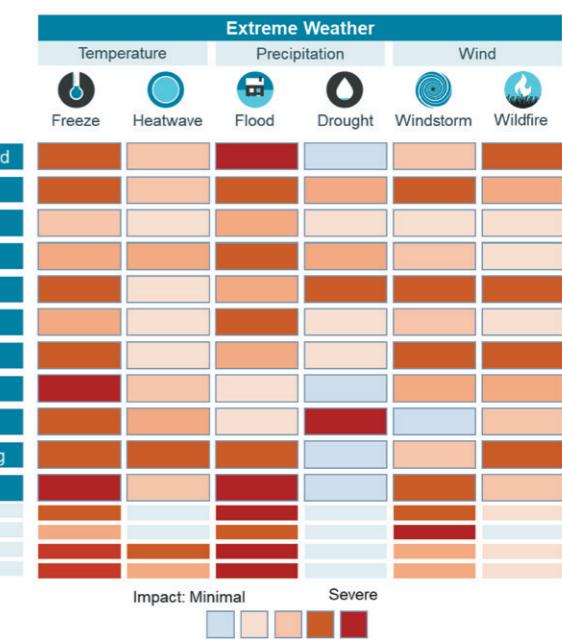


Interactive Business Risk Consulting Tool

Cambridge Evidence Base for Business Impacts from Climate Change

Cambridge maintains a historical catalogue of impacts on business activity from Climate Change consequences. This data is used to compile 'vulnerability functions' for business activity change with different weather metrics and includes socio-economic changes as well as customer purchasing preferences being driven by attitudes to corporate climate change actions. Other considerations include:

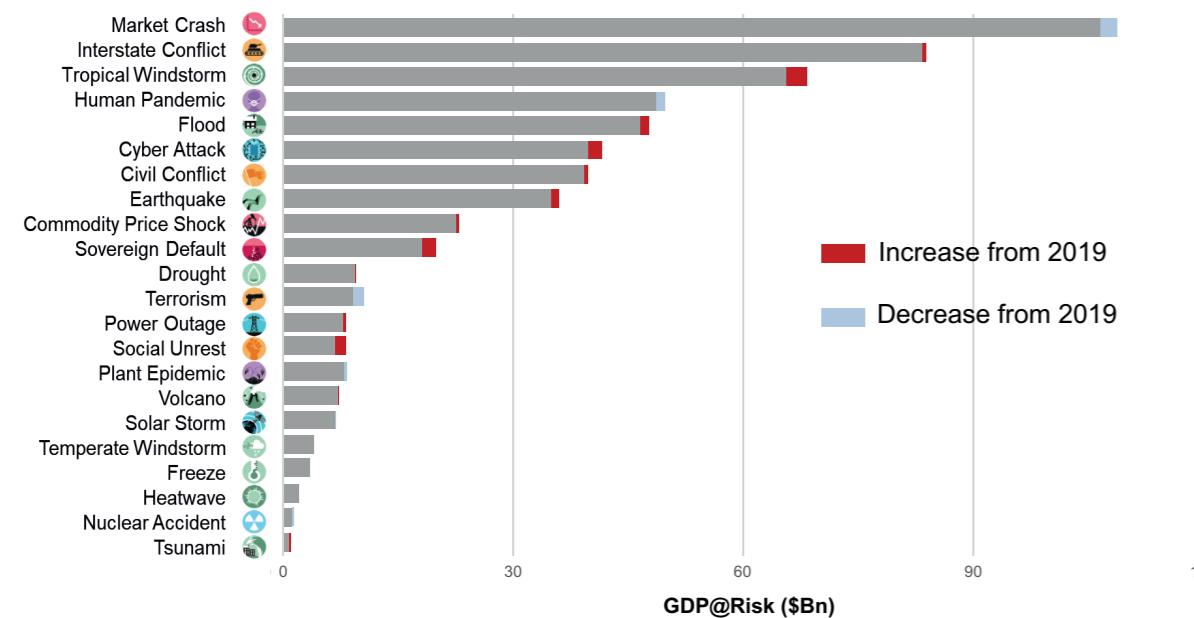
- Impacts on businesses from regulatory changes and cost burdens from sustainability compliance
- Litigation information and status
- Share price reductions from divestment and investor attitude changes



A SPOTLIGHT ON KEY RESEARCH THEMES

CAMBRIDGE GLOBAL RISK INDICES

2020 Global Risk Index by Threat Type



Given the international footprint of global companies from their supply through demand, a world view of risk is critical. The Cambridge Global Risk Indices (CGRIs) are a de facto standard for multi-threat comparisons across 279 cities representing nearly half of the world's economic output.

GDP@Risk is a novel risk metric originated by Cambridge. The annual updates of the Cambridge Global Risk Indices receive wide coverage from a variety of media channels such as the Financial Times, New York Times, CNBC, Forbes, CNN, Reuters, U.S. News & World Reports, Marketwatch, Japan Times, and numerous other news outlets and online platforms. Application areas include the following:

- Corporate risk profiling and management
- Resilience analysis resulting from climate change
- Global economic modelling
- Major trends in modern economic progress
- Municipal bond structures
- Policy-making implications
- Risk transfer and the insurance industry
- Financial solutions to improve risk management in the economy
- Protection gaps where conventional risk transfer products are not available

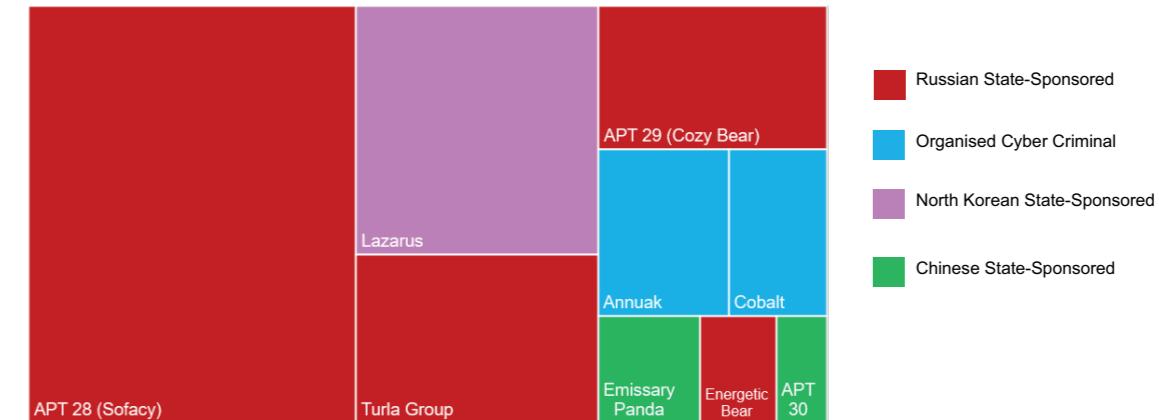
Related publications referencing the Cambridge Global Risk Indices include:

- *Cambridge Global Risk Outlook 2020*
- *Disaster Recovery Case Studies: UK Floods of 2007*
- *Disaster Recovery Case Studies: Germany Floods of 2013*



CYBER RISK OUTLOOK FOR BUSINESSES

Activity Metrics for Named Cyber Threat Actors



Based on identified malware incidents with signatures, infrastructure compromise information and other sources

The cyber risk for all businesses is changing rapidly due to explosive growth in digital attack surfaces as companies take advantage of digital efficiencies. Companies are increasingly digitising their supply chains, posing a threat to network security of all devices trusted by the network. Malicious software continues to pose a threat to corporations. Distributed denial of service (DDoS) attacks increased by 40 per cent in 2018 with large organisations facing an average of eight attacks per day.

Cambridge takes an objective perspective in identifying key trends in cyber risk to minimise cyber-induced business interruption, corruption of supply chains, theft of intellectual property, reputational damage, regulatory fines, and mitigation costs for companies. Highly capitalised corporations are especially vulnerable to state-sponsored cyber activities as these actors see economic opportunity and potential to gain advanced knowledge.

Related publications on Cambridge's cyber risk research include:

- *Cyber Risk Outlook 2019*
- *Business Blackout: Insurance Implications of a Cyber Attack on the US power grid*
- *Shen Attack: Cyber Risk in Asia Pacific Ports*
- *Bashe Attack: Global Infection by Contagious Malware*



THE EXECUTIVE LEADERSHIP AT CAMBRIDGE

Cambridge's Leadership Combines Academic Excellence with Industry Experience



Professor Daniel Ralph,
Academic Director

Dr Andrew Coburn, Chief Scientist

Dr Michelle Tuveson, Chairman & Executive Director

Simon Ruffle, Director of Research and Innovation

ADVISORY BOARD MEMBERS AT CAMBRIDGE

Business Leaders Bring International Perspectives to Help Guide Risk Research



Steve Coates, Chief Underwriting Officer, Pool Re
Jason Davies, Chief Audit and Risk Officer, Tesco
Rowan Douglas, CEO Capital, Science and Policy Practice, Willis Towers Watson
Brad Fischstrom, Chief Risk Officer, AIG
Jonathon Gale, Chief Underwriting Officer, Reinsurance, Axa XL
Anna-Marie Greenaway, Global Director, International University Partnerships, BP plc
Trevor Maynard, Head of Innovation, Lloyd's

Aleksander Petrov, Senior Partner, McKinsey & Company
Andrew Pitt, Global Head of Research, Citi Investment Research, London
Mohsen Rahnama, Chief Risk Modelling Officer, RMS
Alan Smith, Global Head of Risk Strategy and Senior Executive Officer, Group Risk; Global Risk, HSBC plc
Dickie Whitaker, CEO, Lighthill Risk Network
Carolyn Williams, Director of Corporate Relations, Institute of Risk Management

THE RESEARCH TEAM AT CAMBRIDGE



The Cambridge Centre for Risk Studies is a research centre of the University of Cambridge Judge Business School. The Centre works closely with business partners in tackling complex issues of management science in risk. This policy of deep engagement has enabled the Centre to develop tools and solutions for businesses. The Centre's leadership combines academic excellence with industry experience.

Research Team

Jennifer Copic, Lead Governance Risk Research
Dr Andy Skelton, Lead Risk Modelling
Oliver Carpenter, Lead Environmental Risk Research
Dr Jennifer Daffron, Lead Technology Risk Research
Ken Deng, Lead Financial Risk Research
Tamara Evan, Lead Geopolitical Risk Research
Dr Timothy Summers, Senior Data Science
James Bourdeau, Geopolitical Risk Research
Timothy Douglas, Risk Modelling
Taryn Hubbard, Risk Research
Jay Chan Do Jung, Economic Risk Modelling
Dr Scott Kelly, Economic Risk Modelling
Eireann Leverett, Cyber Risk Modelling
Dr Duncan Needham, Financial History Research
Oliver Pearson, Risk Markets Research
William Turner, Data Science
Jayne Tooke, Communications and Events

Advisors and Fellows

Professor Kern Alexander, Senior Advisor for Financial Services and Regulation
Dr Paul Burgess, Senior Advisor for Risk Management
Lee Coppack, Senior Advisor, Insurance & Risk Media
Andrew Freeman, Risk Fellow
Dr Rainer Sachs, Senior Advisor for Insurance Solutions
Nick Wildgoose, Senior Advisor for Supply Chain Management

Publication Citation:

Cambridge Centre for Risk Studies, 2020. *Cambridge Prospectus on Risk Management: Increasing Business Resilience*. Cambridge Centre for Risk Studies at the University of Cambridge Judge Business School

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Cambridge Centre for Risk Studies

University of Cambridge Judge Business School
Trumpington Street

Cambridge CB2 1AG United Kingdom

enquiries.risk@jbs.cam.ac.uk

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