

Cambridge Centre for Risk Studies

Cambridge Risk Framework

RISK MANAGEMENT PERSPECTIVES OF GLOBAL CORPORATIONS

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School



Developing risk professionals

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About the Institute of Risk Management (IRM)

The IRM is the leading professional body for Enterprise Risk Management (ERM). We drive excellence in managing risk to ensure organisations are ready for the opportunities and threats of the future. We do this by providing internationally recognised qualifications and training, publishing research and guidance and setting professional standards.

For over 30 years our qualifications have been the global choice of qualifications for risk professionals and their employers. We are an independent, not for profit body, with members working in all industries, in all risk disciplines and in all sectors around the world.

Foreword from IRM

We are delighted to have had the opportunity to support the Cambridge Centre for Risk Studies in producing this research into the risk management perspectives of global corporations.

IRM is uniquely placed to bring together the practical experience of our expert members with the rigour and insight offered by global centres of academic excellence. This helps us all advance the understanding and practice of risk management for the ultimate benefit of individuals, organisations and society.

As we had anticipated, this research presents some challenges and also offers some guidance for the profession. There is clearly a growing awareness of risks (and opportunities) arising from digital technology, including cyber security. We have also noted the reported scarcity of practical tools to help organisations analyse and manage some of their key reported risk areas. IRM will ensure that our education, training and professional support evolves swiftly to support this new environment.

There are some interesting lessons here about the varied nature of Enterprise Risk Management (ERM) functions in these global corporations, most obviously that there is as yet no accepted view on the mission, scope and ultimately, value, of ERM. However at the same time there appears to be growing take-up of ERM-led approaches like encouraging healthy risk cultures, training and supply chain initiatives. This is a clear challenge that reinforces our determination to spread good practice and help organisations build competency to manage their risks effectively.

We also note that these global corporations see risk transfer via insurance as an imperfect risk mitigation measure, with a lack of relevant products, capacity and tailoring cited as limitations on the use of insurance within their ERM programmes. However there is opportunity here for the insurance industry and we call on insurers to respond and remain relevant by utilising technology and developing ‘insurtech’ solutions in partnership with the risk profession.

We are now looking forward to the next phase of the research in 2019 which will take a deeper look at risk management practices in the value chains for the energy and retail sector.

I would like to thank all the organisations and individuals who contributed to this work and also the Cambridge team for their focused and thorough approach, bringing some new thinking on concepts and techniques into the risk management space.



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Executive Summary

Corporations are a vital component of an economy. Their health and wealth can be potent indicators of the broader state of the relevant economy and society as a whole. Crises in the private sector can provide early warning indications, and occasionally are drivers, of wider and potentially systemic failures. Within an organisation, good practices in risk management serve to avoid or respond effectively to crises, whereas poor practices may signal weaknesses. In this report, we seek to better understand the risk management perspectives and practices of global corporations.

The research presented in this report is part of the Cambridge Centre for Risk Studies' research track on corporate risk profiling. In partnership with the Institute of Risk Management (IRM), it is informed by views from risk management specialists representing both private and public sectors. The summary and narrative regarding the top risks facing corporations are the result of elicitation through a combination of individual interviews; surveys and real-time polls of audiences at workshops and focus groups; and the in-depth online 2018 Enterprise Risk Management survey. This expanse of inputs paints a broad view of the perceptions of risk at companies and their respective approaches to risk management and mitigation. The general objectives of our overall research programmes are to better understand current views, practices and mitigations of risks at corporations and how they are adapting to meet future challenges and opportunities.

The focus and intention of this report is to better understand the perspectives and practices of risk management at global corporations. We believe that regulations, mandates, structures, and codes governing publicly listed corporations provide commonality for their foundations for risk management practices. We also refer specifically to global versus multinational corporations to focus more on the global nature of exchanges, flows, and connections versus presence at physical locations and sites. We believe the challenges and complexities of risk management brought on by the multi-dimensional nature of global operations are much more significant for this subset of organisations. While this report focusses on global corporations, we expect other organisations including those in the public sector to find considerable overlaps and value the findings.

Vulnerabilities of Corporations

Global trade has been one of the principal drivers of economic growth in recent decades. The world is in a state of peak globalisation as measured by exports and imports as a percentage of gross domestic product for 17 industrialised nations – the low of 7.5% after WWII jumped to 47.2% in the current period. However, the

current situation is not guaranteed to last indefinitely; with renewed challenges to globalism coming from resurgent nationalism, protectionism and rolling back of international trade agreements.

Corporations must contend with both internal and external risks that threaten their business models. They are faced with continuing and growing pressures from a large set of stakeholders and are keenly aware of the many potential negative factors that can impact on corporate profitability and longevity. There has been a reduction in the number of US publicly listed companies from 8,000 in the 1990s to 3,627 in 2017¹, and a reduction from 23 publicly listed companies per million inhabitants in 1975 to 11 in 2016². More fundamentally, only 200 of the top companies by earnings accounted for all the profits in the 2015 US stock market. The remaining 3,281 publicly listed companies lost money.³

2018 Enterprise Risk Management (ERM) Survey Results

The 2018 Enterprise Risk Management (ERM) survey canvassed to the IRM (IRM)⁴ membership and Cambridge's Chief Risk Officer (CRO) and ERM communities. We had 264 survey respondents answering 85 questions in the following categories: Organisational/Company Descriptions, Role in Managing Risk, Risk Governance and Culture, Risk Management Tools and Processes, Crisis Response Capabilities and Risk Mitigation Strategies. The survey reports various characteristics of respondents' companies and roles, without reference to individual or organisational identities. Company size by annual sales is reported as follows in **figure A**:

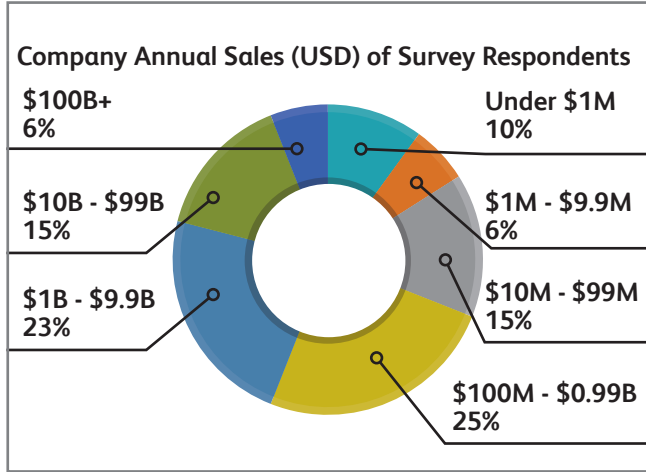
¹ ("CRSP - The Center for Research in Security Prices" n.d.)

² (Stulz 2018)

³ (Sommer 2018)

⁴ ("Institute of Risk Management," n.d.)

Figure A: Company Annual Sales of Survey Respondents

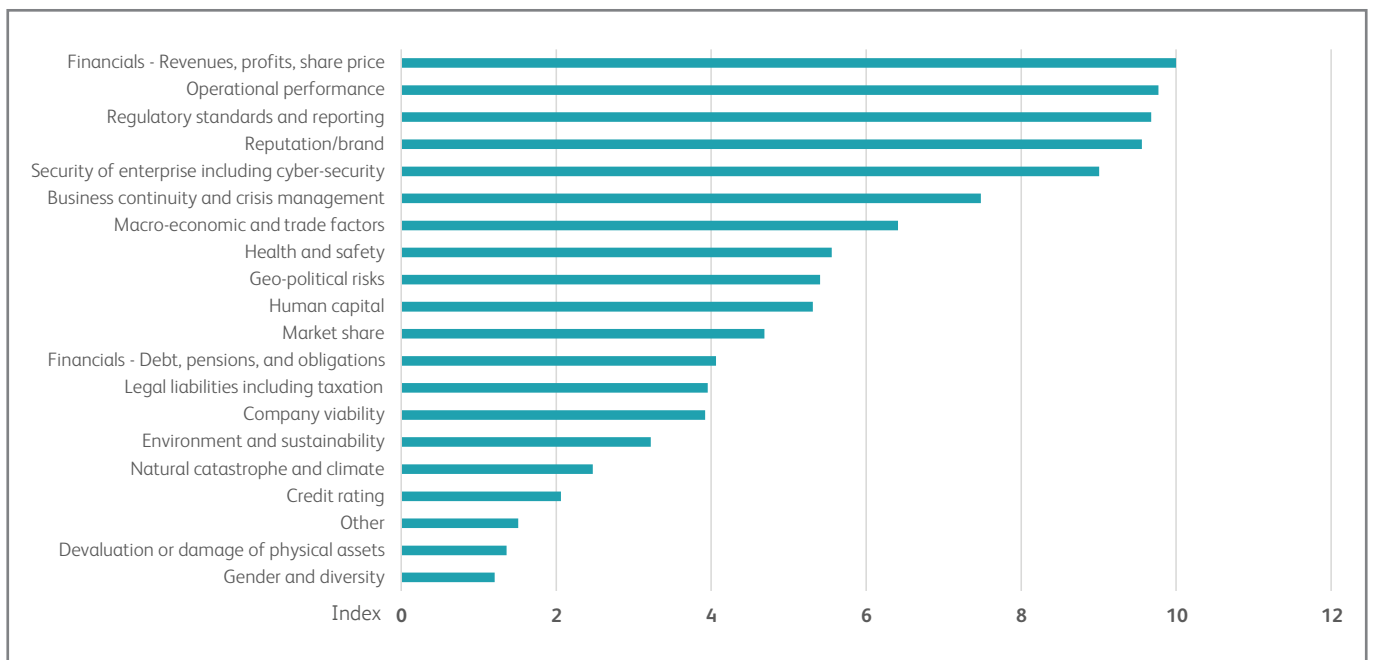


Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Survey respondents also reported their top five countries of responsibility. The most represented countries include US, UK, Germany and China. These are followed by Africa and Europe, excluding Germany.

Respondents ranked their top risks facing their companies for a twelve month time horizon as a point of reference. The top five risks in this year’s survey include (1) Financials, revenues, profits, share price, (2) Operational performance, (3) Regulatory standards and reporting, (4) Reputation/brand, (5) Security of enterprise including cyber security. We note that Gender and diversity risk is ranked at the bottom of risks by survey respondents across all sectors. Despite its low prioritisation, we believe its growing visibility makes it worth highlighting in this report. See below for a full list of risks and their rankings.

Top Enterprise Risks of Potential Concern for Companies in the Next 12 Months.

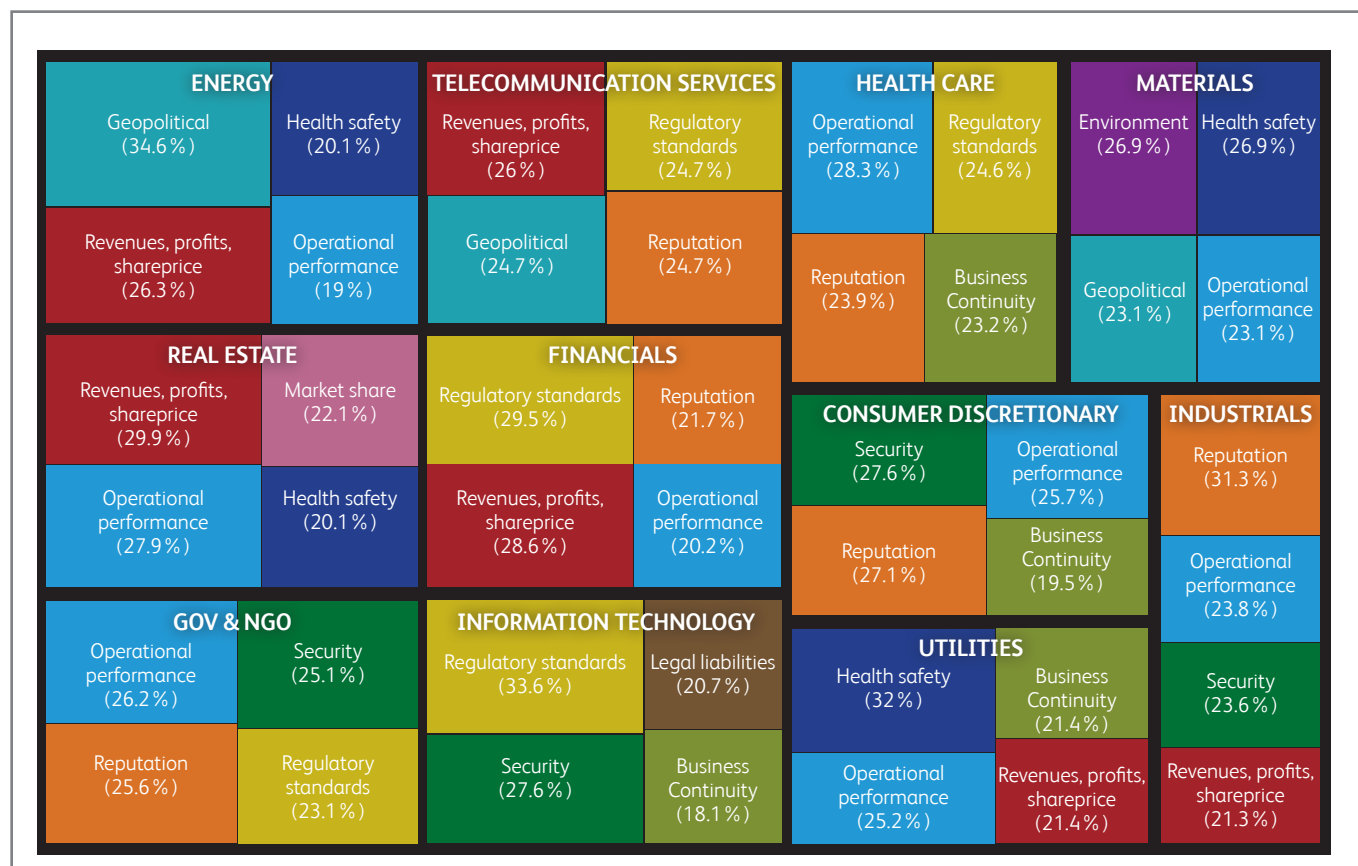


Source: Cambridge Centre for Risk Studies 2018 ERM Survey. See Appendix A for index description

Sector Considerations of Top Risks

We report top risks by business sector using the Global Industry Classification Standard (GICS)⁵. The top four enterprise risks are displayed by each GICS sector in the sector view graphic below. The top enterprise wide risks are heavily represented across most sectors such as Financial risk and Reputation risk. However certain risks are sector specific. Although Geopolitical risk is relatively low ranking (9 out of 10) by survey respondents, sectors such as Energy, Telecommunications and Materials rank it highly. Regulatory Standards risk is the highest risk for the Financials and Information Technology sectors and the second highest for Healthcare and Telecommunications.

Sector View of Top Enterprise Risks for Companies.



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

⁵ ("GICS - MSCI" n.d.)

Exploration of Risks through Scenario Analysis

Scenario analysis is a common approach used by managers to view their organisations in an imagined state and to help plan for uncertainty in both business and global environments. Of the survey respondents, 63% report usage of scenarios as part of their business risk analyses. Business stress test scenarios are prominent as part of business continuity assessment and training. Longer term or strategic scenarios are typical in scenario planning, which looks at the impact of societal change, driven by underlying forces or trends, on a business. Scenario application areas reported by survey respondents are summarised below:

Scenario Application Areas

Annual supplier renewal and reviews

Capital allocations and reviews

Content for annual reports and viability statements

Information Technology infrastructure

Insurance/reinsurance purchasing

Operational capability and business continuity

Preparedness planning

Risk tolerance and appetite benchmarking

Strategic planning and market assessments

Percent of Dedicated Risk Management Tools per Risk Area.

Risk Area	Percent with Dedicated Tools
Financials – Revenues, profits, share price	65%
Operational performance	57%
Business continuity and crisis management	55%
Health and safety	52%
Security of enterprise including cyber-security	52%
Financials – Debt, pensions and obligations	50%
Regulatory standards and reporting	49%
Human capital	38%
Legal liabilities including taxation	35%
Credit rating	31%
Reputation/brand	31%
Environment and sustainability	27%
Company viability	26%
Market share	24%
Macro-economic and trade factors	19%
Natural catastrophe and climate	19%
Devaluation or damage of physical assets	18%
Geopolitical risks	14%

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Risk Management Tools

Interview participants indicate that appropriate market tools are limited in their capacity to satisfy their requirements and address many of the top risks faced by a company. Many risk managers report that spreadsheets and other self-designed tools are the primary tools in use to support their requirements. Senior executives from risk and business functions note that different risks have different timelines and parameters for effective comparisons.

The percentage of survey respondents having dedicated tools, analytics and models to address the top risks are listed below. What is particularly interesting is the lack of maturity in the development of tools to support the risks that feature in the top ten list. Frameworks and tools are lacking for Geopolitical risks, Reputation, Company viability, and Macroeconomic and trade factors.

Top Mitigation Strategies

Survey respondents ranked the top 10 most important risk mitigation strategies that their companies are currently planning. The top mitigation strategies include increased training around the company's critical operations, balancing staff and strengthening risk culture. Respondents recommend specific strategies for mitigations such as adjusting product offerings, changing geographical footprint of operations, divesting business units and modifying supply chains.

Role of Insurance in Risk Management

Survey respondents report little overlap between the activities of ERM teams and those involved in insurance purchasing and suggest there is considerable organisational distance between the two departments. Descriptions of

the limitations of insurance as an effective risk mitigation solution range from the lack of relevant products, unavailability of appropriate scale and absence of bespoke sector specific insurance products. The process of purchasing insurance is characterised as being inefficient and lacking transparency. Liability insurance, particularly non-damage business interruption, is viewed as being poorly served by the current offerings.

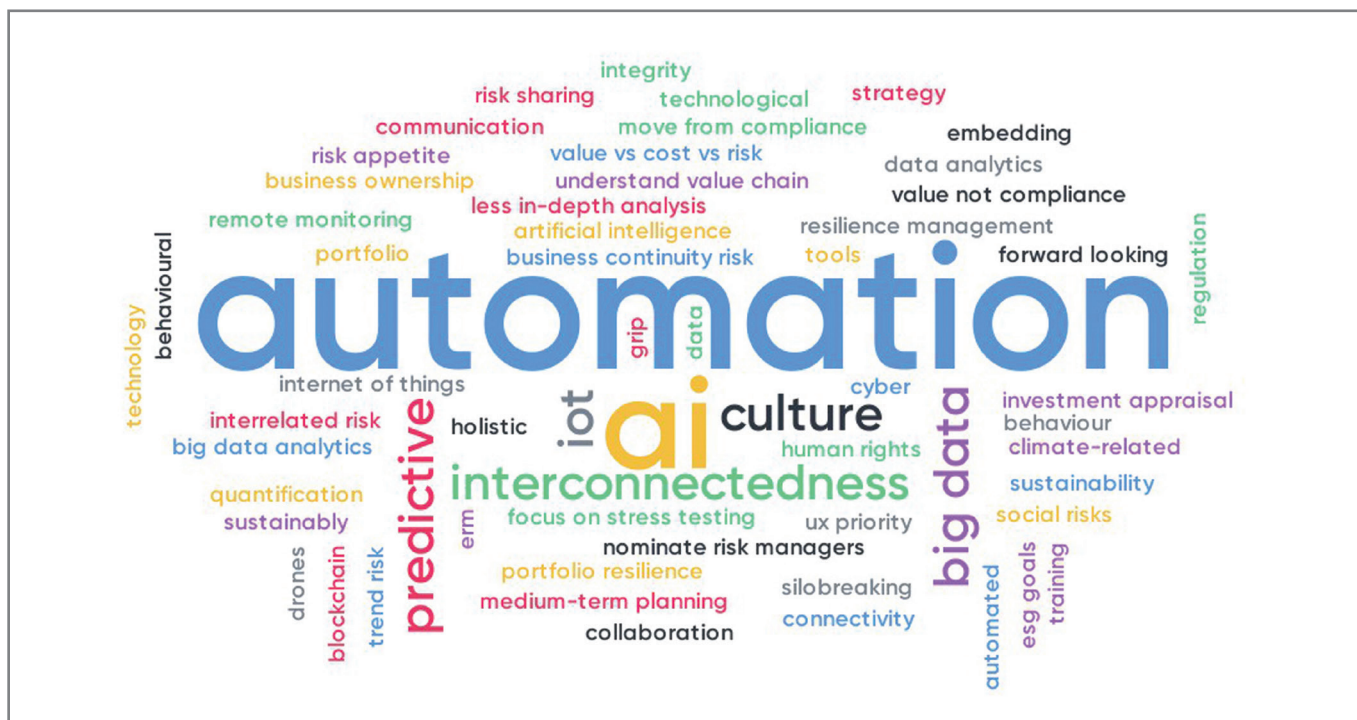
The organisational distance between risk management and insurance purchasing may be a real and continuing obstacle for companies to consider the full basket of risk mitigation tools and strategies. Interviewees feel there is considerable hope for 'insurtech' solutions and greater access to technology to bridge the gap.

Future Perspectives

While there are growing challenges in the global environment, improvements in culture, automation, transparency, modelling and data analytics give reason for optimism. Participants in our research particularly highlight the central theme of disruptive technology in the form of artificial intelligence (AI), robotics and a general increase in automation. Referred to by many as the Fourth Industrial Revolution, this new phase of development for society foresees that artificial intelligence (AI) will drive automation beyond warehousing and assembly lines into the workforce at large. This will revolutionise employment practices and opportunities in entire sectors, indeed nations. At the same time, the growth of digital technology will come with unpredictable growth in the threat of disruption or damage from cyber accidents or cyber attacks. Risk teams at senior levels of organisations are called on to recognise and manage the risk of uncertainty associated with this new order and the challenges to our understanding of privacy, governance, corporate identity, and organisational structures.

Below is a consolidated word cloud showcasing responses from a collection of focus groups regarding the next wave of change in risk management. While figurative, the collection of words conveys the expanse of risks facing corporations both in terms of identification and management.

Next Wave of Change for the Field of Risk Management.



Source: Cambridge Centre for Risk Studies

Section 1: Introduction

The analysis presented in this report is part of the Cambridge Centre for Risk Studies' research track on corporate risk profiling. In partnership with the IRM, it is informed by views from risk management specialists representing both private and public sectors. The summary and narrative regarding the top risks facing corporations are the result of elicitation through a combination of individual interviews; surveys and realtime polls of audiences at workshops and focus groups; and the in-depth online 2018 Enterprise Risk Management survey. This expanse of inputs paints a broad view of the perceptions of risk at companies and their respective approaches to risk management and mitigation. The general objectives of our overall research programmes are to better understand current views, practices and mitigations of risks at corporations and how they are adapting to meet future challenges and opportunities.

There is more publicly available data on companies in the US and Europe than other regions and literature and media coverage of business activities and reporting in these regions tend to follow suit. Likewise, the data and analysis in this report has greater focus on sectors and companies located in the US and Europe. This report addresses insurance related risk management where appropriate but is not an insurance focussed view of risk management.

The focus and intention of this report is to better understand the perspectives and practices of risk management at global corporations. We believe that regulations, mandates, structures, and codes governing publicly listed corporations provide commonality for their foundations for risk management practices. We also refer specifically to global versus multinational corporations to focus more on the global nature of exchanges, flows, and connections versus presence at physical locations and sites. We believe the challenges and complexities of risk management brought on by the multi-dimensional nature of global operations are much more significant for this subset of organisations. While this report focusses on global corporations, we expect other organisations including those in the public sector to find considerable overlaps and value the findings.

The broader objective of this research is to better understand how corporations are adapting their current views and practices to meet future challenges and opportunities in risk management. This report reviews that journey by presenting a collection of perspectives of risk managers as added narratives to the quantitative analysis of the data collected from the 2018 ERM survey. The survey was administered to the IRM (IRM)⁶ membership and Cambridge's Chief Risk Officer (CRO) and ERM communities. The aims of this report are the following:

- Review top risks concerning global companies as synthesised from survey respondents and expert

interviews;

- Report on views of global companies in recognising, managing and mitigating their risks;
- Summarise the emerging or trend risks which will challenge future ERM teams.

Corporations are a vital component of an economy. Their health and wealth can be potent indicators of the broader state of the relevant economy and society as a whole. Crises in the private sector can provide early warning indications and occasionally are drivers, of wider and potentially systemic failures. Within an organisation, good practices in risk management can serve to avoid or respond effectively to crises, whereas poor practices may signal weaknesses.

How do multi-national corporations effectively identify their sources of risk? For many, risk identification is an art form driven by intuition and gut feel, despite the fact that making risk management decisions drives corporate decisions that have widespread implications on meeting revenue and growth targets. Profiling a corporation's broad set of risks becomes essential in supporting strategy setting and execution. Corporate filings such as the Longer Term Viability Statements⁷ in the UK and Security and Exchange Commission's 10-K⁸ filings in the US are foremost compliance driven but serve as a forum for presenting a corporation's broad set of risks.

Historically, corporate risk managers resided within corporate treasury groups and were largely involved in the management of a company's credit rating, cash flows, exposure to currency or commodity price fluctuations, or insurance purchases. The treasurer's view of the company's risks allowed the company to position itself for stability in earnings and share price. Even today, low volatility in corporate profits signals a premium in the eyes of investors. Prudent management would avoid missing an earnings target, let alone falling into financial distress.

The role of the corporate risk manager has evolved and, in many cases, expanded its mission to have purview over the company's sustainability and viability through its processes of managing operational and strategic risks. This includes governance and sustainability practices over and beyond the organisation's more tactical activities. For many corporations, the responsibilities of senior risk teams have become coordinated and centralised, in order to own and manage the totality of the company's risks.

⁶ ("Institute of Risk Management," n.d.)

⁷ ("UK Corporate Governance Code" 2018)

⁸ ("How to Read a 10-K" 2011)

Section 2: The Present State of Global Corporations

The Globalisation Landscape for Corporations

Corporations today are both contributors to and beneficiaries of an international and interconnected marketplace shaped by globalisation. Global trade has been one of the principal drivers of economic growth in recent decades. The world is in a state of peak globalisation as measured by exports and imports as a percentage of gross domestic product for 17 industrialised nations – the low of 7.5% after World War II jumped to 47.2% in the current period. See **Figure 1**. However, the current period of globalisation is not irreversible. The occurrence of the First and Second World Wars resulted in protectionism that reversed globalisation for half a century. Arguably, the world now faces renewed challenges of resurgent nationalism, protectionism and reverses to international trade agreements.

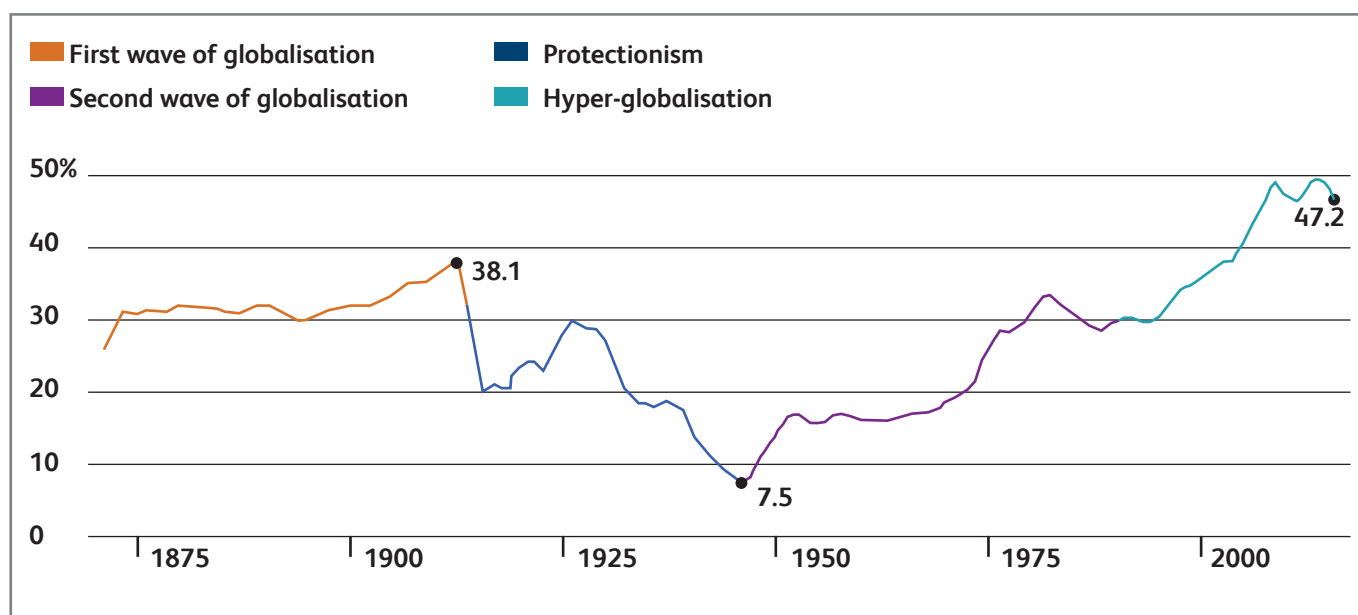
Globalisation has been an engine for growth for both the corporations and the countries they touched. Multi-national corporations provide just 2% of the world’s jobs, however

they own 50% of the world’s supply chains, provide 40% of the value of the Western stock market and own most of the world’s IP.¹⁰

There is a growing challenge for adopting long supply chains given their exposure to geopolitical and logistical risks. “Chasing the lowest labour costs is yesterday’s model”, noted one Fortune 500 chief executive.¹¹ A new philosophy of localisation versus globalisation is gaining traction in corporate strategies.¹² By many accounts, there appears to be a collective retreat from the past trends in globalisation.

The average multi-national corporation today faces very different threats to its business than it did, for example, in the 1980s and 1990s when dominant forms of risk and compliance practices were formed. Overall risk for corporations has increased since then, simply from the effects of a more globalised and closely networked world. A typical multi-national company conducts a wide range of business activities across a geographically dispersed set of functions, operations and customer segments. That privilege entails exposure to a range of threats across multiple legal

Figure 1: Exports and Imports as a Percentage of Gross Domestic Product for 17 Industrialised Nations.



Source: NBER, Barclays, Bank of England, Sunday Times⁹

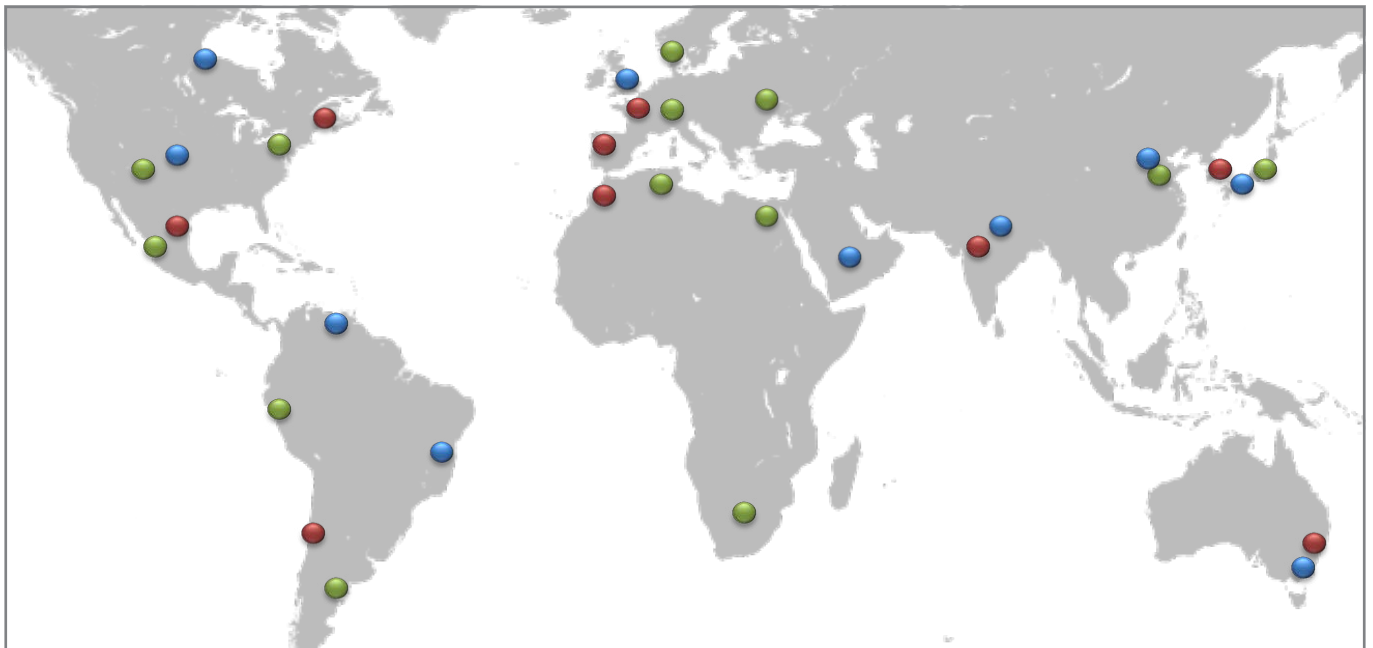
⁹ (Smith 2017)

¹¹ (Tett 2017)

¹⁰ (The Economist 2017)

¹² (King 2017)

Figure 2: National Geographical Footprint of Pharmaceutical Company.



Source: Cambridge Centre for Risk Studies

and regulatory jurisdictions. As one example, **Figure 2** shows a condensed footprint of a representative pharmaceutical company covering its manufacturing, research and development and personnel presence.

Growth of Corporations

Some argue that during the last several decades, corporations have expanded in dominance as measured by their contribution to economic output, ownership of intellectual property and political, educational and cultural influences on society. As a trade-off for the creation of jobs and livelihoods in communities, there has been a level of societal acceptance of what Keynes called “economic statesmanship”. Many corporations have been empowered to be on equal footing with the state and certain corporate controls have passed beyond the confines of private enterprise and into society more broadly.

The publication of Ronald Coase’s “Nature of the Firm”, with its ground-breaking rationalisation of transaction cost economics, helped to explain the rise of the corporation in the following decades. Today, however, Coase’s transaction cost view of the firm has declining applicability, in many instances, due to the equalisation created by digital and technology platforms. Digital progress allows a host of business enterprises to access similar efficiencies; meanwhile, technology platform companies are enjoying scaling that historically has been associated with industrialisation and government programmes. For the

foreseeable future, corporations will continue their societal predominance even as they redefine their rationalisation for existence and models for value creation.

Some argue that the share of economic gains has been realised by large companies at the expense of workers. This “winner takes most” climate has resulted in personal wages and salary income at historic lows, in real terms, while corporate profits remain near record highs as a percentage of gross domestic product. The ratio of median wages to gross domestic product per capita in the US has declined from 1.3 in 1980 to 0.75 in 2017.¹³ Since the Great Financial Crisis, corporate profits in the US have grown at an annualised rate of 6.5 percent.¹⁴ By one estimate, one third of overall increases in US corporate profit margins between 1997 and 2014 are attributed to rising “corporate market power” versus globalisation or other macro-economic effects.¹⁵ Corporate mark-ups – in other words, how much companies are selling their products and services above cost – show concerning secular trends. Average mark-ups rose nearly 50 percentage points between 1980 and 2016 (from 10 per cent to 60 per cent) across advanced economies.^{16,17} See **Figure 3**. This growing trend in concentration of corporate power and resulting decline of workers’ incomes have been credited to the surge of populist movements across advanced economies.

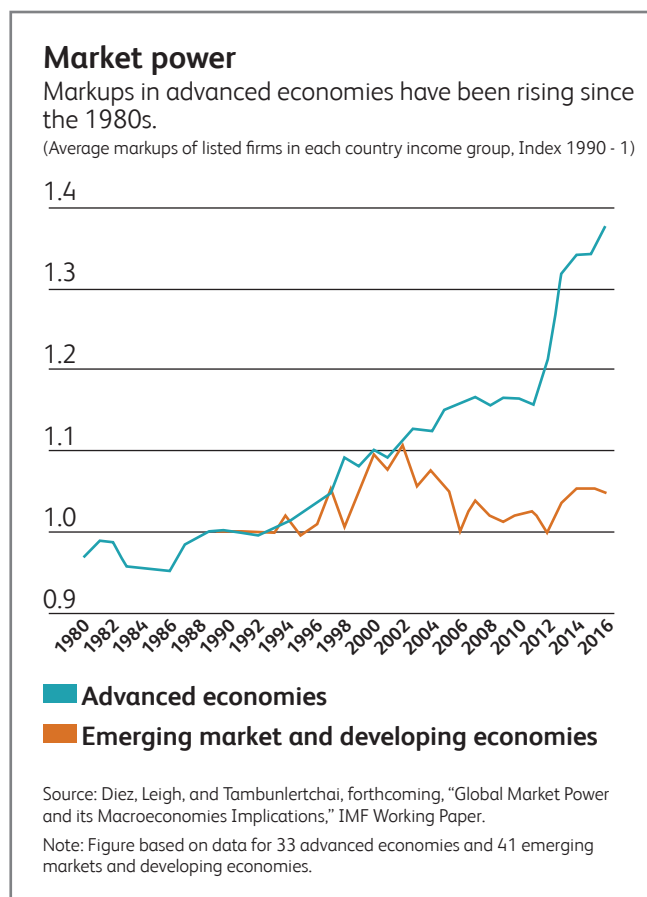
¹³ (De Loecker and Eeckhout 2017)

¹⁴ (Cohen 2018)

¹⁵ (Scaggs and Smith 2018)

¹⁶ (De Loecker and Eeckhout 2017)

Figure 3: Global Market Power: Markups since 1980s.



Source: Díez, Leigh and Tambunlertchai¹⁸

The state of corporate dominance sets a climate that exacerbates citizens' grievances against large corporate entities. In particular, attributions of income inequality to multi-national companies could create backlash and challenge future business models of companies. Governmental initiatives in the US such as the "Accountable Capitalism Act"¹⁹ seek to widen the remit of corporate charters beyond shareholder interests. The Act outlines stricter codes for companies with annual revenues in excess of \$1B by requiring terms such as employee involvement in electing directors and limitations to sales of company shares.

The bi-directional relationship between corporations and communities is recognised and celebrated in many instances. Corporations provide jobs and contribute to local taxes but they also rely on communities for common infrastructure such as roads, utilities and local services to make it attractive for employees. Expectations are rising for enlightened corporate behaviour extending beyond existing corporate social responsibility (CSR) programmes.

Vulnerabilities of Corporations

Corporations must contend with both internal and external risks that threaten their business models. They are faced with continuing and growing pressures from a large set of stakeholders and are keenly aware of the many potential negative factors that can have an impact on corporate profitability and longevity. In the US, there has been a reduction in the number of publicly listed companies from 8,000 in 1990s to 3,627 in 2017²⁰ and a reduction of 23 publicly listed companies for million inhabitants in 1975 to 11 in 2016.²¹ More fundamentally, only 200 of the top companies by earnings accounted for all the profits in the 2015 US stock market. The remaining 3,281 publicly listed companies lost money.²²

Corporations rely on independent governance structures, in a wider regulatory and legal system, that dictate their operations; however, precedence suggests that they have the potential to rapidly become state responsibilities during times of distress. The concept of widespread bail-outs of "too big to fail" financial institutions was probably unimaginable in previous decades, especially after having experienced the banking failures in Japan in the 1990s and the US savings and loan crisis in the 1980s and 1990s.

The potential for scenarios of systemic failure and collapse manifesting in the real economy are lessons painfully learned from the Great Financial Crisis. Likewise, it is feasible that corporations or entire sectors could be central to future systemic events. In the next several decades, "too big to fail" status could conceivably extend beyond financial

¹⁷ (Díez and Leigh 2018)

¹⁸ (Díez and Leigh 2018)

¹⁹ (Warren 2018)

²⁰ ("CRSP - The Center for Research in Security Prices" n.d.)

²¹ (Stulz 2018)

²² (Sommer 2018)

services firms to companies in the technology, energy, health, automobile, or defence sectors. Triggers such as debt and liquidity events, financial crises, mass litigation, demand destruction, or cyber-security attacks could swiftly threaten the viability of entire corporations, leaving governments as creditors of last resort for many of these “too big to fail” companies.

The issue of managing a corporation’s collective risks is not often raised in the same discussion as maximising shareholder value. A corporation’s risk exposure is defined over a certain return period, which may not overlap with shareholder’s short term aperture. Recently, we have seen evidence of aligning strategic decisions to a corporation’s overall risk profile such as exiting certain markets to reduce financial crime risk or human rights violation claims - decisions which may not have been undertaken several decades ago. Seen in this light, some corporate decisions balance longer term health and viability against what may be significant impacts on meeting short term revenue and growth targets.

Understanding a Corporation’s Risks

For many corporations, risk identification is an art form driven by intuition and gut-feel. How these risks are communicated is also eclectic and qualitative. Many risk management teams contribute to risk reporting through outlets such as the UK Longer Term Viability Statements and the US 10-K filings. Corporations often create internal risk registers and use them to help provide structure across disparate divisions of their company. Although risk registers can provide a holistic sense of risks, their qualitative nature can be a limitation without a process for comparing and prioritising risks.

Understanding a corporation’s risks involves integrating multiple sources of information. Only 33% of survey respondents feel that third parties have high visibility into their top risks. Senior risk managers, financiers of credit, ratings agencies and investors identify similar informational sources in helping to understand a company’s risk. Financiers, however, place greatest weight on the financial statements and the quality of management in forming an accurate picture of a company’s risk profile. They also report relying on internal databases and analyst statements to form a more complete picture.

Cross-Company Risk Aggregations

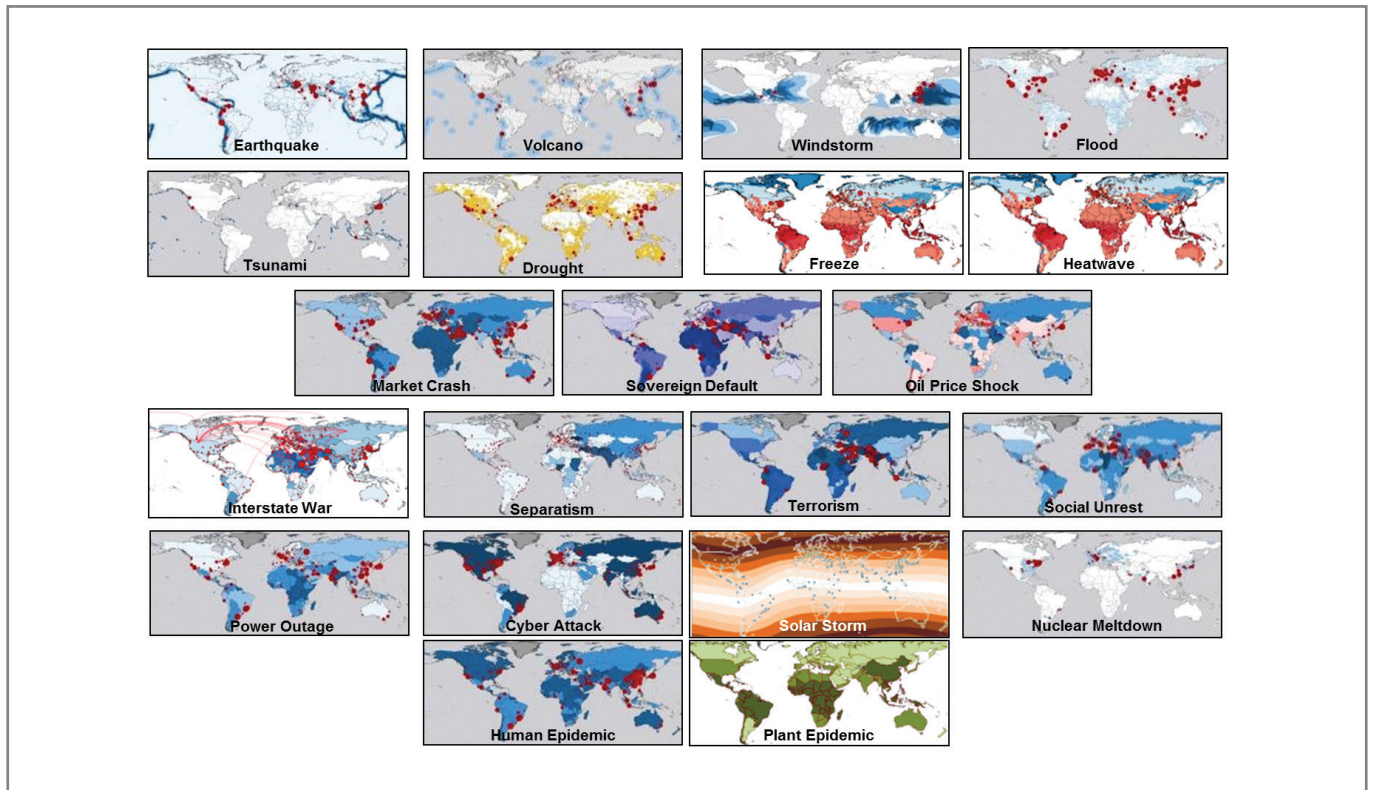
Multi-national corporations hold a variety of risks on their balance sheets. The ability to review risks in aggregation continues to challenge risk managers. The need for better assessment tools becomes apparent when companies face operational questions such as a company’s choice of location for offices, factories and suppliers to execute their strategies. What locations are optimal and pose the least amount of risk in comparison to their value? Capabilities for advancing these qualitative scenarios to a quantitative aggregated risk profile appear to be lacking in many organisations. For example, if posed with a decision to locate the next factory in either Jakarta or Manila, a wide range of risks would have to be considered. As a data point, the Cambridge Global Risk Index²³ through the lens of 22 comprehensive types of risks, Jakarta would have an annual economic (gross domestic product) loss of 2.6% versus Manila’s 9.7%, as measured by percent of GDP@Risk. Jakarta would be more attractive for siting a factory from a risk premium perspective, though specific operational or strategic reasons may dictate the choice.

Could an organisation assess their corporation’s footprint more holistically by considering a universe of wide-ranging threats? Today, a collection of wide-ranging business stress test scenarios can be applied to understand the impacts on a corporation’s business outputs (supply shocks) and threats to its markets (demand shock). The threat taxonomy within the Cambridge Risk Framework²⁴ is one such example. See **Figure 4**. Frameworks can serve as a foundation for using scenarios to quantify both impacts and likelihoods of threats, shed light on early warning signs of distress to the enterprise and have tools to assess a corporation’s resilience and risk mitigation strategies. Competitive advantages may be gained by corporations that lead in identifying and assessing risks that are presently non-standardised.

²³ (Cambridge Centre for Risk Studies 2018a)

²⁴ (Cambridge Centre for Risk Studies 2014a)

Figure 4: Geographical Mapping of Threats from the Cambridge Risk Framework



Source: Cambridge Centre for Risk Studies

Demanding Better Cultures of Corporations

Organisational culture has come to the forefront as a lens into the set of norms that influence behaviours which link individual behaviours to the actions and performance of a corporation. Culture ultimately provides the backdrop for decisions made within the structure of a corporation. Disruptive forces of change will continue to challenge company cultures.

Culture for some companies is the biggest proponent for progress, whereas it represents an impediment for others. Is culture something that is monitorable and manageable? The responsibility of developing and maintaining a healthy culture is company-wide. As identified in the survey, in some organisations there is very limited recognition or development of risk culture with limited buy-in from senior executives. Individual departments can remain isolated in their understanding and experience of their risk culture. Some interviewees believe that good behaviours with respect to risk are evident throughout their companies but that some pockets of the business remain exceptions.

The majority of survey respondents believe that risk culture is noted and understood at their companies but oftentimes originates from a policy control and compliance perspective. This approach has been described by some as ‘embryonic’ and as an ‘after-thought’. Some respondents point out that organisational inconsistencies in stated

values, beliefs and operational actions become apparent when under high pressure or stressful situations. Ideals fostered during calm periods of the business cycle become obsolete or inapplicable during a crisis.

Communication from senior management to other employees is viewed as an important element of the culture as it improves transparency and morale. Some companies hold formal risk roundtables, on a regular or frequent basis, to foster risk dialogues between all employees. This is deemed particularly useful for new or junior staff. Some companies hold events such as “risk week” every year to help promote awareness of their core values and culture across the entire company.

It is worth noting that risk culture has received regulatory attention in the financial services within several jurisdictions.²⁵ These include the Senior Manager’s Regime in the UK which exposes senior executives to criminal legal proceedings based on illegal actions of their staff in conducting business,²⁶ and related supervision guidance in the Netherlands.²⁷

Measurement of Risk Culture

Over a third of survey respondents indicate that risk culture is not measured or assessed within their company. The rest of the respondents indicate that measurement of risk culture is performed to some degree. The most common processes for assessment of risk culture are summarised in **Figure 5**.

Figure 5: Measurement of Risk Culture

Annual employee satisfaction surveys	Use of risk maturity assessment tools
Annually entity level controls testing	Measurements of participation levels in training programmes
Surveillance and monitoring of employees	360 degree qualitative survey of senior leadership team
Client/customer feedback on service quality	Behaviour modelling of employees
Measurement through Key Performance Indicators (KPIs): <ul style="list-style-type: none"> • Voluntary adoption of group risk processes • Awareness of risk appetites and capacities 	Regular risk assessment of key processes and projects and follow up on implementation of mitigating actions
Qualitative assessment led by 3 rd line of defence	IRM standard on risk culture

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

²⁵ (Tuveson and Ralph 2016)

²⁶ (Financial Conduct Authority 2018)

²⁷ (De Nederlandsche Bank 2015)

Section 3: Scope of Enterprise Risk Management

ERM teams have a broad remit to protect the corporation against any risks that might have negative impacts, leading to losses in firm value or future earnings. They are expected to show their value by not only protecting the business but also aiding in the business strategy process and ultimately helping to enable the business. We note that enterprise risk activities are often independent of the corporate finance or insurance purchasing functions.

Our research journey confirmed that ERM departments varied widely in their remits, scope of responsibility, influence within their organisation and budget allocations. Unlike other corporate executive roles such as the Chief Financial Officer and Chief Operations Officer, we found that titles such as Head of ERM and Director of Operational Risk Management at companies did not have much uniformity across companies. The question “What is the function of the ERM department in your company” elicited very different responses.

The Committee of Sponsoring Organisations of the Treadway Commission (COSO) states:

“Enterprise Risk Management is not a function or department. It is the culture, capabilities and practices that organizations integrate with strategy-setting and apply when they carry out that strategy, with a purpose of managing risk in creating, preserving and realizing value.”²⁸

In the US, the Sarbanes-Oxley (SOX) Act of 2002 was enacted in response to major corporate and accounting scandals and strived to raise the standards of corporate governance and reporting for public corporations. Specifically, SOX, Section 404, requires companies to report the management of their internal control over financial reporting including a statement identifying the framework used by management to evaluate their effectiveness. General approval by the US Securities and Exchange (SEC) Commission for publicly traded companies to use the COSO framework to implement Section 404 of the SOX Act since 2002 have given rise to the COSO framework’s broad adoption. This regulatory mandate for large public companies to assess and attest to their internal controls for financial reporting has driven many companies to grow their risk management functions around the COSO framework. Corporations with US jurisdictional overlaps continue to be guided by respective regulations and reporting requirements originating from SOX. Directors of corporations hold both professional and personal

responsibility for accurate reporting including the assessment and disclosure of material weaknesses.

Many companies have adopted their own or externally sourced frameworks to help develop narratives in scoping and describing their enterprise wide risks. Some companies have complemented COSO audit oriented ERM functions with their own structural innovations by integrating sustainability perspectives served by their Environmental, Social, and Governance (ESG) department. There are movements to merge viability and sustainability functions with ERM. This is rationalised as being a more efficient way to identify and manage the broad remit of risks facing the company. The Sustainability Office in a company focuses on risks that go beyond environmental issues and challenge the ability of the company to sustain its business model and performance into the far future. Adopting a viability related focus is contributing to the rewriting of job functions of heads of sustainability in companies.

The breadth of risks considered by the ERM teams are wide and varied. Once a clearer understanding is gained of a corporation’s enterprise risks, then arguably, strategic decisions can be made around managing those risks. ERM theorists support the concept of corporations holding specific risks where they have core competencies in managing and mitigating those risks, thus a comparative advantage. Otherwise, a company would transfer its other “non-core” risks to takers of the risk at a reasonable price. In some cases, large multinational corporations have footprints that are so expansive that such takers of risk do not have the balance sheets to cover these risks. Consequently, many corporations bear their risks with their own balance sheets – commonly referred as self-insuring – or using insurance captives.

What is the value proposition of ERM departments? Comments from workshop participants and interviewees suggest value but not without controversy. They suggest that similar to other cross-functional groups, the ERM teams provide overarching services versus providing measurable value through profit and loss activities. Additionally, their roles are oftentimes perceived to limit business opportunities in contrast to other departments such as strategy and business development. Against this backdrop, ERM teams compete for budget to fund their initiatives. Participants indicate that ERM teams are gaining visibility throughout their organisations by participating in core operational and strategic discussions. Key areas of support include compliance and reporting of material risks, supporting key decision-making towards strategy, markets, operations from a risk perspective, managing and mitigating risk and uncertainty given decisions made by company departments external to ERM, and providing a longer-term view in supporting the company’s decision-making.

²⁸ (Committee of Sponsoring Organizations of the Treadway Commission (COSO) 2017)

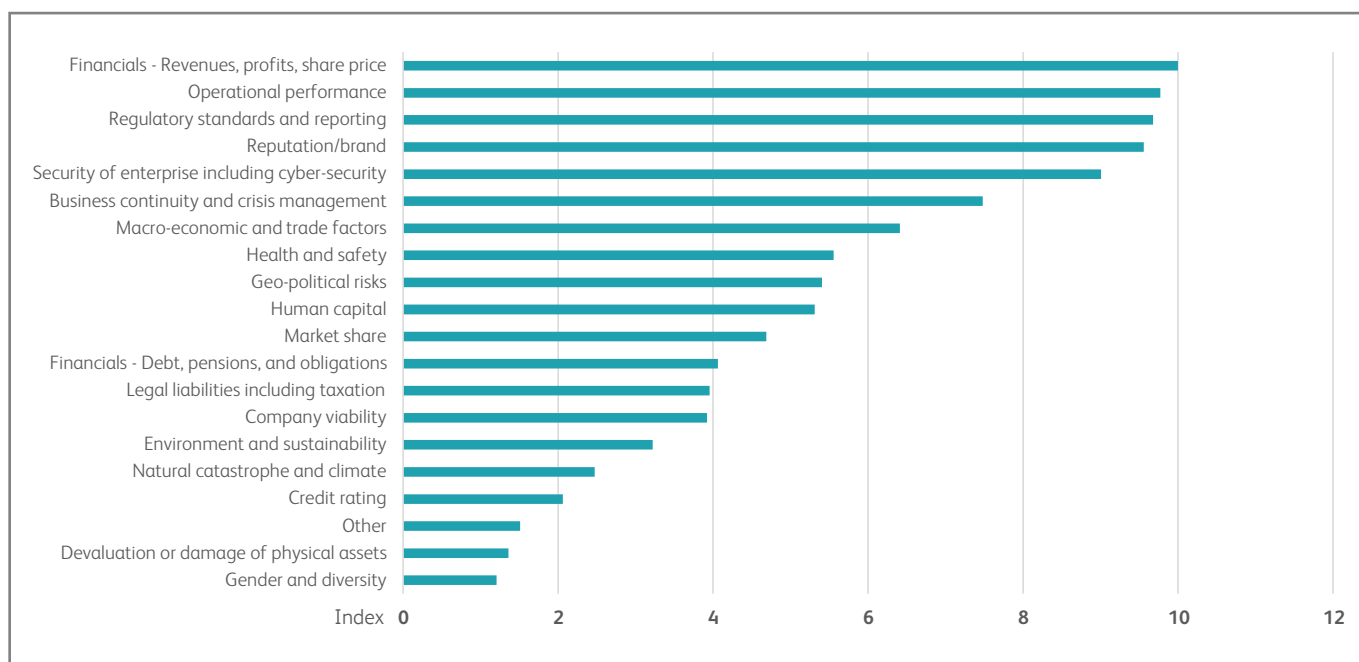
²⁹ (American Institutes of CPAs (AIPCA) n.d.)

³⁰ (U.S. Securities and Exchange Commission 2003)

Section 4: Top Enterprise Risks Facing Corporations

This section presents the results of a widely administered survey of risks that corporations face. We highlight each of the top ten and bottom risks, where a time horizon of twelve months is used to frame risk materiality. We note that Gender and Diversity risk is ranked at the bottom of risks by survey respondents across all sectors. Despite its low prioritisation, we believe its growing visibility makes it worth highlighting in this report. We provide a briefing on materiality of the top ten risks as well as Gender and Diversity in the text below. See **Figure 6** for the full list of risks and their rankings.

Figure 6: Top Enterprise Risks of Potential Concern for Companies in the Next 12 Months.



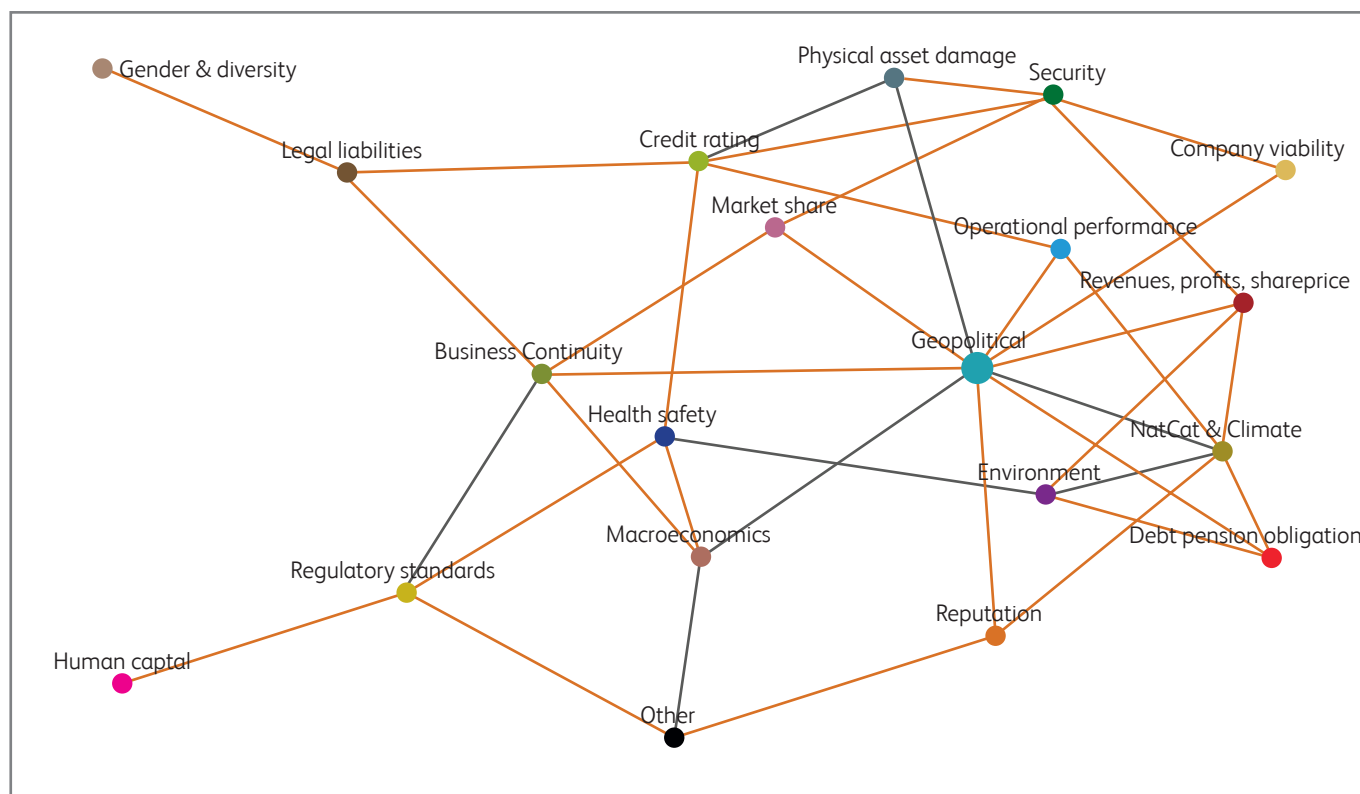
Source: Cambridge Centre for Risk Studies 2018 ERM Survey

A Network Perspective of Top Enterprise Risks

Risks are rarely singular in their origins or manifestations. The complexity of each different risk type is difficult to convey through relative risk rankings. We highlight the risks covered in the previous section from a network perspective. Their complexity is due to their interlinkages and risk effects that are often non-linear with respect to shock severity or time. Risk amplifiers may precede or follow the occurrence of a risk event, which compounds the consequences or triggers another type of risk event. Network diagrams are useful in visualising entity relationships.

Figure 7 shows the relationship between the top risks, which are depicted as nodes with linkages that represent the correlations between the corresponding risk types.

Figure 7: Network View of Correlations of Top Enterprise Risks.



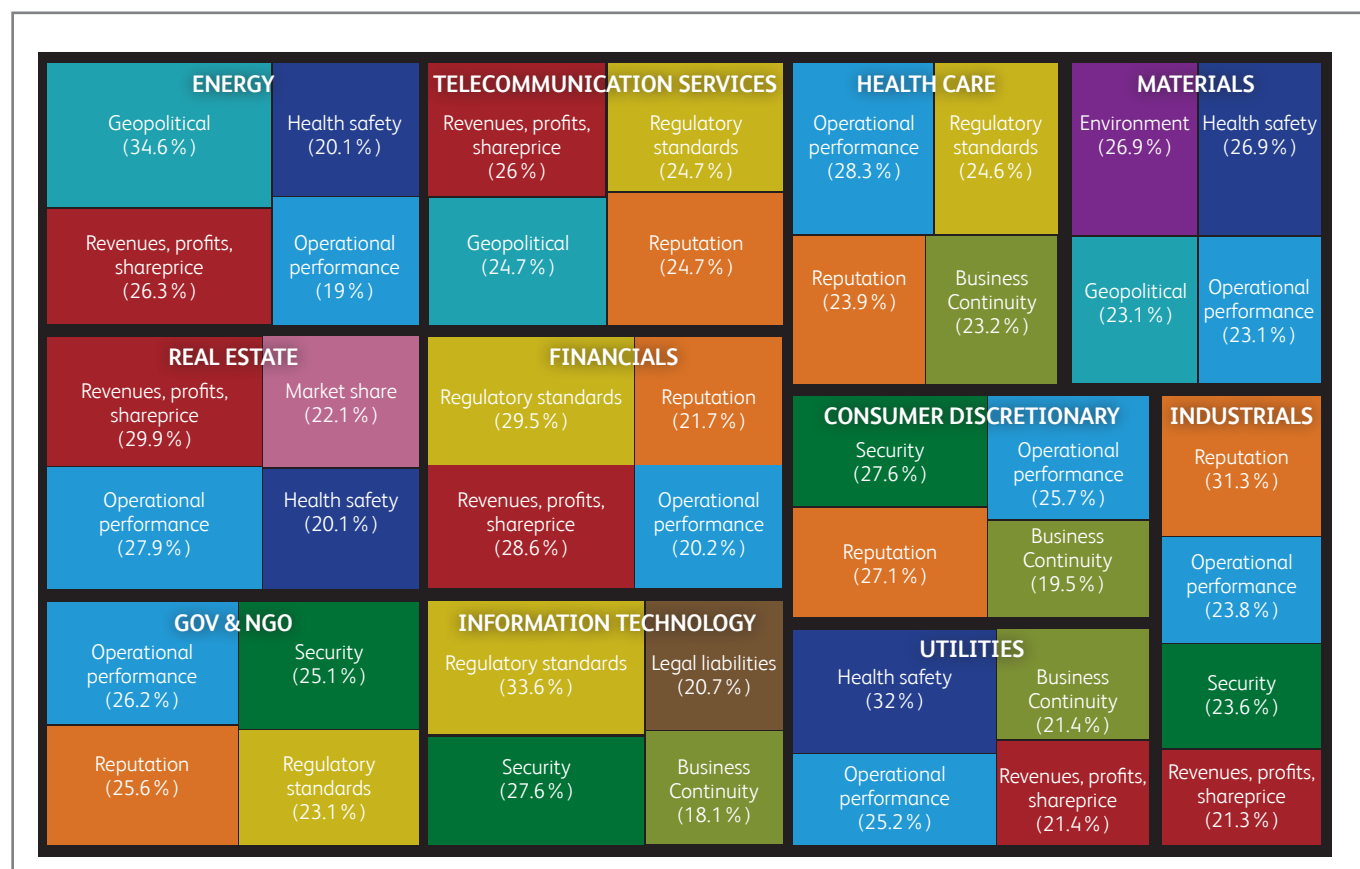
Source: Cambridge Centre for Risk Studies

Sector Considerations of Top Risks

Business sector segmentation is important for understanding a company’s risk profile, exposure management, regulation and market developments. We report top risks by business sector segmentation using the Global Industry Classification Standard (GICS)³¹. The GICS structure consists of 11 sectors, 24 industry groups, 686 industries and 157 sub-industries. The GICS schema encompasses the main activity sectors in the economy and segmentation used in market reporting and analysis. This classification system goes through an annual review process involving market views to evaluate the sectors and industry allocations. When appropriate, we include Public Authority, NGOs and Non-Profit in addition to the GICS sectors within the analysis.

While **Figure 6** displays risks ranked by all combined sectors, **Figure 8** shows the top four enterprise risks reported by each GICS sector. Each risk category is colour-coded uniformly across sectors. However, as one might expect, certain common risks are weighted quite differently according to the sector of the respondent. The top enterprise wide risks are heavily represented across most sectors and include Financial Risk - revenues, profits, share price and Reputation/brand risk. However certain risks are very sector related. Although Geopolitical risk is relatively low ranking (9 out of 10) by overall survey respondents, sectors such as Energy, Telecommunications and Materials rank it highly. Regulatory Standards risk is the highest risk for Financials and Information Technology and the second highest for Healthcare and Telecommunications.

Figure 8: Sector View of Top Enterprise Risks for Companies



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

³¹ (“GICS - MSCI” n.d.)

Top Risk #1 – Financials: Revenues, Profits, Share Price

The term ‘financials’ casts a wide net as it reflects the impacts of almost all other risks. It is not surprising that survey respondents rank it as a top risk. From an operational perspective, ‘financials’ is interwoven with revenues, costs, profits and losses whereas from the financial market’s perspective, it relates to share prices, dividends, market capitalisation and corporate bonds. These items are an integral part of daily activities in every corporation and dictate the success of business at every stage of a company’s life cycle.

The more complex a corporation is, either in terms of geographical footprints or product varieties, the more blended the financials are across all facets of its business. Such connectedness implies that once triggered, a financial health problem may not be able to be understood separately from the context of the whole company or even the entire industry. With plural business coverage, financial problems are multifaceted. The diagnosis and treatment of financial problems within corporations can ultimately translate into huge costs or bring the company’s licence to operate into question.

We have seen many companies in financial distress – either experiencing deterioration relative to peers or failure to honour debt payments that threaten business termination - in recent decades. In 2015, the top 200 US companies in terms of earnings accounted for all the profits of the US market while everyone else lost money.³² From 1975 to 2016, the number of publicly listed companies per one million capita decreased significantly by more than 50%.³³ Recent evidence in 2018 showed that retail and oil & gas were the most troubled industries susceptible to defaults, with bankruptcy records reaching an all-time high for retail businesses.³⁴

Interviewees agree uniformly that financial risks should be addressed from the bottom up with the supervision of top-down guidance. Financial metrics can help in this process of identifying, mitigating and monitoring risks.

While debt and leverage are essential components in propelling a company’s growth, they also put a company at greater risk of financial distress. Financial distress is the primary reason for public company delistings from exchanges. Additional causes include failure to comply with minimum listing requirements such as market share, size and financial viability. Corporations see value in adopting a more structured, integrated and forward-looking risk solution that identifies, analyses, solves and monitors fundamental risks from their root causes. A combination of assessment, mitigation as well as risk transfer strategies is likely to remain high on the list of corporate considerations.

³² (Sommer 2018)

³³ (Stulz 2018)

³⁴ (Moody’s 2018; “Moody’s: Retail Corporate Defaults Hit All-Time High in First Quarter 2018” 2018; Peterson n.d., 2018)

Top Risk #2 – Operational Performance

Early recognition of operational performance has roots in agricultural practices with labour and productivity both relevant to crop output. Today's industrial and information business environments are dictated by analogous metrics. In industrial settings, physical rates like tonnes of mineral ore processed per unit time need further metrics to have economic meaning, such as cost per tonne to acquire and process, quality and market price of the processed ore and cost of capital intrinsic in machinery and stock. Similar statements apply to information technology services that have emerged and accelerated through the 20th century to the present. Operational risk to an organisation is the risk it faces due to failure in any of its business processes.

Operational risks to an organisation vary widely from breakdowns of key machinery or information processes; in-house accidents like fires or external shocks such as power outages and floods; negligence or criminal activity; natural catastrophes that affect supply chains or, any event that disrupts its business processes. Losses due to operational events may involve damage, physical or informational, to the means of production which are regarded as losses in capital stock, or an interruption of a process that results in an unanticipated loss to a business activity or flow.

The 2001 Bangkok floods illustrate the complexity of operational risk. The insurance industry suffered much larger losses from business disruption outside Thailand than from physical damage within Bangkok.³⁵ Events with large enough impacts are likely to overwhelm day-to-day management processes for dealing with variability, such as inventory management and may benefit from a coordinated organisational response across business lines and in the wider supply chain.

Global supply chains are exposed to significant operational risks, with internal and external disruptions to corporate supply chains associated with 40% -plus annual losses in operating income.³⁶ Supply chain disruptions are also and unsurprisingly, associated with substantial stock market impacts.³⁷

In supply chains of physical products, inventory is the classical way of managing uncertainty in availability or price of an input to production, or fluctuations in

demand or price of an output. These issues can also be mitigated by financial means such as forward contracts on commodities or long term supply agreements. Dual sourcing – having contractual arrangements with two suppliers of similar components – reduces concentration risk by allowing a company to increase its production from one supplier, on short notice, should the other run into difficulties. More generally, standardisation and modularisation across an industry, components for consumer electronics being an example, provides a move from bespoke and, therefore, risky procurement toward commoditised and more stable supply.

³⁵ (BBC 2011)

³⁶ (Hendricks and Singhal 2005b)

³⁷ (Hendricks and Singhal 2005a)

Top Risk #3 - Regulatory, Standards and Reporting

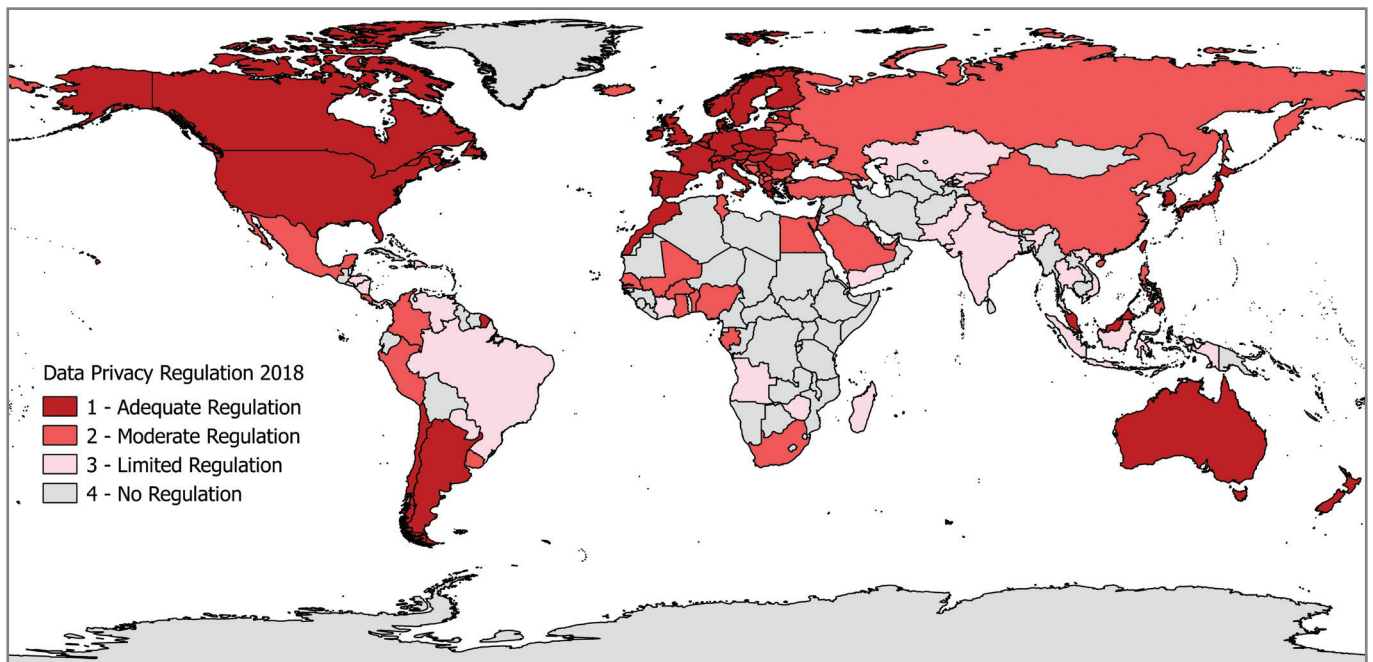
Regulatory risk is often used as a blanket term that covers policy, legislation and regulation risk, with some companies even associating this collection of risks with ‘political risk’. All facets of Regulatory risk can directly impact a company’s balance sheet through reduced performance or indirectly through market uncertainty. Governments set policies and enact legislation, while legislation can be ratified through regulation. Further, regulation is written by regulators who have deep knowledge of the industry and subject matter.³⁸ Policies can change with the shifts in political leadership. These aspects together inform the global regulatory landscape, which is becoming more complex over time and requiring management of established and emerging regulatory trends.

Newly instituted regulations and their potential for amplification are causing uncertainty for corporates and the market. See **Figure 9** for a global data privacy heatmap.

One example is the launch of the European General Data Protection Regulation in May 2018. Although corporates had time to prepare for the regulation, there is still uncertainty around the evolving data privacy dialogue. Information technology companies and social media firms now house more consumer data than ever before. With data privacy as a top priority for consumer and legislative actions, many of the large technology companies are embracing the seriousness of data privacy and taking pre-emptive measures for self-regulation. The case of Facebook in 2018 highlights the multi-pronged regulatory environment within which a technology company must operate as a growing number of countries implement data privacy regulations. While survey respondents ranked Regulatory risk third, it is notable that it was ranked first for the Information Technology sector.

Emerging trends portend consequential policy, legislation or regulation actions in the future. Brexit has caused turmoil for UK and some European businesses as they continue to try to navigate the potential for a ‘Hard Brexit’ in March 2019. This could create additional strain on the balance

Figure 9: Data Privacy Regulation Heatmap.



Source: Cambridge Centre for Risk Studies³⁹

³⁸ (Ranci 2016)

³⁹ Data compiled and reviewed from the following sources to create this map: (DLA Piper n.d.; CNIL 2018; Privacy International n.d.; Hedrich, Wong and Yeo 2017)

Top Risk #4 - Reputation/Brand

sheets for corporates as they are forced to adhere to World Trade Organisations (WTO) trade agreements and other non-tariff barriers.⁴⁰ Even in the two years since the Brexit vote was held, corporates are already reporting that they are struggling to find talent to fill vacancies as fewer EU workers apply for postings, highlighting the indirect consequence of policy changes.⁴¹

The US and China are in the midst of a trade war that is dynamically increasing the financial burden on corporates within specific sectors. Tariffs imposed during trade wars can impact business sentiment and lead to reduced investment, limiting corporate growth.⁴² Corporates also need to keep an eye on shifts in competition and antitrust law as changes in these laws may restrict their merger or acquisition capability, or open them up to probes by federal agencies.⁴³

Laws and regulations are jurisdiction and sector specific; therefore, in many cases, legal and regulatory compliance is locally directed. However, some global corporates attempt to create a “global code of conduct safety provisions” that can apply to all their operations in various countries.⁴⁴ These are often hard to create as they need to comply with each jurisdictional requirement. Furthermore, these codes of conduct are not usually applicable to supply chains, but regulation may dictate their applicability.

Following the Bangladesh factory collapse in 2013 that killed 1,134 workers, the UK developed reporting requirements around slavery in supply chains.⁴⁵ The Modern Slavery Act of 2015 has a provision titled “Transparency in Supply Chains” that requires corporates in the UK with an annual turnover of £36 million to report on the actions taken to eliminate slavery and human trafficking from their global supply chains.⁴⁶

To enhance the strength of compliance, the interviewees in our workshops confirm the value of ethical and legal training for key employees. The majority believe that the processes at their companies are effective for raising awareness and strengthening the broader corporate culture.

Corporate reputation is widely viewed as an intangible asset and thus potentially a significant source of value to a company. Conversely, a compromised reputation or brand has the potential to destroy the future value of a company. Positive reputation can provide competitive advantage by signalling quality and pricing to consumers and greater growth prospects to investors and capital markets. Likewise, reputation enables the hiring and retention of key talent. In theory, better reputations enable premium pricing for products and services.

For a corporate, maintaining its reputation can be an abstract concept but its materiality is uncontested. Past market studies have widely highlighted reputational risk as a top risk for companies.⁴⁷ Similarly, we have confirmed reputational risk as a top risk for companies both in the short and long terms.

Reputation is defined generically as, “The beliefs or opinions that are generally held about someone or something.”⁴⁸ Discipline-based concepts have been developed with distinct literatures on this subject. Company definitions are typically tied to processes, for example, one ERM director explained that they assess reputation based on customer sentiment, share price and press coverage.

It is arguable whether reputational risk is a first order or a secondary risk. The literature supports both views. Whatever first-order risks precipitate the reputational event, consequences may play out differently depending on the capacity to amplify or mediate the potential for reputational harm. This will depend on the dynamics of the organisation as well as its response capacity. Reputational risk is considered during mergers and acquisitions where negative reputational associations might carry over to the acquiring firm. More recently the importance of social media has registered at the board level, due to unparalleled information and opinion flow beyond the traditional (20th century) sources of information emanating from the organisation itself, regulatory or industry bodies, politicians and journalists.⁴⁹

⁴⁰ (Raphael 2018)

⁴¹ (Morrison 2018)

⁴² (Tan 2018)

⁴³ (Dentons 2018)

⁴⁴ (Dowling 2011)

⁴⁵ (Hoskins 2015)

⁴⁶ (UK Government 2015)

⁴⁷ (Aon Risk 2017)

⁴⁸ (Oxford Dictionaries n.d.)

⁴⁹ Szwajcadanuta

Reputation is sector-sensitive. Thus, a company's reputation can be painted with the same brush as that of its sector. Reputational advantages are considered a source of competitive advantage. The build-up of good reputation - "reservoir of goodwill" - may in some cases provide a company an amount of resilience during unfavourable conditions from internal or external sources. The level of intangible assets in a company can be a proxy for a company's reputation. Companies with higher market to book ratios have a higher fraction of intangible assets, thus their reputation contributes to their market value more significantly than other sectors. On that basis, one can infer that reputation makes up a greater proportion of market value for the Information Technology, Consumer Staples and Industrial sectors. Conversely, the share price of a company in those sectors is more exposed to potential reputation risks.

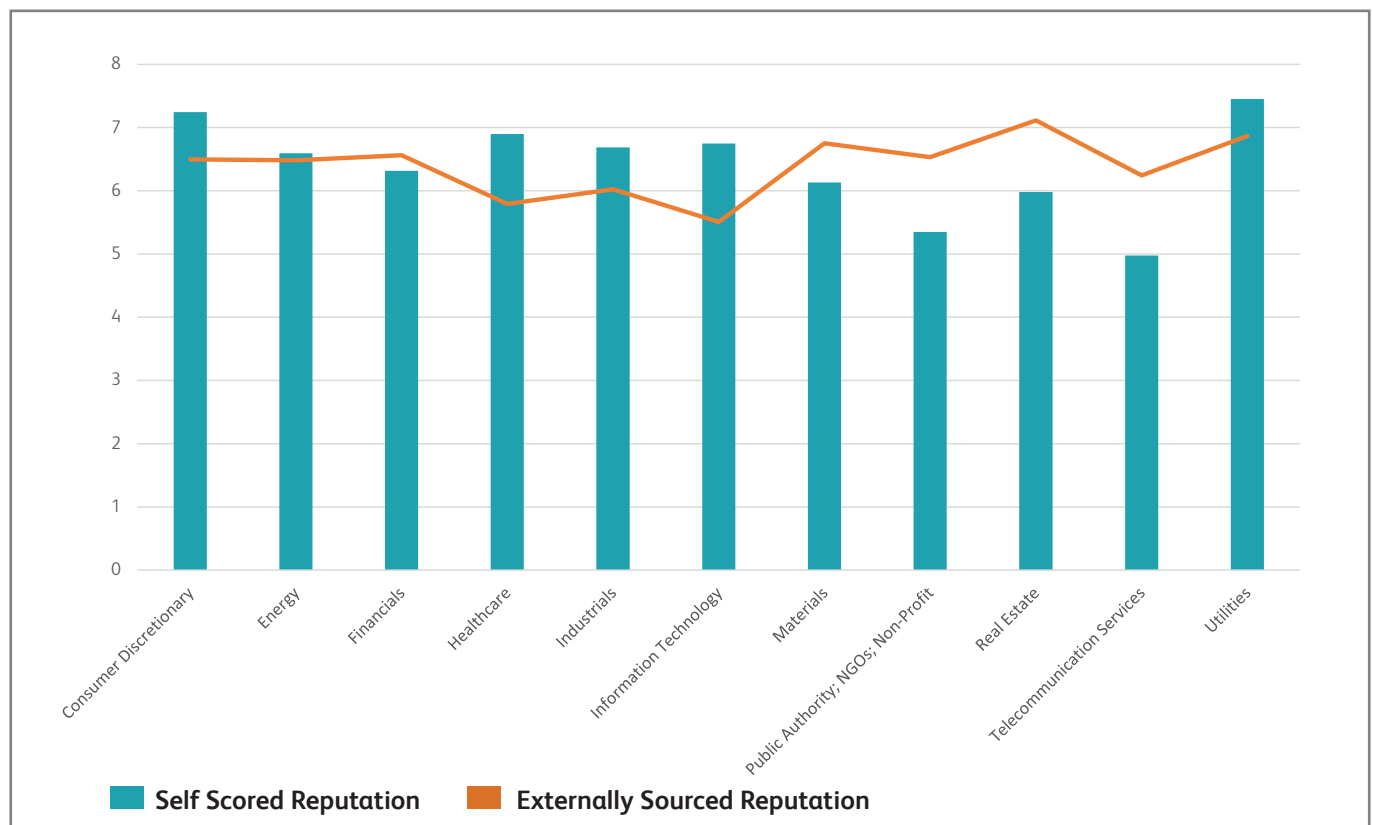
Reputation risk is ranked amongst the top four risks for Telecommunications, Financials, Healthcare, Industrials and Consumer Discretionary sectors by survey respondents. Respondents also self-scored their sector's reputation in comparison to other sectors. Figure 10 shows both their self-scored reputation and externally scored reputations. Most sectors scored their own sector at

a premium, i.e., self-scored higher than scored by others. The data shows a reputation premium ranging from 12% - 23% for Consumer Discretionary, Energy, Healthcare, Industrials, Utilities and Information Technology sectors. In contrast, Financials, Real Estate, Telecommunications and Materials scored their sector at a discount; i.e. self-scored lower than scored by others.

Companies have varying degrees of reputation management programmes and initiatives. 83% of survey respondents reported that their company had a crisis management plan. 66% of survey respondents believe that their companies have enough reputational resilience to weather a reputational event versus 17% who felt that their companies probably could not weather such an event.

There is a close relationship between crisis management and reputational risk management. The quality of crisis risk management plans will serve as a proxy for the ability of the company to attenuate fast developing risks. Crisis management is a reactive approach to handling a shock event; the speed, coherence and agility of response may be key in preventing the initial damage morphing into a larger-scale reputational event.

Figure 10: Reputation Perception: Self-scored vs Externally Scored by Sector



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Survey respondents reported their budget allocations for supporting measures to mitigate reputation risk. The largest budget allocations to support reputation risk mitigations go towards tools for analysing, managing, visualising and reporting risks. The next in line is the training of internal staff related to potential reputation events. This includes simulation exercises across a selected set of scenarios. Cyber has wide ranging impacts that cut across a broad class of risks including reputation damage. Thus, the purchase of cyber insurance is viewed as a mitigation measure for reputation risk in addition to its other purposes. Expenditures on external consultants and advisors are allocated in budgets towards reputation risk management as they are deemed critical when addressing public relations responses.

The overall growth in scrutiny of companies and corporate stakeholder communities will continue to put pressure on reputational risk management at companies. The pervasiveness of social media as a platform for voicing public opinion will further amplify reputation-related events for companies. A healthy company culture and governance will be more important than ever; however, complementary focus on reputation risk and crisis management will continue to be essential.

Top Risk #5 - Security of Enterprise Including Cyber Security

Security of the Enterprise including Cyber Security suggests broad risks and security issues. Cyber is a relatively recent risk type with a short but ominous history and continues to rapidly alter its threat dynamics.⁵⁰ Thus, the cyber component is high on the priority list for security, information technology and ERM teams; it is the most pressing, or salient, emergent risk for many companies.

Information technology has engendered massive shifts in business and society since the 1990s, driving improvements in productivity by opening global access to data, information and knowledge systems, cloud analytics and talent. A relatively small but increasingly alarming side effect is that information technology, which has always had to pay attention to maintaining large scale digital infrastructure, has become a battleground for combatting external attacks from malicious hackers. Major companies report frequent attempted cyber-attacks seeking to find weaknesses in the protection of their information technology systems. Cyber-attacks can cost companies many millions of dollars. Costs depend on the type of attack and the magnitude and characteristics of the attack. Types of direct payout costs include:⁵¹

- **Disruption to business activities** – halting revenue generation from key business processes, by disabling or damaging the information technology systems supporting them.
- **Losses from the theft of financial assets** – currency, transfers, trading value – which is the motivation behind many attacks.
- **Exfiltration of sensitive data** – such as personal credit card details or personal health data. Companies can incur large payouts in compensation for people whose personal data is compromised or stolen, including costs of notification, managing their enquiries and providing customer support, providing credit watch services and payouts for any losses these individuals may suffer.
- **Response and forensics** – costs of the information technology security team and external consultants, for diagnosis and rendering the system safe from further exploitation. This may require the replacement of equipment, software and extensive restoration of systems.

⁵⁰ (Tuveson and Ruffle 2014)

⁵¹ (Cambridge Centre for Risk Studies 2018b)

- **Fines that may be imposed by regulators** – the high water mark is the 2018 General Data Protection Regulation act in the European Union that allows fines of up to 4% of global turnover to be levied against a company which suffers a data breach.
- **Legal services to defend any litigation** – legal actions that might be brought against the company and respective costs of settling the action or losing the case and paying damages or even punitive awards.

Costs incurred to the affected company from the disruption to business operations can be extensive. Infection by NotPetya contagious malware caused 300 public companies to declare profit warnings in 2017, with some companies such as Maersk declaring costs of over \$450 million from 10 days of disruption of their shipping activities.

Operational disruption can last for several hours or days and affect many parts of an organisation. Surveys of corporate security executives show that breaches impact more than a third of a company’s systems in around 40% of cases and more than half of systems in 15% of cases. They disable operational activity, including revenue generation, for over 9 hours in 35% of cases and for durations of 24 hours or more in 9% of cases.⁵²

The consequential business losses from a cyber attack, such as a data breach, can be more severe than the direct costs. The company’s reputation is damaged; senior executives resign; customers lose trust and transfer their business elsewhere; and revenues dip and market share is lost to competitors. Studies show typical churn rates of around 7% of a company’s customers after a data breach and 31% of consumers have discontinued a relationship with an organisation that has suffered a data breach.⁵³ Around a third of companies that experience a breach have reportedly suffered revenue loss, around 12% reported losses greater than 20% of their annual revenue and just over 1% lost more than 80% of their annual revenue.⁵⁴ These companies also reported significant losses in business opportunities and increases in customer desertion as a result of the breach.

A major cyber attack can cause a company to have a downgrade of its credit rating.⁵⁵ Companies seen as a credit risk lose suppliers as well as customers and find it more expensive to borrow capital and fund their cashflow. Credit rating downgrades indicate to the public that a company is in distress and can hasten a company’s decline and threaten its viability. The viability of a company can also be threatened in other ways if the consequences of the attack are severe enough. There have been cases where class action litigations brought against a company for their data breach liabilities far exceed the

capital valuation of the company.⁵⁵ Companies have been devalued in merger and acquisition negotiations because they suffered data breaches.⁵⁷

The effects of a cyber attack are not isolated to the individual organisation that is attacked. The consequences are also felt by the company’s suppliers and trading partners, investors, financiers and other counterparties. Economists term this the multiplier effect, or “financial spill-over”. Cyber attacks have a clear multiplier effect on the economy as a whole.

Cyber threat is becoming more international and more geopolitically motivated. Cyber crime remains a major element of the threat and is continuing to grow. Technologies for carrying out cyber-attacks are becoming more accessible to cyber criminals at lower costs and requiring less skills to operate. The costs for companies of protecting against cyber-attacks are escalating, but well-protected companies operating good practice are likely to remain at lower risk than organisations that do not take cyber threat seriously. Cyber risk is continuing to grow and to rise in many countries of the world. Companies are only as strong as the weakest link in their defences. Cyber is likely to remain a significant and important threat to businesses for many years to come.

⁵² (Ulevitch 2017)

⁵³ (Ponemon 2017)

⁵⁴ (Ulevitch 2017)

⁵⁵ (Cherney 2017)

⁵⁶ (Mosendz 2017)

⁵⁷ (Kuchler and Fontanella-Khan 2017)

Top Risk #6 - Business Continuity and Crisis Management

83% of survey respondents report having a crisis management plan at their companies. 66% feel confident that their company has enough reputational resilience to weather a reputational event as opposed to 17% who feel such an event would pose a viability risk.

The top areas for crisis risk are shown in Figure 11 with business continuity as the number one concern. Other top concerns include emerging risks highlighted in cyber and social media threats; traditional risks such as employee, product quality and financial crime incidents; and supply chain and environmental risks.

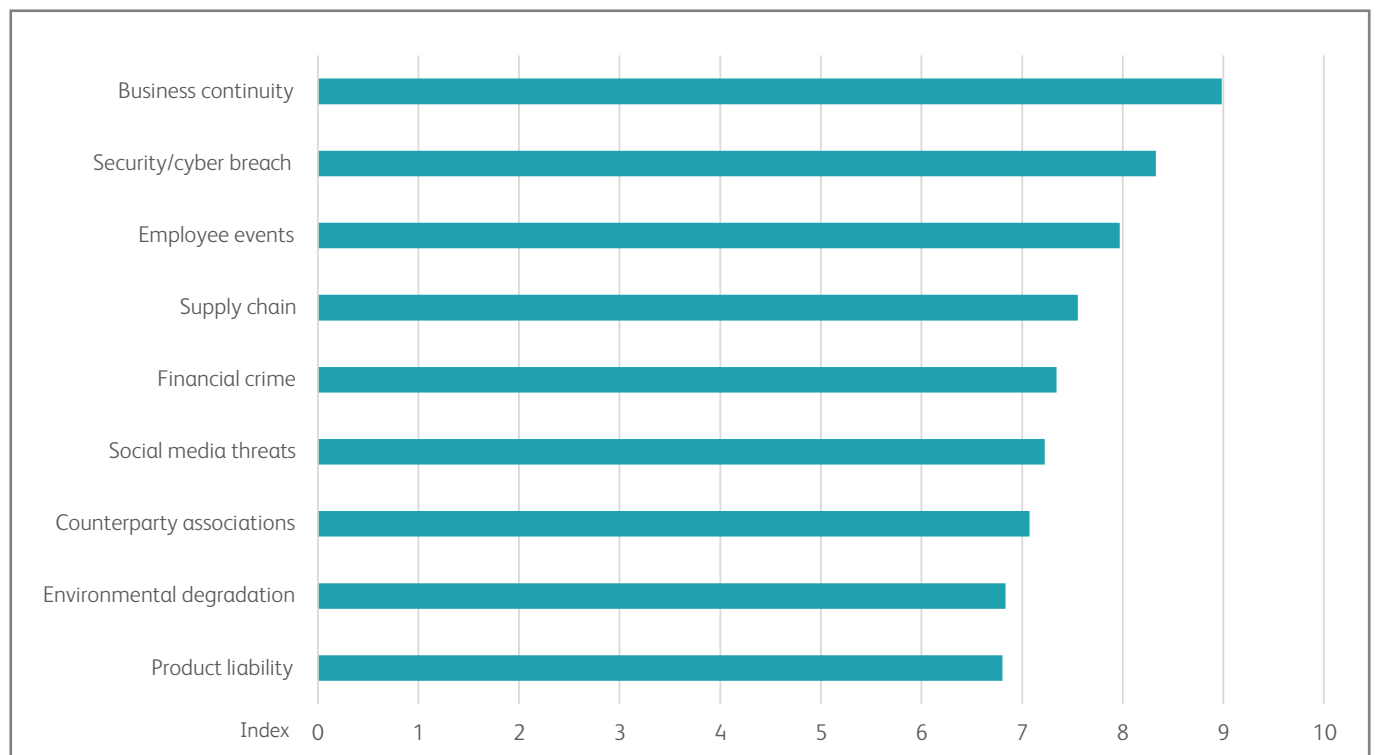
The survey reveals that planning for business continuity and crisis management is standard, indeed the lack of it is exceptional. We review comments by respondents that shed further light on this area. First, scenarios, simulations and war gaming are important tools for developing, testing and training regarding business continuity and crisis management situations. Second, whilst simulation exercises are common, carrying these out more than

once a year and taking these into different parts of the organisation on a continual basis are less common.

Third, risk culture can have a visible impact. In some organisations, a lack of attention or interest at the top forestalls meaningful planning and training activities elsewhere. In others, there is widespread aversion from front line staff to give input to business continuity planning, preferring to leave that to risk officers. On the other hand, very active business continuity and crisis planning demonstrates a much more engaged risk culture. A final point is that some organisations identify key personnel by name and extend that to succession planning as one element of their business continuity and crisis risk management structure.

Failure to respond quickly and sufficiently to a crisis can result in significant exposure of staff and facilities to further risk and escalation of business interruption. Beyond its direct impacts, a crisis can cascade to enterprise-wide damage such as reputational loss. A crisis can begin with reputational damage as illustrated vividly by the 2014 resignation of chief executive officer Mike Jeffries of the global retailer Abercrombie and Fitch, after a string of bad publicity – including being voted “Most Hated

Figure 11: Risks Addressed in Crisis Management Plan



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Brand in America” in the American Customer Satisfaction Index in 2013 – based on punitive, exclusive and outright discriminatory policies in hiring of staff and associated with boycotts, protests and million-dollar lawsuits.⁵⁸

Traditional challenges to business continuity and crisis risk will persist in terms of localised breakdowns of machines and processes and interruptions to upstream supply chains, downstream platforms for delivery of goods and services and supporting infrastructure such as transportation, power, telecommunications and the internet. The 2012 Bangkok floods, infamous for inflicting substantial business interruption costs to firms outside Thailand that suffered no direct damage from the flood, are a reminder that the global consequences of natural catastrophes are as relevant in the 21st century as ever.

Meanwhile emergent pressures are likely to aggravate business continuity risks. The most salient today may be exposure to information technology failure, whether due to accidental or malign events in cyber space. Cyber attacks on Systemically Important Technology Enterprises (SITEs),^{59 60} systems and services that are central to a business such as databases, cloud or internet address providers, have the potential to wreak global havoc.

This trend of growth in cyber risk is likely to continue and not in entirely predictable ways. The promised acceleration in automation will be driven by artificial intelligence that manages industrial controllers in equipment from cars and trucks to assembly lines, freight handling, warehouses and retail outlets. This trend suggests a greater exposure to business continuity risk from digital disasters.

Top Risk #7 - Macro Economic and Trade Factors

Increased exposure of national economies to global markets has resulted in corporate stakeholders paying close attention to macroeconomic and trade factors. As discussed in Section 2: The Present State of Global Corporations, globalisation has driven an unprecedented growth in international trade since the 1950s. As a result, the world’s economies have become more interconnected through networks such as global value chains where the production of goods is often dependent on inputs from multiple countries. This process of globalisation has been fruitful in lowering the costs of production but has likely also increased the exposure of corporations to systemic economic shocks.⁶¹

The development of international trade through global value chains has also likely increased corporates’ exposure to trade shocks.⁶² These shocks influence the terms-of-trade that countries export and import with each other. Sudden volatility in exchange rates can significantly increase or decrease the relative cost of final and intermediary goods and services imported or exported from one country to another. A negative shock to a currency valuation can increase input costs that companies face in production and lead to a fall in demand for final goods. Companies report heightened trade risks to their business from the recent rise in protectionist trade rhetoric and policies.

Unexpected macroeconomic events can impact growth rates of an economy through fluctuations in consumption (demand-side shocks), production (supply-side shocks), financial factors and trade shocks. Risk managers cite their company’s primary macroeconomic risk to be the potential for a recession and the rise in interest rates.⁶³

In 2018, debt levels of US corporations reached a record \$6.3 trillion.⁶⁴ At such historic levels, companies are especially vulnerable - even to small increases in interest rates. As the cost of borrowing increases, company expenditures on research and development, training, acquisitions, capital improvement projects and other growth enabling initiatives tend to be curtailed. Managing financial risks associated with macroeconomic factors, such as foreign exchange and interest rate risk is typically the domain of the finance department. Subscriptions to market analyses and early warning systems are standard for the purposes of tracking and reviewing macroeconomic trends. Many risk teams engage with corporate finance departments to stay apprised of macroeconomic shifts and time scales. Risk teams consume such model outputs as inputs to scenario analysis and are considered in their overall risk management strategies.

⁵⁸ (French 2016)

⁵⁹ (Cambridge Centre for Risk Studies 2014b)

⁶⁰ (Tuveson and Ruffle 2014)

⁶¹ (Belanger and Leclerc 2013)

⁶² (Blanchard, Bown and Johnson 2016)

⁶³ (Cambridge Centre for Risk Studies 2015a)

⁶⁴ (Franck 2018)



Top Risk #8 - Health and Safety

Occupational health and safety management and legislation have a focus on employees but also reflect how an organisation's activities impact the safety of customers and the wider public.

The very long term trend has been for greater attention to be paid to training, monitoring and prevention of accidents and exposure to workplace risks. This can be seen even in recent decades in developed nations, such as the UK's construction industry where accident rates have fallen by a third since 1990.⁶⁵

Long term trends include the shift from a heavy to a light economy with agricultural workers migrating to cities and industrial employment and industrial economies being complemented or to some extent replaced by service economies. This steady shift away from physical labour to service provision intuitively suggests a reduction in exposure to physical hazards. It also leads to different workplace stresses. In the UK in 2016/2017 the main causes of lost days at work were musculoskeletal conditions including back pain and tendonitis, minor illnesses (coughs and colds) and stress, anxiety or depression.⁶⁶ In the US the so-called opioid epidemic has been linked to pain management by healthcare organisations dictated by "the cost-benefit calculations of insurance carriers".⁶⁷

Although the frequency of accidents and injuries appear to be falling over time, the financial penalties for health and safety violations in the UK have been climbing with the five year total from 2012-2016 being roughly double that of the previous period 2007-2011 and an apparent exponential increase in penalties over the decade 2007-2016.⁶⁸

Rising penalties suggest a trend of increasing investment by organisations in improving occupational health and safety. Reducing frequency and direct cost of health and safety incidents and indirect costs including fines, could more than compensate increased cost of health and safety interventions.

The emergence of legislation with international reach for protection of workers' health and safety is part and parcel of global governance. While this is in part a reputational concern, it increasingly entails legal liability. An example is the UK's 2015 Modern Slavery Act which makes UK businesses, with a global turnover of at least £36 million, responsible for reporting on steps taken – or not – to ensure that slavery and human trafficking is not taking place in their operations or supply chains. This signals increasing global transparency and responsibilities of firms and potential liabilities charged against senior officers.

Continuing to look ahead, some good news is promised by the so-called 4th Industrial Revolution, which combines automation and artificial intelligence, in that a significant reduction of workplace risk is anticipated as human activity is gradually replaced by machine activity.

⁶⁵ (Health and Security Executive n.d.)

⁶⁶ (Public Health England n.d.)

⁶⁷ (Meldrum 2016)

⁶⁸ (Arewa et al. 2018)

Top Risk #9 - Geopolitical

Geopolitical risks continue to challenge global companies. Concerns over heightened geopolitical risks across a broad spectrum of categories and their potential to trigger systemic shocks are growing. Although markets have been slow to adapt to this new climate, sustained geopolitical uncertainty will continue to pressurise global businesses by presenting increasingly complex and interconnected risks.

Geopolitical risks are characterised by varied and distinct manmade threats. Unlike natural catastrophe risks, geopolitical risks reside in a fluid environment that can often complicate companies' risk management practices on multiple fronts. From terrorism and social unrest and civil conflict to the extremes of interstate conflict, geopolitical risks can be highly unstable and ultimately costly. Perhaps no other risk carries such diverse and interconnected problems as geopolitical risks and thus is compounded by threat factors outside of both the control and knowledge of companies. Geopolitical issues can lie dormant or intensify according to security or diplomatic interests, going against accepted trend, trade, economic and legal data that most risk managers use to calculate their exposure; and the way in which companies respond is likely to be restricted by policies, regulations and legal frameworks as well as the prospect of media attention.

Contextualising geopolitical risks and their impact on companies can be problematic. Trends and high-level themes such as the rise of populism, protectionism and autocratic governance, the emergence of a challenge to the rules based international system and increasing military tensions such the East and South China Seas, Korean Peninsula and Eastern Europe, have dominated 2017-2018 risk perceptions.^{69 70}

How do risk teams consider geopolitical risk for their companies? Global companies with large international trade and supplier footprints find it challenging to assess their material impacts from geopolitical risks. Scenario analysis is frequently used to play out the risks against a company's business; contextualising, analysing and integrating the consequences into a broader global framework including the organisation's strategy.

Geopolitical risks present a varied threat to global industry. Globalisation has encouraged and developed a highly interconnected business environment in which many sectors remain interdependent on global networks. The marine and transportation infrastructure industries are vital to global networks and remain especially susceptible to geopolitical shocks. Integrating theoretical and strategic logic of how nations cooperate and dissemble in pursuit of their own interests could prove beneficial to risk managers. The goal of making this practical suggests a geopolitical analysis directed to sectoral impacts and ultimately a model that connects geopolitics concerns directly to business operations.

⁶⁹ (Aon Risk 2017)

⁷⁰ (World Economic Forum, 2017)

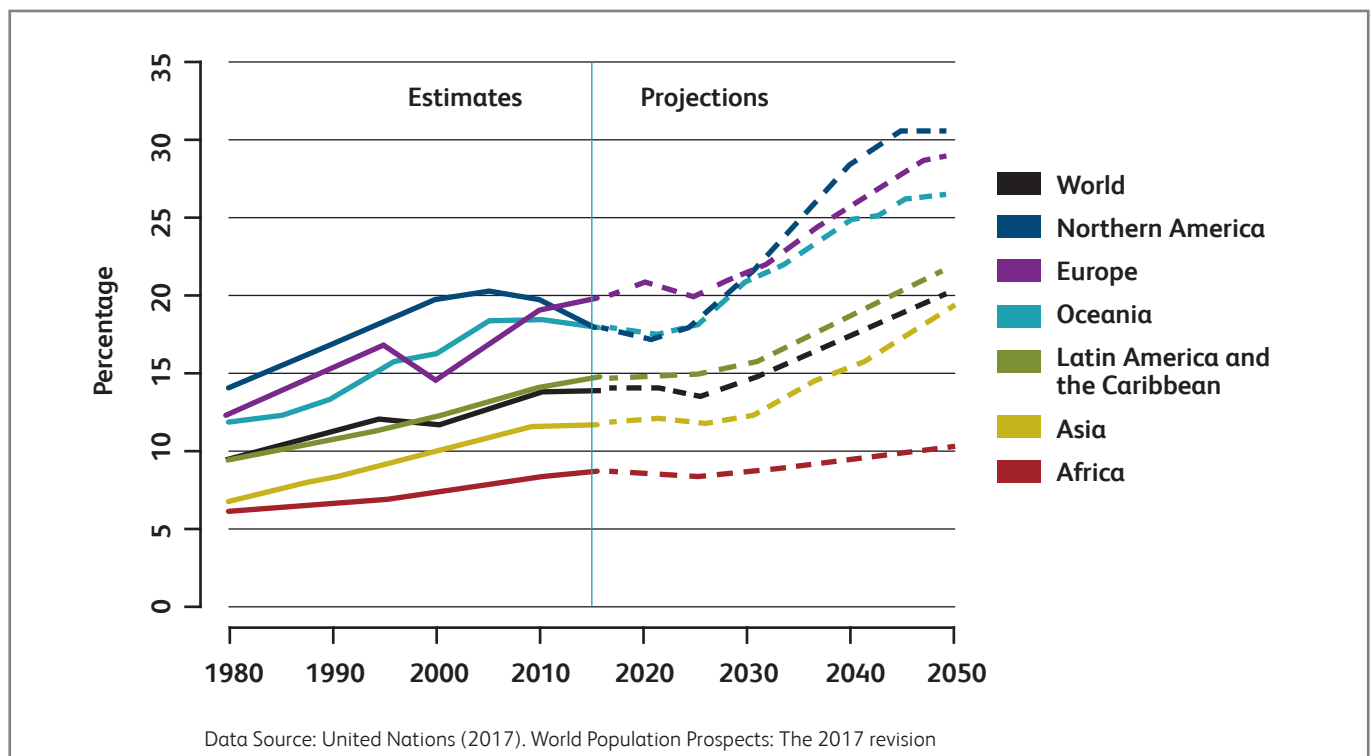
Top Risk #10 - Human Capital

Human capital presents several different dimensions of risk to companies. Research study participants identified changing demographics of the workforce and the aging of global populations as the primary human capital risk for their workforces. Pressures from both labour demand and supply bring greater focus to human resources policies such as pensions, benefits, salary and flexible working conditions.

We are presently witnessing an era where the global population is becoming increasingly aged. According to a 2017 report, the share of the older population that is aged 80 years or over rose from 9 per cent in 1980 to 14 per cent in 2017; however, it is projected to rise on average to over 20 percent of populations in Northern America, Europe and Oceania after 2030.⁷¹ This shift is illustrated in **Figure 12**.

The changing demographics of the global population is reflected in the demographics of the global labour force. In the United States, baby boomers – the generation born between 1946-1964 – make up 24 % of the total US population but 31 % of the workforce. Furthermore, 56 % of baby boomers currently hold leadership positions and 66 % of all US businesses with employees are owned by baby boomers.⁷³ These problems are not restricted to the West alone – in Japan, the current number of 2.5 million chief executives of small and medium-sized companies is predicted to be halved over the next 10 years as founders retire or die without successors.⁷⁴ It is unsurprising in the face of these statistics that the prospect of retiring workers presents a significant challenge to businesses.

Figure 12: Percentage Aged 80 Years or Over Among the Population Aged 60 Years or Over for the World and Regions, 1908-2050.



Source: United Nations ⁷²

⁷¹ (United Nations 2017)

⁷² (United Nations 2017)

⁷³ (Lindegren 2015)

⁷⁴ (Lewis 2018)

In losing baby boomer workers, companies risk losing the historical knowledge that such employees have gained after years in the workforce.⁷⁵ This knowledge is distinct from information that can be accessed through online or educational resources as it is gained specifically through experience including with the client base. Furthermore, new millennial employees joining the workforce have different attitudes towards work as well as different professional goals and values than their older counterparts. This means that companies face the dual risk of losing established employees to whom their current work culture is best suited when baby boomers retire as well as their millennial employees.

The risk of an aging workforce and losing the historical knowledge of established workers is acute in certain sectors. A recent study estimates that the 2020 workforce would fall 5 million employees short of fulfilling employment needs⁷⁶ and this shortage would be felt most keenly in the several of the fastest-growing occupations: science, technology, engineering and mathematics (STEM), healthcare professionals and community services, which have the highest demand for employees with postsecondary education and training.⁷⁷

In some countries, knowledge in certain sectors is concentrated amongst older workers, for example the manufacturing sector in Japan. Some fear that in Japan the technologies and manufacturing know-how accumulated during its high economic growth period after World War II will not be inherited.⁷⁸ Demographic risks associated with the aging workforce in Japan have led to succession crises amongst the leadership of numerous companies.

Fears associated with artificial intelligence and increasing automation relate to the assumption that workers will be made redundant, leading to mass unemployment and societal breakdown. However, one study suggests that the opposite is true and that “the world’s economy will actually need every erg of human labour” to leverage the capabilities of automated machines.⁷⁹ While automation may ultimately be beneficial for business in this respect, it will nonetheless fundamentally change the nature of many workplaces and how organisations and business models are structured. Many companies feature this emerging trend on their risk registers and its related impact on their labour forces.

⁷⁵ (Gaines 2016)

⁷⁶ (Carnevale, Smith and Strohl 2013)

⁷⁷ (Carnevale, Smith and Strohl 2013)

⁷⁸ (Lewis 2018)

⁷⁹ (Manyika et al. 2017)

Bottom Risk #1 - Gender and Diversity

Gender and diversity risk was ranked at the bottom of risks by survey respondents across all sectors. Despite its low prioritisation, we believe it is a material risk that is applicable to all companies across sectors and worthy of highlighting in this report.

Recent decades have seen continuing efforts to end discrimination related to gender and diversity in the workplace and in society more broadly. Gender and diversity risk encompasses equality in income and career progression opportunities, creating a harassment-free workplace and safeguarding vulnerable employees. Ethical management practices include fair hiring with respect to gender, race, religion, disability and other identity backgrounds.

Drives to achieve greater equality in the workplace are not without controversy or criticism.^{80 81} Nonetheless there is growing consensus that greater diversity in the workplace correlates to improved business performance. One study found a direct correlation between diversity at the executive level to profitability and value creation in a study of more than 1,000 companies in 12 countries.⁸² The study also found that companies in the top quartile for gender diversity were 27 percent more likely to outperform their national industry average in terms of economic profit.⁸³ The business case for greater diversity also has been made in the form of improved company governance. This includes better practices in managing broader stakeholders by taking greater care in sustainable environmental practices, enhanced corporate social responsibility, organisational culture, recruitment and retention of talent.

Liability risk is a general concern for all large companies and gender and diversity present liability exposures. The potential for large financial losses exists and companies are actively trying to manage this risk. One mitigation measure for gender and diversity risk is to increase representation of diverse employees across the entire spectrum of a company. This ranges from entry-level to senior level employees as well as board seats. The mechanisms for doing so are less obvious as the challenges range from filling a pipeline of qualified candidates to changing

⁸⁰ (Sherbin and Rashid 2017)

⁸¹ (Wakabayashi 2017)

⁸² (Hunt et al. 2018)

⁸³ (Hunt et al. 2018)



company specific processes for hiring and promoting. Representation of diversity in a company can be gleaned through metrics such as gender and income balance at entry, senior, board levels. However, the numbers do not tell the whole picture as there are many other factors involved such as the strength of the company culture and governance structures.

As social justice movements such as #metoo have raised public awareness regarding workplace misconduct, companies are increasingly interested in coverage for discrimination claims as well as improving internal programs targeting discrimination and harassment. The rising penetration of Employment Practices Liability Insurance (EPLI) demonstrates the risks associated with discrimination claims and the possibility of mitigation through risk transfer structures.

The recent public stories of inequities associated with gender and diversity highlight the power structures prevalent in many societies and the immutability of certain organisational cultures. Recent high-profile allegations have brought egregious behaviours of prominent individuals to the public eye and awoken frustration and outrage that many have quietly suppressed for fear of recourse. It is unclear whether the recent surge of media attention and legal redress will bring about permanent change, but many are hopeful that barriers for a more open society have successfully been challenged and that further progress related to gender and diversity will be forthcoming. Ultimately, businesses making improvements in workplace culture are likely to see increases in productivity as a result of greater employee satisfaction and engagement.

⁸⁴ (Quintano 2017)

Section 5: Trend Risks

A majority of survey respondents, 72%, believe that the risks facing their companies are increasing in all respects: frequency of occurrences, severity of consequences, scope of exposure and potential for unplanned reach into their organisations. 10% of survey respondents believe that risks are not increasing. The survey also contrasts attitudes to short term (next 12 months) versus long term (next decade) risk. See **Figure 14**. In most cases, the categories surveyed elicited similar short and long term risk attitudes. Some areas of high concern where short and long term views apparently differ are summarised in **Figure 13**.

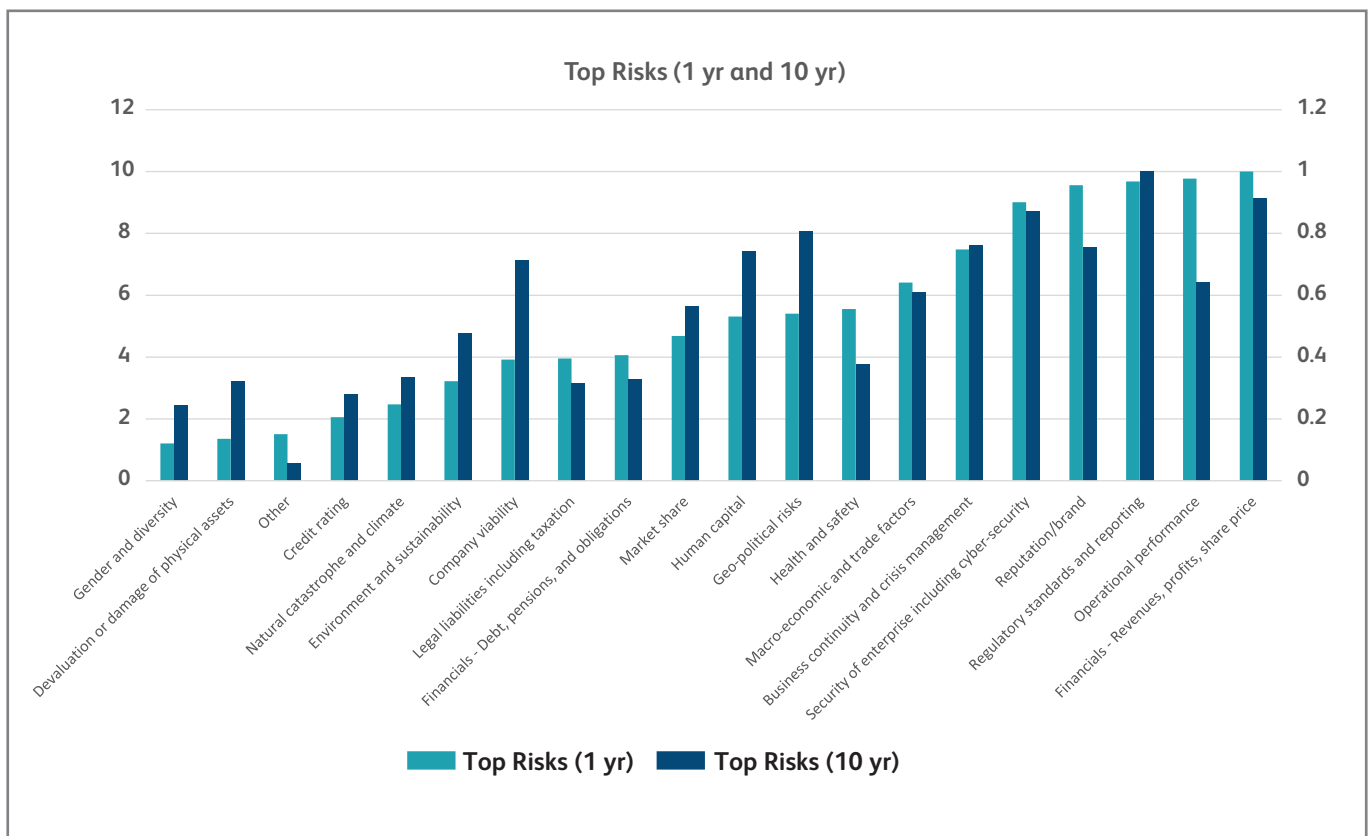
Intriguingly, Reputation/Brand features much more strongly as a short rather than long term risk. Although it can be argued that reputation, an intangible asset, is a signal of value which is tied to the longer term, such as a potential for growth of the top line on the back of brand recognition, survey respondents prioritised the shorter term outlook. On the other hand, for two risks of apparently low concern, Physical Asset Damage and Gender & Diversity, the long term risk is more salient than the short term risk.

Figure 13: Differences in Short and Long Term Priorities for Top Risks.

Dominant timeframe of concern	Top risk categories of concern
Short term	Operational Performance Reputation/Brand Health & Safety
Long term	Geopolitics Human Capital Viability Environment and Sustainability

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Figure 14: Top Enterprise Risks of Potential Concern for Companies – One and Ten Year Views.



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Exploration of Risks and Trends through Scenario Analysis

Scenario analysis is a common approach used by managers to view their organisations in an imagined state. Scenarios are often used to help plan for uncertainty in both the business and global environments. This allows challenge to the business-as-usual mentality in the context of risks, whether internal to the organisation or external/systemic, short or long term, or having the characteristic of a shock or a trend. Perhaps the most common use of scenarios is as stress tests, whether via operational shocks or strategic challenges. Scenario applications range from planning or testing tactical capabilities, in business continuity, crisis response and operations, through to strategic or blue sky-type of analysis.

Of the survey respondents, 63 % said their company uses scenarios as part of their business risk analysis. Meanwhile respondents highlight that there is not a standard scenario library tool for companies to use for assessment and management of risk.

A key component of strategic scenario planning is the identification of driving forces or trends, which are the underlying drivers of change. **Figure 15** summarises the processes that survey respondents reported for identifying potential or emerging risks. In Appendix B: Five Trends Driving Macro Changes, we highlight five trend scenarios for further review.

Figure 15: Processes for Spotting Potential Risks.

Rank	Processes for Spotting Potential Risks
1	Regular monitoring of activities and staff within the organisation
2	Regular senior management (e.g. Board) interactions
3	Emerging Risks or Horizon Scanning
4	Regular monitoring of external events relevant to the organisation
5	Strategic Planning and Review
6	External input on risks from, e.g., industry bodies, conference, consultants
7	Integration with environment, sustainability and governance (ESG)

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Applications of Scenarios Reported by Survey Respondents

A wide range of applications of the scenario stress tests were cited by survey respondents and they are summarised below:

- Annual supplier renewal and reviews
- Capital allocations and reviews
- Content for annual reports and viability statements
- Information Technology infrastructure
- Insurance/reinsurance purchasing
- Operational capability and business continuity
- Preparedness planning
- Risk tolerance and appetite benchmarking
- Strategic planning and market assessments

Sample Scenarios in Use by Companies

In this section, we highlight some examples of scenario topics reported by survey respondents and interviewees. The respondents cited these scenarios as being materially impactful, either operationally or strategically, to their organisations. Where similar scenarios were cited, we combined them to convey general information and highlight salient learnings.

Severe Recession – A company has a substantial retail component to its business; the possibility of a severe recession is a major risk. It runs a scenario of a severe recession resulting in 50 % declines in sales. The results are presented to the senior leadership team. The scenario enables the company to highlight its balance sheet risks and socialise the need to raise additional capital. Consensus is reached to seek access to a deep line of credit which, at the time, is relatively cheaply secured with the banks. This is an optional life jacket for an economic storm event which may not occur.

Note: This scenario was explored prior to the Great Financial Crisis. The recession scenario materialised, starting in 2008. While competitors were not able to obtain credit and carry stock, this company weathered the storm from 2008-2010 by maintaining gross sales. Additionally, they gained an extra 10 % market share from its competitors, propelling them from 30+ % to 40+ % of total market share.

Loss of Suppliers – As part of their strategic planning activities, annual viability reporting process is used to initiate a company-wide review of concentration risk of suppliers. This includes modelling the impacts of losing a supplier for active ingredients required during a product

manufacturing process. This assessment process contributes to a better understanding of the significance of their volume of ingredients being purchased and their criticality to the bottom line. Processes to identify additional critical suppliers are initiated.

Loss of Top Corporate Clients – In order to stress test its demand concentration, a company writes a stress test around the loss of their top corporate clients and evaluates the shock to their earnings. This scenario incorporates concepts from the supply concentration risk scenario but focusses on demand dynamics. The company runs the scenarios using several different magnitude variants against their sales and revenue targets. The stress tests result in acceptable profit margins and allow them to assure the board of their viability in the event of the worst case scenario.

Multiple Category 5 Hurricanes – Company runs simulations of multiple hurricanes occurring concurrently. Variants include the number of hurricanes versus the magnitude. Trade-off analysis confirms cost/benefit of reinsurance protection and impact on capital. It confirms the financial stability of the company even through a crisis that is relatively large and relatively rare, occurring only once every one or two centuries.

Severe Wind Events – Company uses wind data from previous years against the current book of business in a number of stressed scenarios, i.e., counterfactual wind scenarios with increasing book losses of 5%, 10% and 25%. Recoveries are measured against the current reinsurance programme to evaluate the total losses and assess capital adequacy.

Property Crash – Since the company has significant real estate holdings and interests in Hong Kong, scenarios are used to assess their potential financial obligations. Different variants of the stress test scenario feed into the design of internal processes for monitoring the Hong Kong property markets.

Cyber Attack – Company seeks to better understand and test their crisis management response capabilities addressing a major data loss incident from a cyber attack. The scenario exercise allows them to think through their contingency funding planning process and communications plans for the incident. Through the scenario process, management identifies key staff who are unaware of the playbook that ERM teams have developed and their roles in emergency response. Cyber scenarios also inform mitigation planning and consideration for cyber insurance purchase.

Infrastructure Failure – Company wants to update procedures for responding to emergencies and formalise processes for collaborating with external agencies during an emergency event. They use scenarios of broad infrastructure failures such as loss of access to key buildings, wide transport disturbances and fires, to drive this assessment. The scenario exercises highlight the need for collaboration with civil defence and other disaster management agencies in their city and gives awareness of best-in-class emergency procedures. By thinking through the loss of access to a key building, the company recognises the need to back up data and have alternate access to data and current projects.

Section 6: Risk Management Tools and Processes

Risk Management Tools

Based on research participant feedback, we learned that many companies rely on internally developed tools and approaches to support the management of the majority of their risks. Interview participants indicate that appropriate market tools are limited in their capacity to satisfy their requirements and address many of their top risks. Many risk managers report that spreadsheets and other self-designed tools are the primary tools in use to support ERM requirements. Senior executives from risk and business functions note that different risks have different timelines and parameters for effective comparisons. For example, risks relating to Corporate Social Responsibility were cited as being outside the viewpoint of heatmaps and other typical visualisations of risk management tools. We review in **Figure 16** some of the ways that survey respondents plan for an uncertain future.

Figure 16: Ways to Plan for an Uncertain Future.

Rank	Ways to Plan for an Uncertain Future
1	ERM and strategic planning and assessments
2	Improved processes and metrics for strengthening risk culture through organisation
3	Greater role of ERM in setting and monitoring risk appetite
4	Quantified assessment of strategic risks and opportunities
5	Quantified loss or damage assessments for the major threats to your organisation
6	Quantified assessments of mitigations (measures and capabilities) to respond to shocks to the organisation
7	Integrating ERM and balance sheet planning and assessment
8	Integrating ERM and ESG planning and assessments
9	Insurance policies for threats that are not currently insurable
10	Other

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

The reported characteristics of risk management tools reported by respondents are summarised in **Figure 17**. When asked for respondent's agreement on whether their risk management tools supported each characteristic, contribution to risk reporting was ranked the highest and support for insurance purchasing is ranked the lowest.

Figure 17: Characteristics of Risk Management Tools.

The risk management tools/ analytics/models used at my company...	Level of Agreement Scale 1 to 5
Contribute to risk reporting	4.26
Allow risks to be prioritised	4.12
Help identify enterprise risks	4.00
Allow for a portfolio view of enterprise risks	3.88
Support board level decisions	3.80
Support strategic or long term decision making	3.75
Integrate mitigation strategies	3.64
Help to make insurance purchasing decisions	3.37
Funded from ERM budgets	3.19
Overall, I am satisfied with our ERM tools	3.15

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

What is particularly interesting is the lack of maturity in the development of risk management tools to support the risks that feature in the top ten list. This includes Geopolitical risks, Reputation, Company viability and Macroeconomic and trade factors. The percentage of survey respondents having dedicated tools, analytics and models to address the top risks are listed in **Figure 18**.

Figure 18: Percent of Dedicated Risk Management Tools per Risk Area.

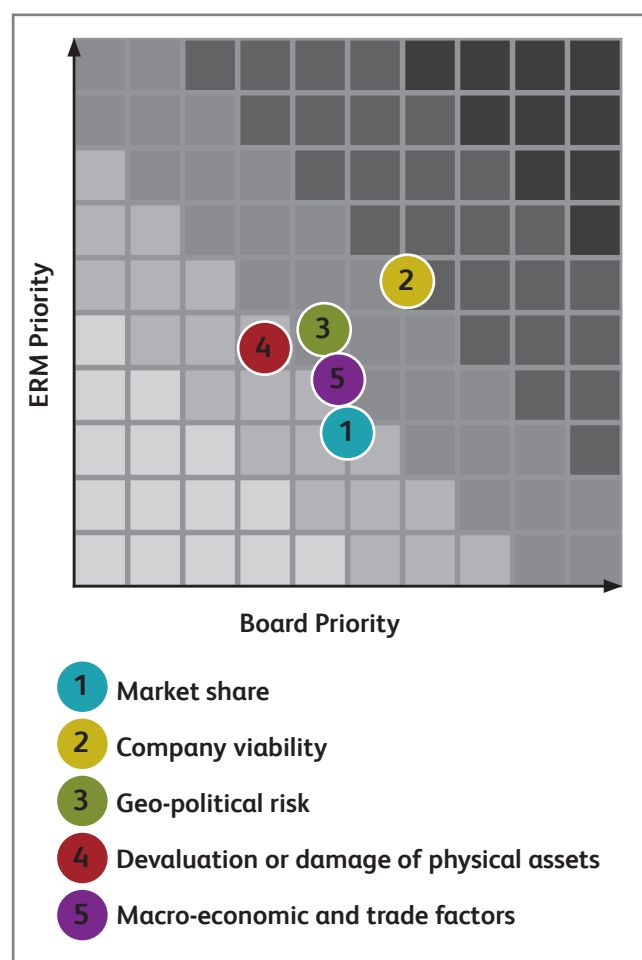
Risk Area	Percent with Dedicated Tools
Financials – Revenues, profits, share price	65 %
Operational performance	57 %
Business continuity and crisis management	55 %
Health and safety	52 %
Security of enterprise including cyber-security	52 %
Financials – Debt, pensions and obligations	50 %
Regulatory standards and reporting	49 %
Human capital	38 %
Legal liabilities including taxation	35 %
Credit rating	31 %
Reputation/brand	31 %
Environment and sustainability	27 %
Company viability	26 %
Market share	24 %
Macro-economic and trade factors	19 %
Natural catastrophe and climate	19 %
Devaluation or damage of physical assets	18 %
Geopolitical risks	14 %

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

A discussion covering the availability and utility for dedicated ERM tools was held during a focus group session with ERM Directors representing a cross section of sectors. The priorities for better tools for viewing and assessing risks were raised in parallel at the board level and at the level of the ERM teams. Board risk committees are common in financial services companies, but less so for non-financial companies. Nevertheless, board members across all sectors are responsible for understanding a broad set of risks that their companies face and seek a consolidated view of these risks.

Figure 19 shows a summary from a poll taken by the focus group regarding both the ERM team and board priorities for dedicated ERM tools. A dedicated tool for understanding company viability was conveyed as being the highest priority for both groups.

Figure 19: Priorities for Dedicated ERM Tools for Risk Areas.



Source: Cambridge Centre for Risk Studies; 2018 ERM Focus Group

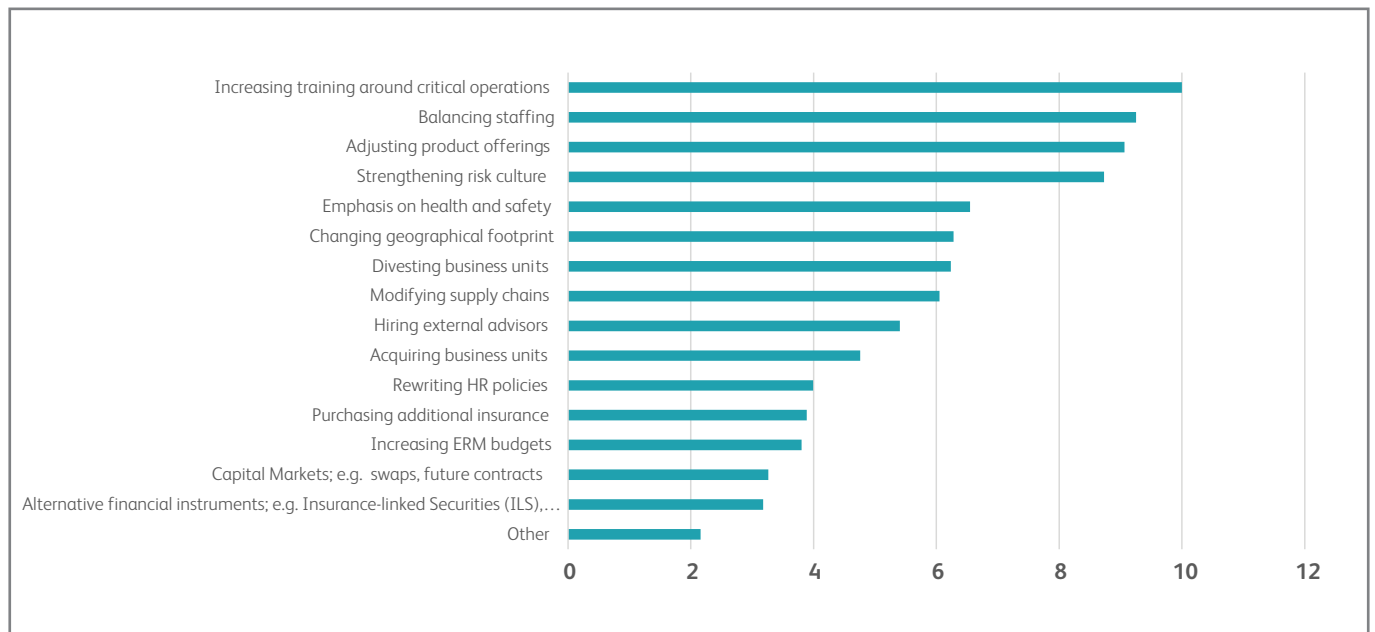
Top Mitigation Strategies

Survey respondents were asked to rank the top 10 risk mitigation strategies that their companies are currently planning. They tended to list as priorities mitigation strategies relating to their workforce rather than the purchasing of risk transfer instruments through capital or insurance markets. The top mitigation strategies include increased training around the company’s critical operations, balancing staff and strengthening risk culture. Specific business focussed mitigations include adjusting product offerings, changing geographical footprint of operations, divesting business units and modifying supply chains.

Figure 20 summarises the top risk mitigation strategies currently being planned at companies as reported by all survey respondents. The two lowest priority categories are purchasing swaps and futures contracts through the capital markets and purchasing additional insurance coverage.

The mitigations captured within the Other category address contract items such as using legal mechanisms to transfer risks including indemnity, hold harmless and negligence and liability clauses. Greater budgets for contingency events, increasing subcontracting and establishing greater clarity in internal communications were also cited by specific respondents as important mitigations.

Figure 20: Top Risk Mitigation Strategies Currently Being Planned at Companies.



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Budget Priorities for Top Risks

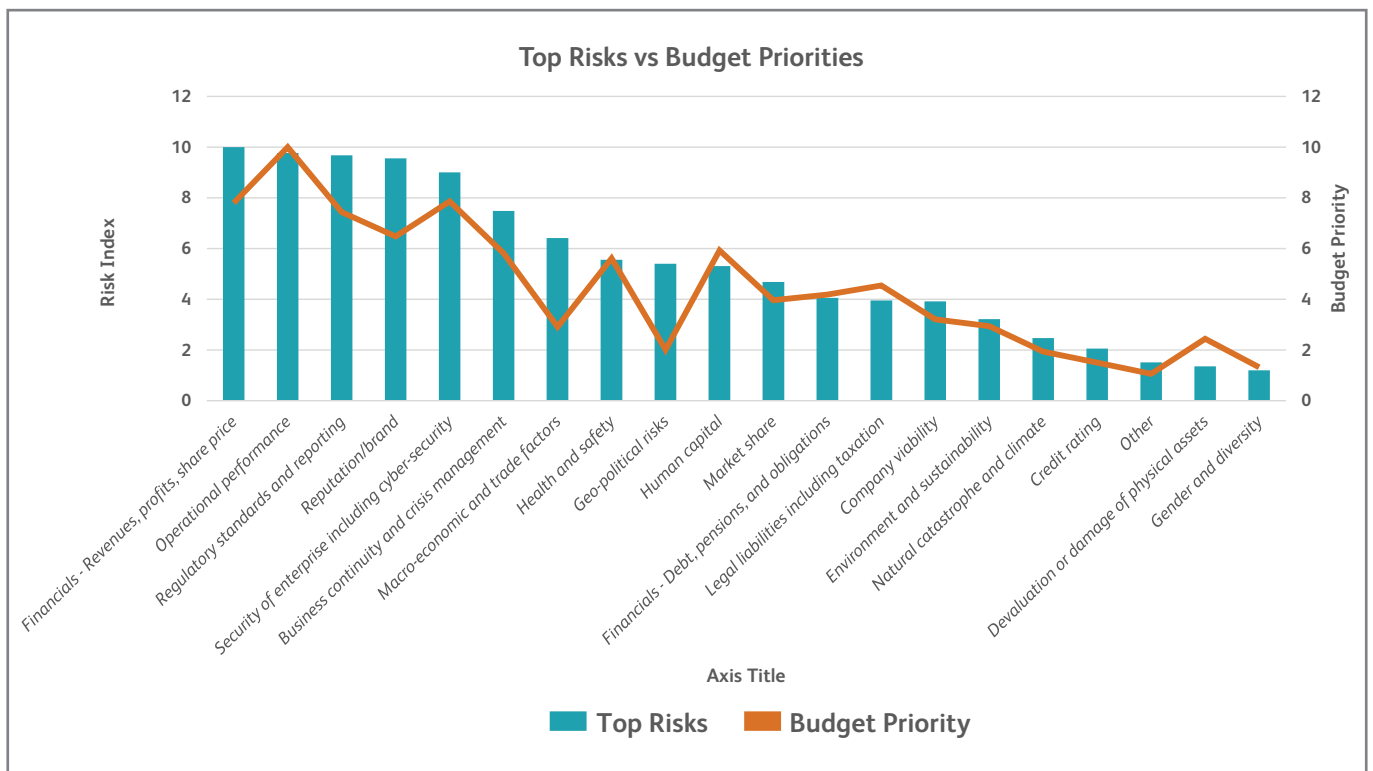
Managing and mitigating risks in a company require workforce attention and focus throughout all levels of seniority. It is difficult to measure the level of effort applied towards the mitigation of a risk. Budget priority is one proxy for gauging organisational commitment.

Figure 21 overlays budget priorities towards managing and mitigating the top risk as reported by survey respondents. The figure shows that while budget priorities generally track risk profiles; the greatest spreads between the two indicators are associated with reputation/brand, macro-economic and trade factors and geopolitical risks.

Role of Insurance in Risk Management

Survey respondents report little overlap between the activities of ERM teams and those involved in insurance purchasing and suggest there is considerable organisational distance between the two departments. Insurance purchasing is viewed as a niche activity undertaken within finance departments with little interaction with ERM teams. Some companies hold monthly risk meetings for the head of ERM and Insurance teams.

Figure 21: Budget Priorities for Top Risks at Companies.



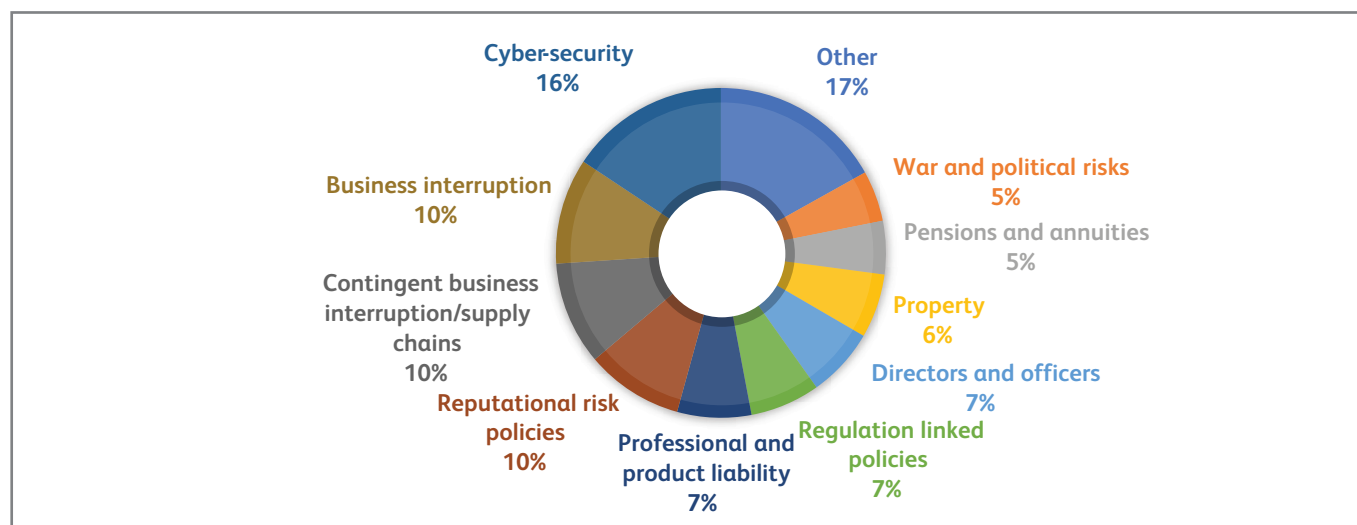
Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Interviewees identify some limitations of insurance, such as lack of relevant products, unavailability of appropriate scale and absence of bespoke sector specific insurance products. One ERM director commented that weather is the company’s biggest risk and feels that insurance products are unavailable to help mitigate this risk to the company’s operations. Liability insurance, particularly non-damage business interruption, is viewed to be poorly served by the current offerings. Risk management directors confirm that there is a divide within their companies between insurance purchasers and ERM teams. Large purchases of liability insurance are viewed as being unnecessary by ERM teams and they feel that oftentimes such purchases are made to validate the insurance purchasing department. The organisational distance between risk management and insurance purchasing may be a real and continuing obstacle for companies to consider the full basket of risk mitigation tools and strategies.

The process of purchasing insurance is challenged as being inefficient and lacking transparency. Further comments are summarised in **Figure 22**.

Analytical limitations in the insurance industry are also highlighted. It is noted that insurance modelling needs greater sophistication and to be more customer-centric with its offerings. As reported by survey respondents, **Figure 23** shows the relative levels of demand for future insurance products to mitigate top risks to their companies. The interviewees express hope for ‘insurtech’ solutions and greater access to technology to bridge the gap.

Figure 23: Additional Insurance Offerings Sought by Companies.



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Figure 22: Perceptions on Limitation of Insurance in ERM at Companies.

Perceptions on limitation of insurance in ERM at companies	GIC Sectors
Lacking relevance: Insurance is mostly relevant for physical assets	Healthcare
High premium costs: Premium costs are too high and better to allocate capital towards research and development or other value generating expenditures	Information Technology
Limitation scale of insurance markets: Insurers cannot compete with large company balance sheets; only option is to self-insure	Energy
Process innovation needed: Interest from companies to package up risks and auction them off in tranches	Healthcare, Energy
Lack sector specific products: Insurance product unavailable to address company’s top risks.	Utilities
Misaligned incentives: Insurance is mostly purchased to satisfy license requirements by host countries to cover assets and other structural reasons.	Materials
Excess cash balance: Companies with high cash balances see better value to self-insure	Consumer Discretionary
Suitability of cyber products: Current market offerings do not sufficiently address needs	Financials

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Section 7: Conclusion and Future Research

The objectives of the research presented in this report were to review the top risks concerning risk teams at global corporations and highlight their views and practices in addressing those risks. This encompassed both short term and long-term time horizons. A list of top ten risks was presented as both a collective ranked list and one categorised by sectors. We expect the priorities of risks to be highly dependent on the pool of individuals surveyed and the current societal, economic and geopolitical environment.

We introduced and described the prevailing conditions within which corporations are currently expected to operate, as we felt that was important background to better understand the risks reported by senior executives concerned with an enterprise-wide view of risks. The survey and focus group participants represent risk management teams across a wide range of corporations. This diversity in perspectives highlights the lack of an accepted view of mission, scope and ultimately, value of ERM.

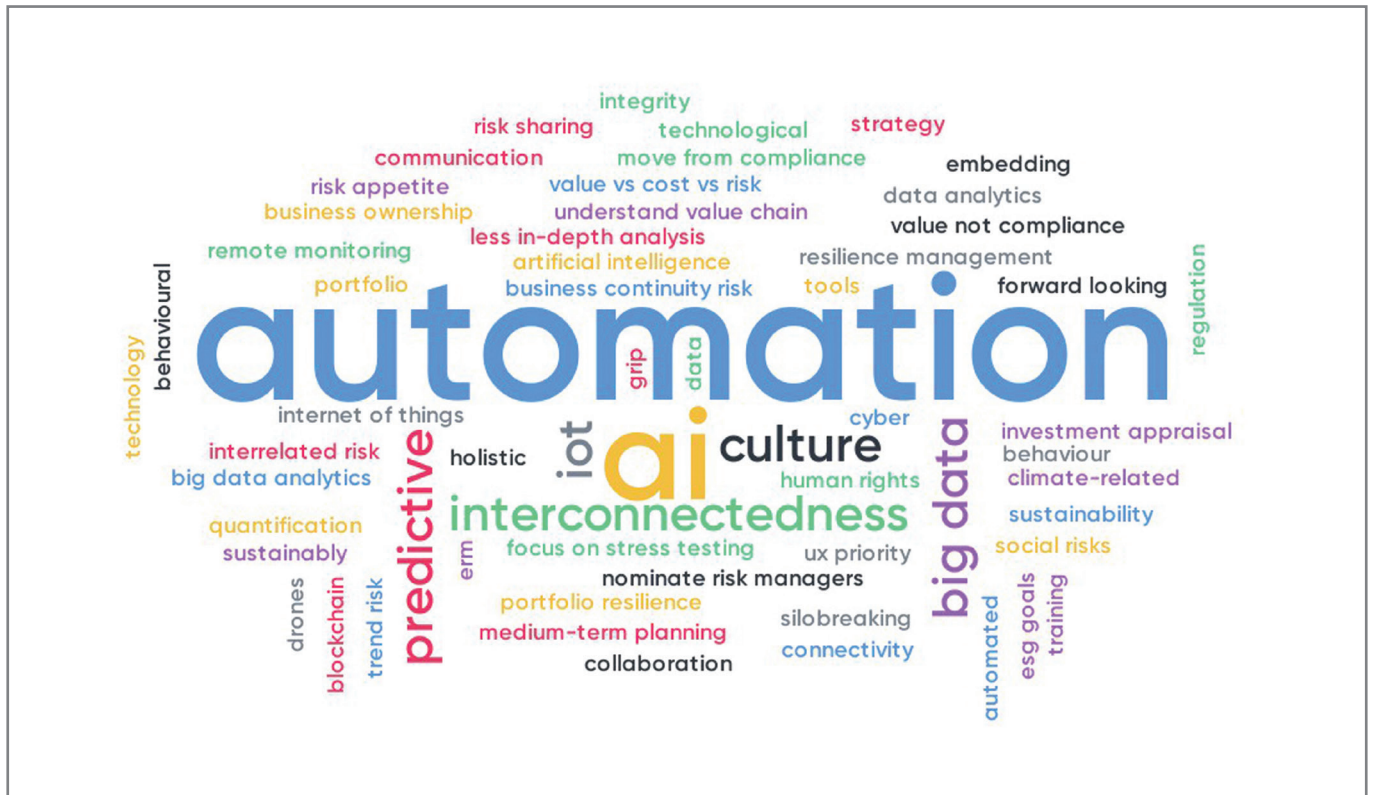
Additionally, we believe that much scope exists to advance the field of corporate risk management. This is both in response to the changes that are occurring within society and to address gaps in current capabilities and scholarship. From the perspective of the Cambridge Centre for Risk Studies, our next phase of research will include a deeper exploration of risk management practices for a sector or a sector's value chain. Some subjects for further exploration include the following:

- **Definition of a Corporation** – Analyst's descriptions of a corporation are largely in financial terms from an accounting perspective. An integrated taxonomy is needed to describe other characteristics of a company such as strategy, human capital, footprint, supply chain and other key elements that define its identity. We believe this could be foundational as a base for overlaying new risk analytics.
- **Pervasive ERM Tools** – A consistent theme throughout our research is that ERM tools are not available to address many of the top risks and that where they exist, their functionality must oftentimes be patch-worked together. Viability and geopolitical risks are iconic examples that survey respondents highlighted reflecting this gap.
- **Organisational Distance** – Conceptually, risk transfer is an integral part of an overall risk management strategy. In reality, formal risk transfer responsibilities largely lie with corporate finance departments who have very little interaction with ERM teams. Further analysis is needed on the value of shortening the organisational distance between these two groups and the value of greater integration in terms of more effective management of risks.

- **Integrated Risks Per Consolidated Corporate Balance Sheets** – It is a powerful concept to have the capability to envision quantitatively a corporation's total risk exposure as a function of its consolidated balance sheet. It would be advantageous to have a clearer enterprise view in order to apply risk management strategies throughout and use a comprehensive threat assessment to provide supporting analysis enabling mitigations such as strategic contingency plans to provide greater resilience.
- **Technology, Artificial Intelligence and Robotics** – While there are growing challenges in the global environment, improvements in culture, automation, transparency, modelling and data analytics give reason for optimism. Participants in our research particularly highlight the central theme of disruptive technology in the form of artificial intelligence (AI), robotics and a general increase in automation. Referred to by many as the Fourth Industrial Revolution, this new phase of development for society foresees that AI will drive automation beyond warehousing and assembly lines into the workforce at large. This will revolutionise employment practices and opportunities in entire sectors, indeed nations. At the same time, the growth of digital technology will come with unpredictable growth in the threat of disruption or damage from cyber accidents or cyber attacks. Risk teams at the most senior levels of organisations are called on to recognise and manage the risk of uncertainty associated with this new order and the challenges to our understanding of privacy, governance, corporate identity, and organisational structures.

We conclude by asking, what does the future of risk management look like? Focus groups responded to this question by providing key words to describe future waves of change in the field of risk management. While there are growing challenges, it seems clear from the various inputs to this study that improvements in culture, automation, transparency, modelling and data analytics combine to give reason for optimism. Enterprise risk managers have future focal points in culture of organisations, interconnection of ecosystems (and risk) and sustainability as an area for development. A focus group comprising of energy value chain risk managers are more orientated towards big data and artificial intelligence to understand connectivity and complexity. We summarise by presenting a consolidated word cloud showcasing responses from all focus groups in **Figure 24**. While figurative, the collection of words conveys the expanse of risks facing corporations both in terms of identification and management.

Figure 24: Next Wave of Change for the Field of Risk Management.



Source: Cambridge Centre for Risk Studies

Appendix A: Materials, Methods and Expertise

Research Engagement with Subject Matter Specialists

The research presented in this report was informed by views from risk management specialists representing private and public sectors. These views were elicited through a combination of individual interviews, workshops, focus groups, a verbally administered survey, real-time polling and an online survey. Each of the engagement sessions are described below:

One-on-one interviews of 60 minute durations were conducted with 14 selected specialists across distinct companies to gain insight into the ERM practices at their companies. The interviews were structured to cover qualitative issues including the following:

- Enterprise value of risk management
- Emerging risks and their respective processes for identifying, prioritising and managing them
- Factors for consideration of top risks
- Role of insurance in their risk management process
- Specialised risk management tools
- Appropriate risk metrics

ERM workshops were held with 20 senior level participants working in ERM functions from companies, insurance companies and global banks. The risk managers with ERM specialisation from insurance companies and global banks were included to provide a complementary view of how financial institutions assess health and viability of companies to whom they provide insurance, capital and credit. A real-time polling survey was administered and anonymous responses were gathered using a polling tool. The workshop covered the following topics:

- Assessing risk maturity of companies
- Process of determining credit worthiness of companies
- Mitigation of top risks

A focus group session with 14 Directors of ERM from major companies was held to discuss top risks to their companies and associated responsibilities for mitigation. A real-time polling survey was administered and anonymous responses were gathered using a commercial polling tool. The topics of the survey included:

- Concerns associated with their top risks regarding counterparties, transparency, systemic span and consequences

- Cost/benefits of resilience
- Governance of mitigations
- Board priorities
- Investment in ERM tools

2018 ERM Online Survey

An online survey of 85 questions was administered to the IRM and Cambridge membership base. Its content was informed by the verbally administered survey and the insights from the individual interviews. Survey data was collected through a third party survey tool and exported to a comma delimited file for use with third party analysis software.

The respondents represented numerous sectors, geographical regions, job titles, rank and tenure. A total of 264 responses were collected and used in the analysis and on average took 30 minutes to complete. The identity of the respondents and their companies are not used in the survey. To ensure the high quality and validity of the survey results, Cambridge worked to communicate the questions and breakdown of multiple-choice answers as effectively as possible. The categories of the survey questions are listed in **Figure 25**. Each question and multiple-choice response were worded to try to prevent leading questions that might unduly favour responses. To minimise order effects (bias resulting from the order that questions and options are presented), common multiple-choice answers were presented in various orders. The order variation paired with reverse phrasing of questions also ensured all participants were reading and responding accurately.

For maximum information content, partial completions were considered in the results. Best practice for social science surveys considers analysis of fewer than 32 data points to be unreliable. Our analysis size exceeds that figure for all questions.

An indexing algorithm was used to average and normalise survey responses from questions regarding rankings and priorities. The indexes were constructed by linearly fitting data to a range between zero and ten, with ten indicating the highest level of importance or priority. See **Figures 6, 10, 11, 14, 20, 21**.

The survey was divided into six discrete sections. Respondent confidence levels across the sections were queried as part of the survey. Respondents had the highest confidence levels in commenting about their risk

management tools and processes with 81 % saying they had either high or highest confidence levels in their answers. Respondents had the lowest confidence their responses to regarding their risk mitigation strategies. See **Figure 25**.

Figure 25: Survey Confidence Levels.

Survey Confidence Levels	Respondents with High Confidence
Risk Management Tools and Processes	81 %
Your Role in Managing Risk	81 %
Risk Governance and Culture	76 %
Organisational/Company Description	68 %
Crisis Response Capabilities	67 %
Risk Mitigation Strategies	57 %

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Enterprise Size and Revenues

Survey respondents had the option to either submit their answers anonymously or indicate their company name; however, company names, when given, are not used in the survey analysis.

Number of Employees - Size of enterprise is one of the leading attributes of factors collected by analysts and insurance writers. Size is both an exposure differentiator and a risk factor. For example, most writers of cyber insurance at least differentiate large companies from small and medium enterprises (SMEs).

Annual Revenue - Revenue information is important as a cross-reference for company size. The annual revenue of a publicly traded company is public information.

Geographical Jurisdictions

To better contextualise the responses from the survey, respondents identified their top five countries of responsibility. This helps reflect the networked nature of the globalised economy. Corporate headquarters or division locations can be very different to locations of business responsibilities. A selection of the top 40 countries by gross domestic product were the available options. The International Monetary Fund's list of 2017 countries was referenced.

Business Sector Classification

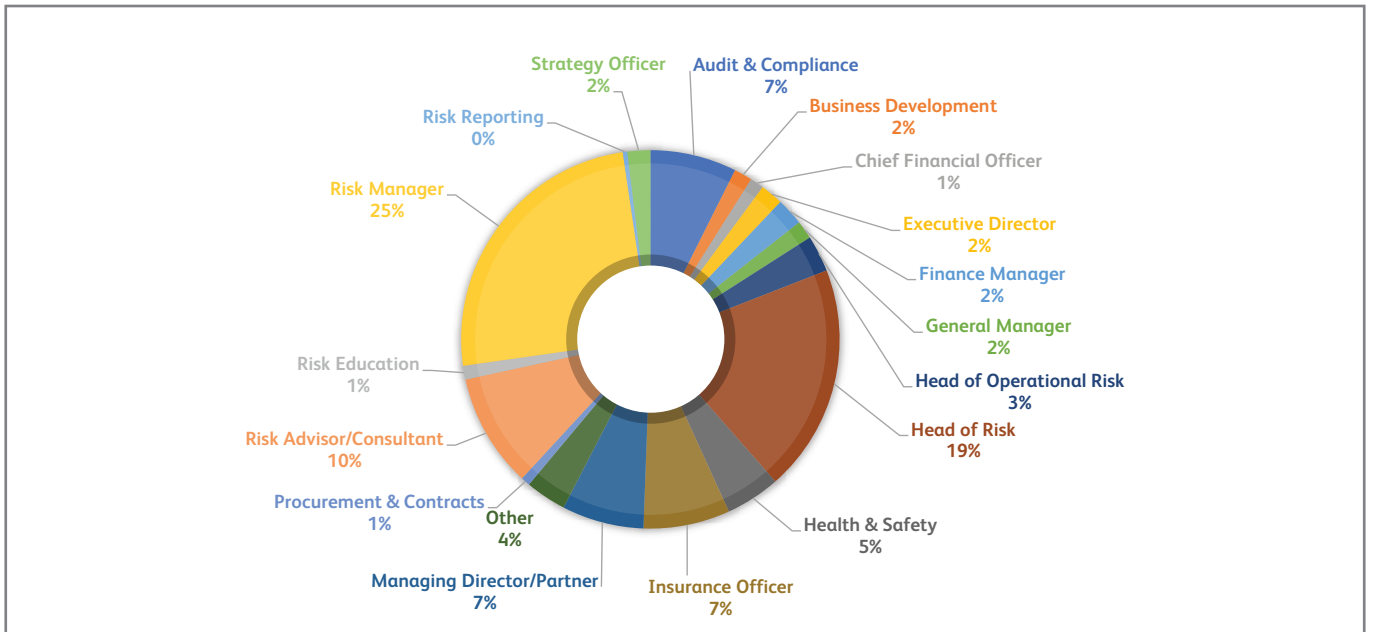
Business sector segmentation is important for understanding a company's risk profile, exposure management, regulation and market developments. Cambridge's business sector classification includes a mapping to the Global Industry Classification Standard (GICS) Structure by S&P Dow Jones Indices and MSCI Inc. The GICS structure consists of 11 sectors, 24 industry groups, 686 industries and 157 sub-industries. This classification system goes through an annual review process involving market views to evaluate the sectors and industry allocations. Where there are multiple mappings from Cambridge's business sector to GICS, a single GICS sector has been designated for the purposes of survey analysis.

Note: For the purposes of the survey data analysis, the GICS Consumer Staples sector has been combined with the GICS Consumer Discretionary sector. This combined sector encompasses businesses that are most and less sensitive to economic cycles. Its manufacturing segment includes automotive, household durable goods, leisure equipment and textiles & apparel, distributors of food, beverages and tobacco. It includes food & drug retailing companies as well as hypermarkets and consumer super centers. The services segment includes hotels, restaurants and other leisure facilities, media production and services, and consumer retailing and services. It also includes producers of non-durable household goods and personal products.

Survey Respondent Profiles

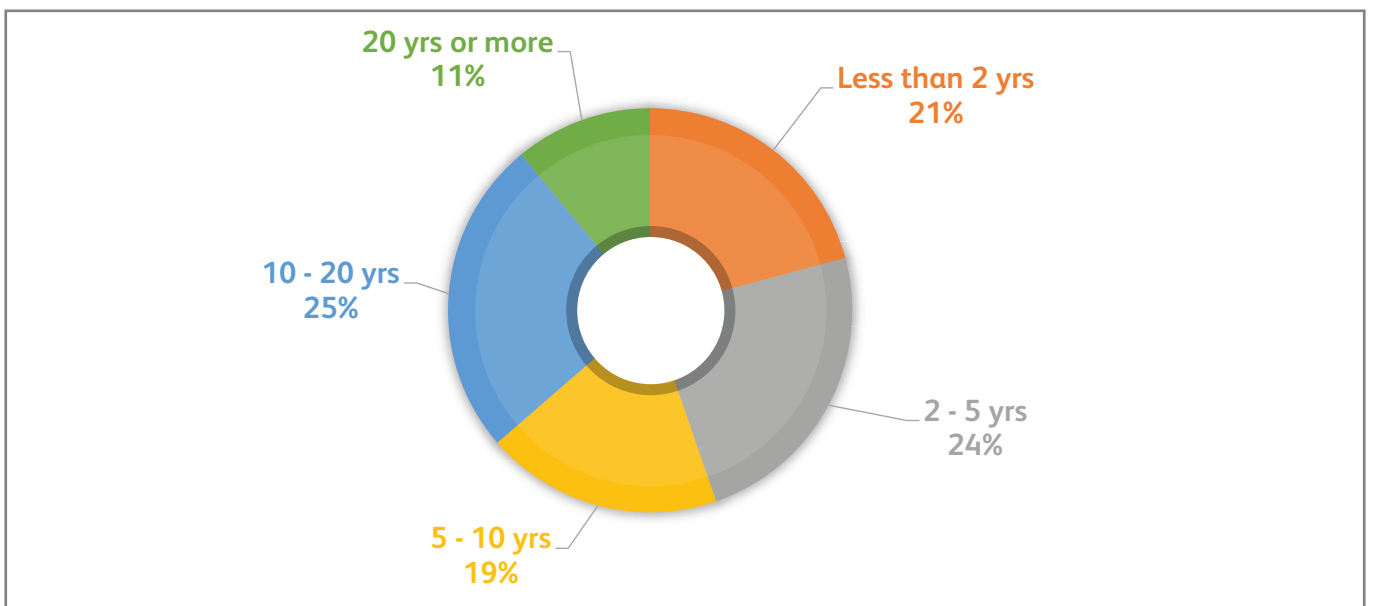
The 2018 ERM survey was administered to the IRM membership and to Cambridge's Chief Risk Officer (CRO) and ERM communities. We are enormously thankful for their engagement and time commitment in completing the survey. Clear declarations were presented at the start of the survey to ensure options for anonymity of individual and company. Where survey respondents provided their personal and company identities, we have likewise protected this information. The survey information may be retained beyond the publication of this report for future research at Cambridge. We have not incorporated direct quotations without express permission from survey respondents. Self-reported profiles of survey respondents can be viewed in **Figure 26** through **Figure 32**.

Figure 26: Job Descriptions of Survey Respondents.



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Figure 27: Company Tenure of Survey Respondents.



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

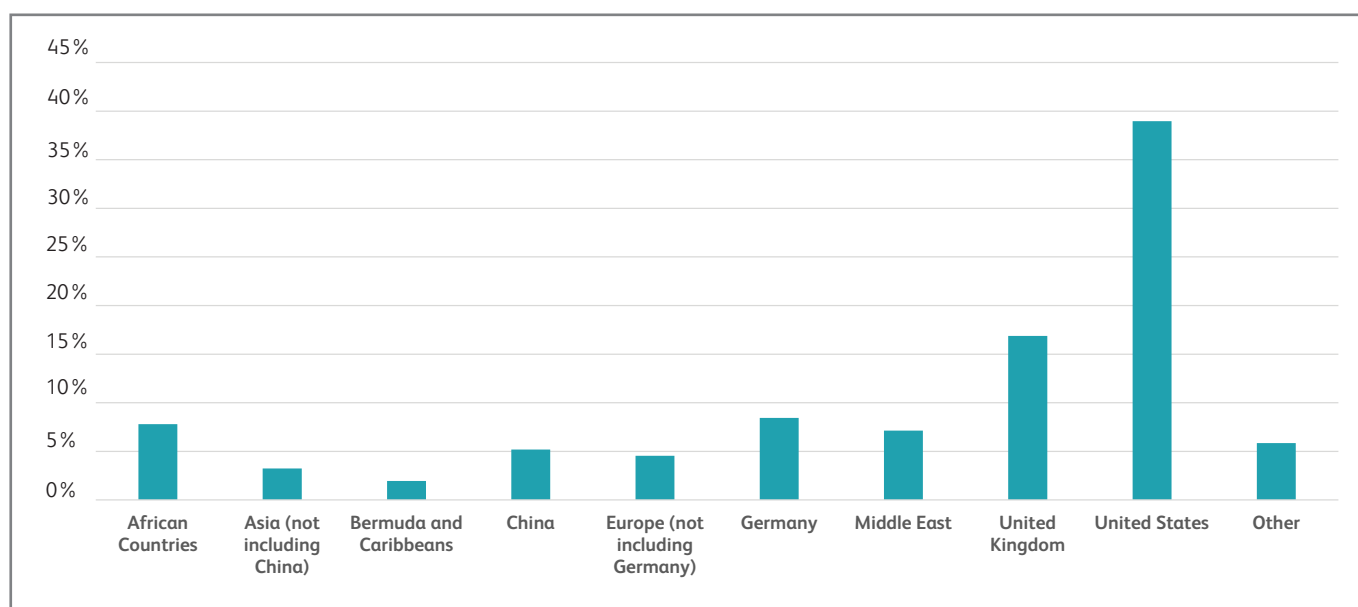
Figure 28: Sector Representation of Survey Respondents.

Sector Representation of Survey Respondents	Percent
Consumer Discretionary	7%
Energy	5%
Financials	36%
Healthcare	5%
Industrials	19%
Information Technology	3%
Materials	2%
Other	1%
Public Authority; NGOs; Non-Profit	12%
Real Estate	5%
Telecommunication Services	1%
Utilities	3%
	100%

Source: Cambridge Centre for Risk Studies 2018 ERM Survey

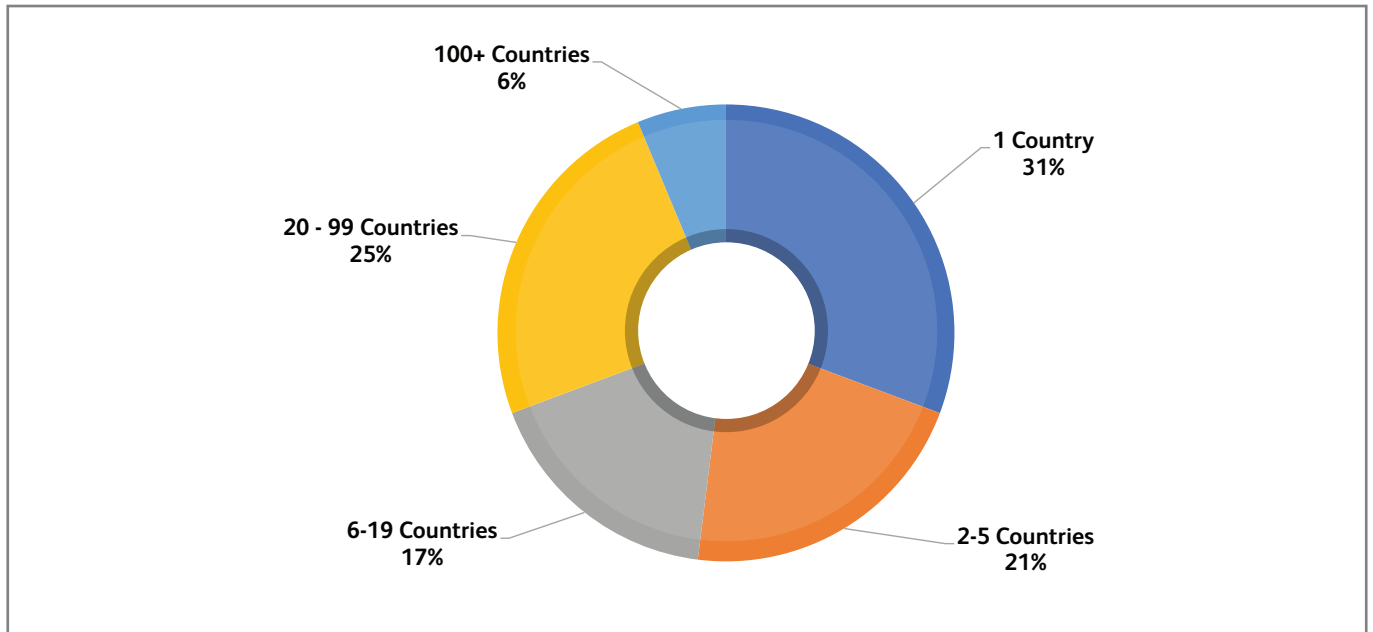
Survey respondents reported their top five countries of responsibility. The most represented countries include US, UK, Germany and China. These are followed by the blocks of Europe excluding Germany and Africa. See **Figure 29**.

Figure 29: Countries of Responsibility of Survey Respondents.



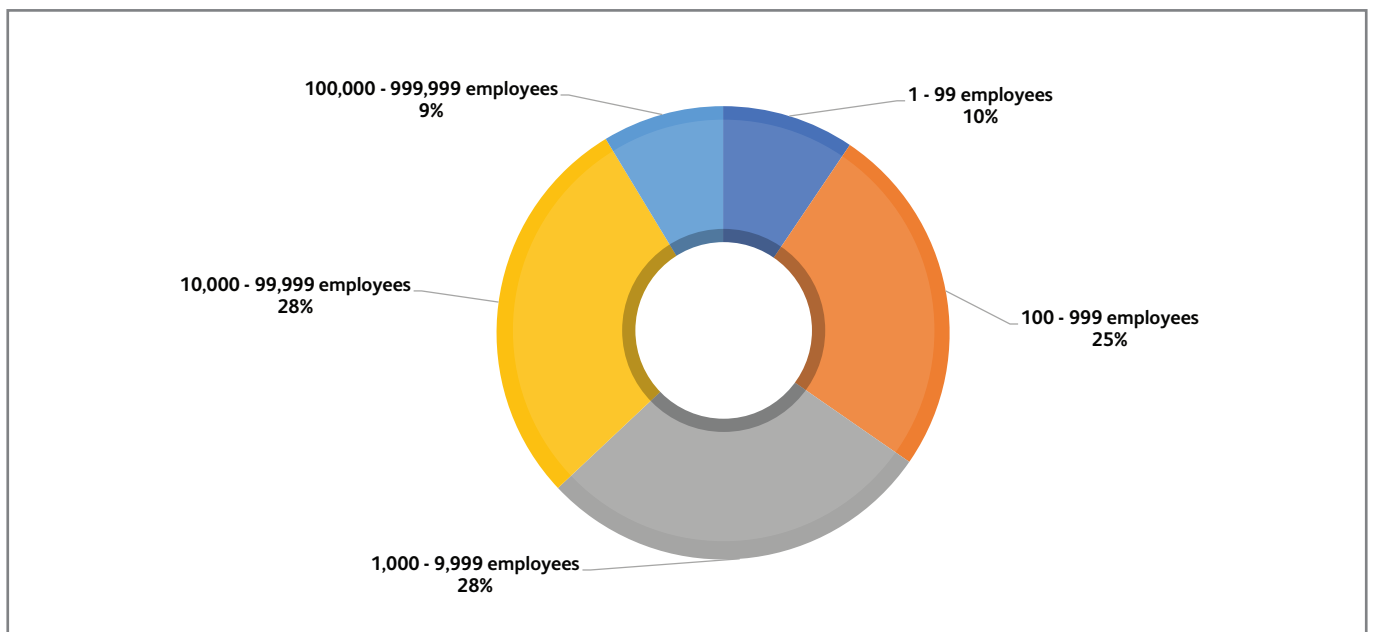
Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Figure 30: Number of Countries of Operations of Survey Respondents.



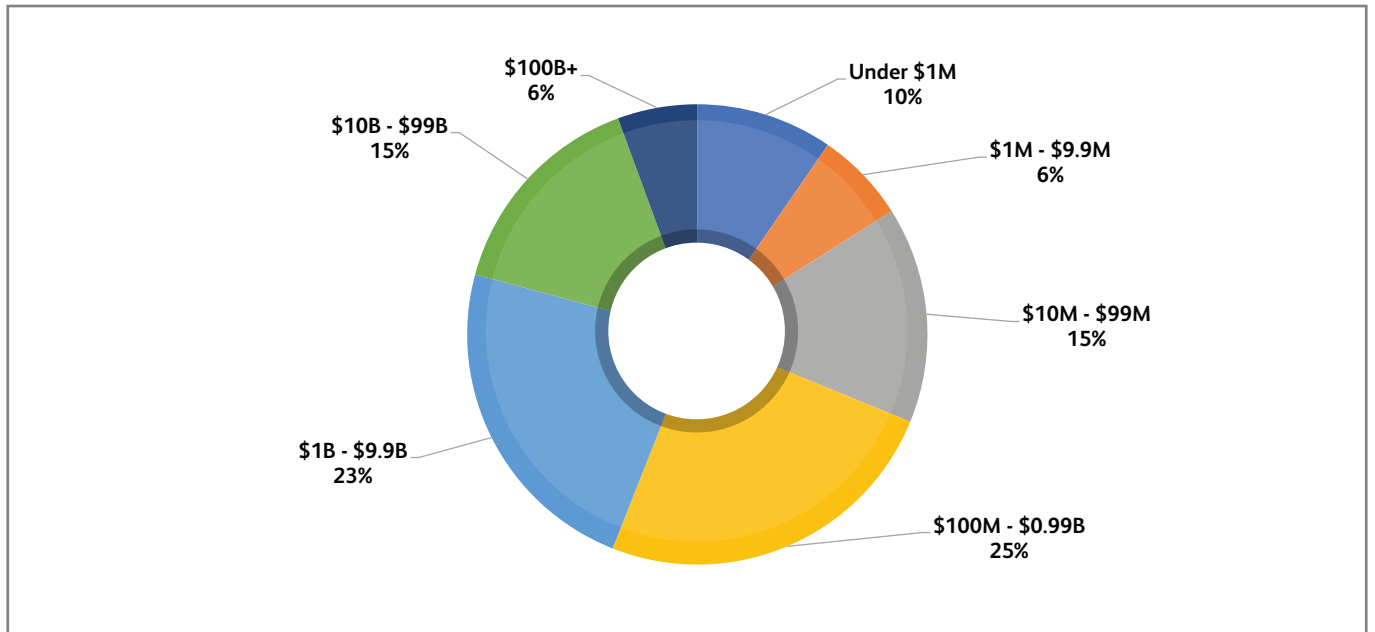
Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Figure 31: Company Size by Number of Employees of Survey Respondents.



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Figure 32: Company Annual Sales of Survey Respondents.



Source: Cambridge Centre for Risk Studies 2018 ERM Survey

Appendix B: Five Trends Driving Macro Changes

For input into longer term thinking and strategic debate, we outline five trends that were discussed during focus group meetings. These trends were highlighted for driving macro change for society, economics and management in the 21st century. They include the following:

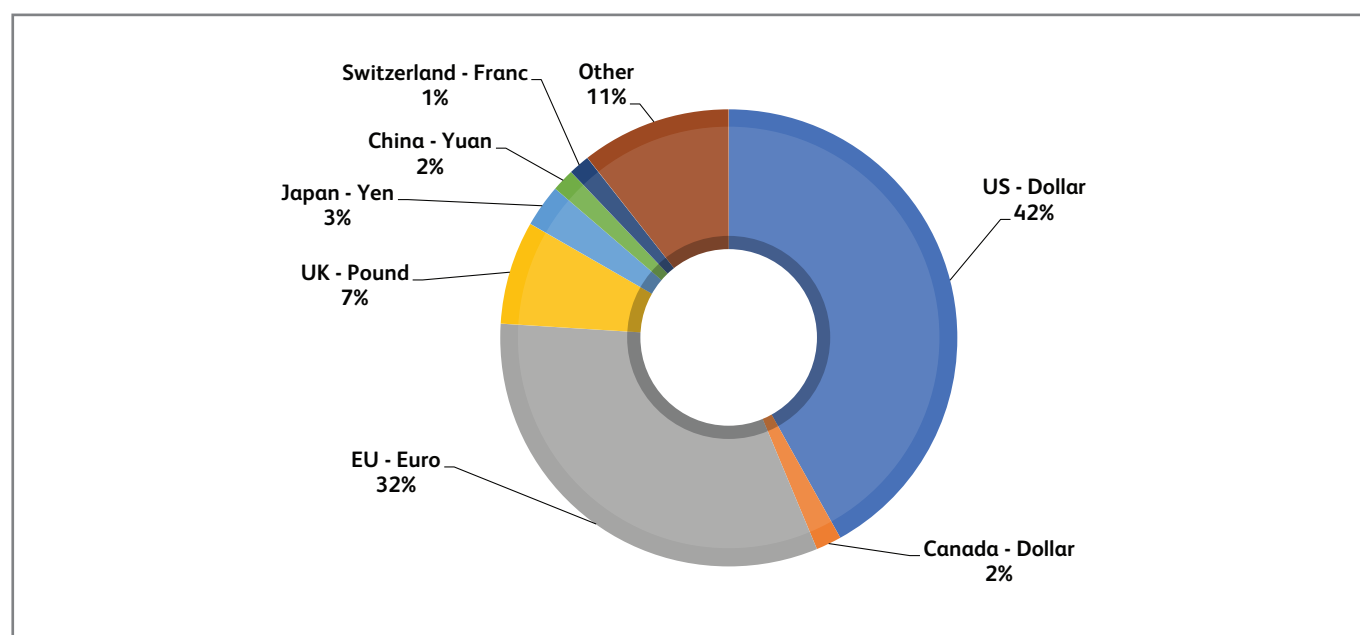
- Future of the dollar
- Climate & sustainability regulation
- Growth of liability risk
- Human capital, aging and longevity
- Technology, artificial intelligence and robotics

Future of the Dollar

The US Dollar has been the de facto reserve currency of the world for the last 70 years, dating back to the 1944 Bretton-Woods Agreement. To this day the dominance of the dollar in world trade has been unassailable as illustrated recently in the currencies used for 2017 global trade. See **Figure 33**. This “dollar hegemony” is being challenged

and can be viewed as a proxy for the relative decline in US economic post-war dominance. The period of ‘Pax Americana’ commenced during the post-World War II reconstruction of war-torn nations when efforts were made to uphold systems to prevent future wars – at that time the US accounted for about a third of the world’s output versus about 20% today.⁸⁵ The Trump administration in the US was elected to power by populist movements supporting the re-evaluation of trade and tariff policies. The administration has focussed on China by emphasising unfair trading practices and abuse of US intellectual property. The Trump administration’s recent rhetoric of trade wars to gain more favourable trade treatments for the US has resulted in harsh exchanges with many OECD countries and significant developing economic powers. China is a target because of the scale of exports to US: \$506 billion in 2017.⁸⁶ The devaluation of the Chinese yuan has also been referenced by the administration, accusing the country of continuous currency manipulation in an attempt to diminish the current valuation of US trade deficit, roughly half of which is owned by China.⁸⁷

Figure 33: Percentages of global payments conducted in leading currencies to January 2017



Source: SWIFT

⁸⁵ (Ganesh 2018)

⁸⁶ (“Trade War Reality Sets In as U.S and China Stick to Their Guns” 2018)

⁸⁷ (Dembik 2018)

The limits on economic sovereignty imposed by the dollar hegemony have led Russia and China to seek their own bilateral trade agreements backed by native currencies. After the US imposed sanctions against Turkish steel and aluminium, President Erdogan announced that Turkey would bypass the Dollar entirely and seek local currency-backed trade with its major trading partners in Asia and Eastern Europe.⁸⁸ Pakistan and Iran have agreed to participate in yuan transactions in infrastructure initiatives with China.⁸⁹ Without the convertibility of the renminbi, it is a relatively low likelihood that the Dollar will be completely replaced by another currency at the head of the global financial system in the near future.⁹⁰ Instead, several currencies of varying volatility may become contenders in world trade, putting the Dollar's reputation as a safe haven at risk, to the detriment of markets.⁹¹

There are no credible predictions of the timing of when the dollar might slip from being the dominant world currency to becoming merely one of the dominant currencies. Yet there are many pundits who argue that the transition process has begun and that coupled with the rise of China, both domestically and on the world stage, this shift is just a matter of time. From a macroeconomic perspective, such a shift will entail winners and losers but could enhance rather than diminish global gross domestic product in the long-term.⁹²

Climate & Sustainability Regulation

The 2015 signing and adoption of the Paris Agreement signalled the intention for 178 nations to transition to a low-carbon economy. The Agreement aims to reduce greenhouse gas emissions and slow the process of global warming, which some scientists agree is already irreversible. Businesses, therefore, must prepare for the impacts of this global transition (such as a shutdown of coal-fired power stations, investment in renewable fuels, a switch to electric vehicles, etc.) as well as the physical effects of climate change itself (including more severe natural disasters, shrinking coastlines and mass migration of peoples in response to famine).

⁸⁸ (Bershidsky 2018)

⁸⁹ (Luft 2018)

⁹⁰ (Al Jazeera News 2018)

⁹¹ (Skinner 2018)

⁹² (Cambridge Centre for Risk Studies 2018c)

⁹³ ("Commitments | One Planet Summit" n.d.)

⁹⁴ ("CLIMATEACTION100.ORG" n.d.)

⁹⁵ ("Task Force on Climate-Related Financial Disclosures" n.d.)

⁹⁶ (Cambridge Centre for Risk Studies 2015b)

⁹⁷ (Stanford Securities Litigation Analytics 2016)

⁹⁸ (Howard and Nokes 2018)

In December 2017, the investment initiative Climate Action 100+ was launched as part of #OnePlanet "key global initiatives" to combat climate change.⁹³ The initiative brings together 296 institutional investors with a collective £31 trillion in assets under management to apply pressure and provide incentives for the top 100 highest-emitting corporations over the next five years.⁹⁴ Such initiatives signal a changing attitude to environmental responsibilities of firms, demanding greater transparency on sustainability planning and reporting. This is backed by the establishment of a G20 Task Force on climate-related financial disclosure by the Bank of England Governor Mark Carney in June 2017, which seeks to establish a standard for companies to share the physical, liability and transition risks of climate change with investors, lenders, insurers and stakeholders, in order to best respond to and prepare for change.⁹⁵ Climate Action 100+ is just one of the signals of various regulatory and market shocks⁹⁶ that are expected to anticipate – perhaps by many decades – the most significant physical impacts of global climate change.

Growth of Liability Risk

The potential for significant liability claims is increasing globally. The nature of allegations in securities class actions (SCA) has evolved since early 2000s, when the Enron, Worldcom and Tyco scandals led to a new and more rigorous standard in internal auditing practices. Since 2012, the majority of filings have been non-financial in nature, focused on instances involving defective products, deceptive reporting or marketing practices, divertive tactics and public nuisance, with the number of claims increasing year over year since 2015.⁹⁷ More significant than the quantity of cases, however, is the growing complexity, severity and size of some international claims in the environmental, pharmaceutical, automotive and tech sectors.

The traditional focus of liability risk in insurance is exemplified by the question, "What will be the next asbestos?". Recent decades have seen dramatic shifts in public health and regulation around the use of tobacco. This followed, first, scientific evidence that incontrovertibly linked smoking to lung and other cancers and, second, lawsuits that established the culpability of tobacco companies. Currently we are witnessing a nascent and rapidly developing opioid scandal with a long list of potential litigants who span the entire supply chain, from invention and manufacture to healthcare management and drug retailing.⁹⁸ This is related to wider issues of workplace stress and associated mental and physical health issues, the latter including chronic back pain which, not coincidentally, is one of the triggers leading to opioid consumption. Today, still slightly out of focus, there is also the lurking spectre of mass class action against corporates for unfair employment

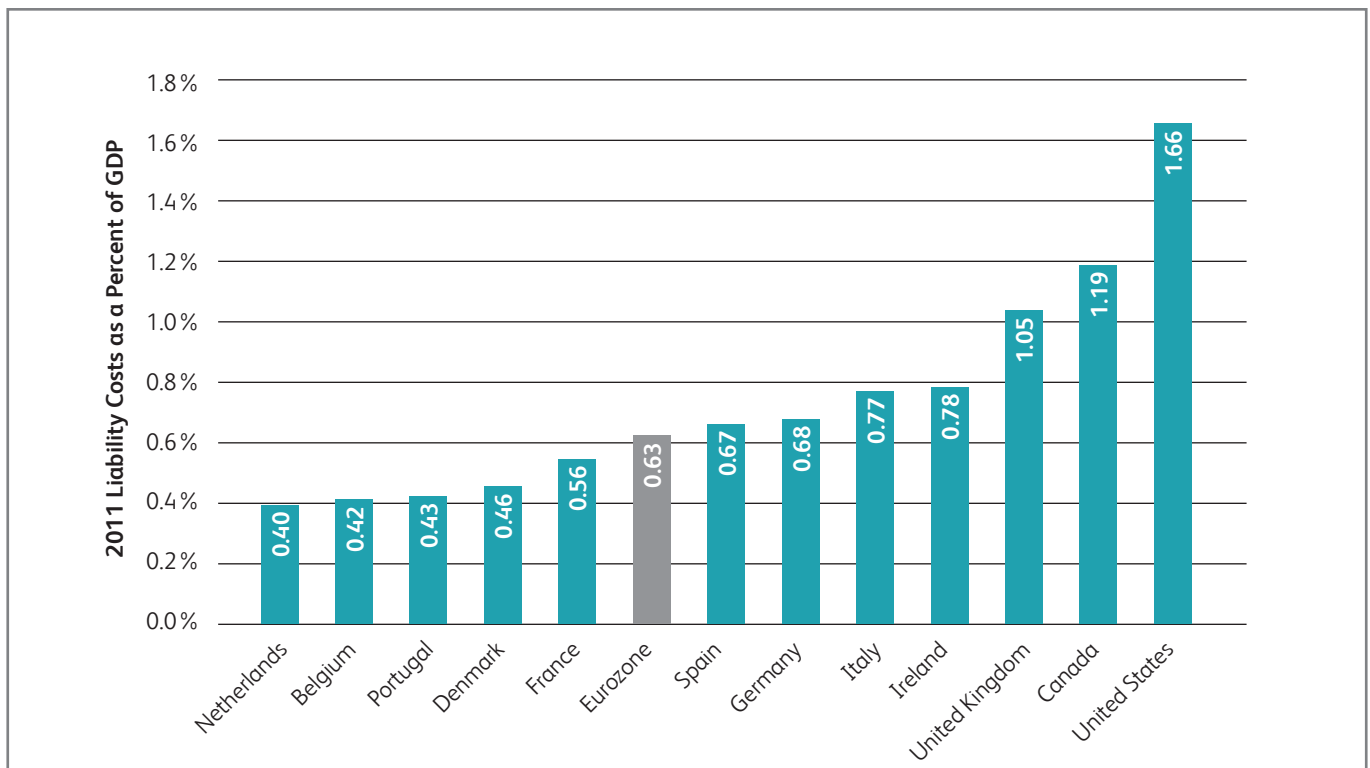
practices, exemplified by the £4 billion lawsuit against the UK-based supermarket Tesco;⁹⁹ see Section on Bottom Risk #1 - Gender and Diversity, for more thoughts in this direction.

While the US remains the largest liability market, both in the number of claims and in terms of claim value, see **Figure 34**, liability is on the rise globally, particularly in developing markets, where the sharpening of environmental legislature and consumer rights has contributed to a higher frequency of liability cases for international firms operating in regions such as Latin America and Southeast Asia. Product liability and Director’s & Officer’s coverages are the main drivers for claims for companies established in these areas, as they gain greater exposure to “more litigious and regulated overseas markets” in the US and Europe.¹⁰⁰ Such firms are now buying more cross border liability insurance in order to better manage exposure in diverse markets; large liability claims now frequently involve multiple jurisdictions and parties, which contribute to longer proceedings, larger fines and greater litigation costs.

Human Capital, Aging and Longevity

Many economies face the emerging challenge of significant demographic shift owing to increased longevity, amplified by advances in disease control and a historically low global birth rate.¹⁰² Aging populations naturally place a strain on social security, pension and national health schemes, by increasing the burden on the labour force. The increase in the so-called super-aging nations, where 20% or more of the population are over 65, will move well beyond the earliest of the super-aging countries – in 2014 only Germany, Italy and Japan – to include over 30 nations in 2030 such as Hong Kong, Korea, the US, the UK and New Zealand.¹⁰³ See **Figure 35**.

Figure 34: Liability Costs as a Fraction of National Gross Domestic Product in 2011.



(Source: US Chamber Institute for Legal Reform¹⁰¹)

⁹⁹ (Ahmed 2018)

¹⁰⁰ (“Liability Claims Trends” n.d.)

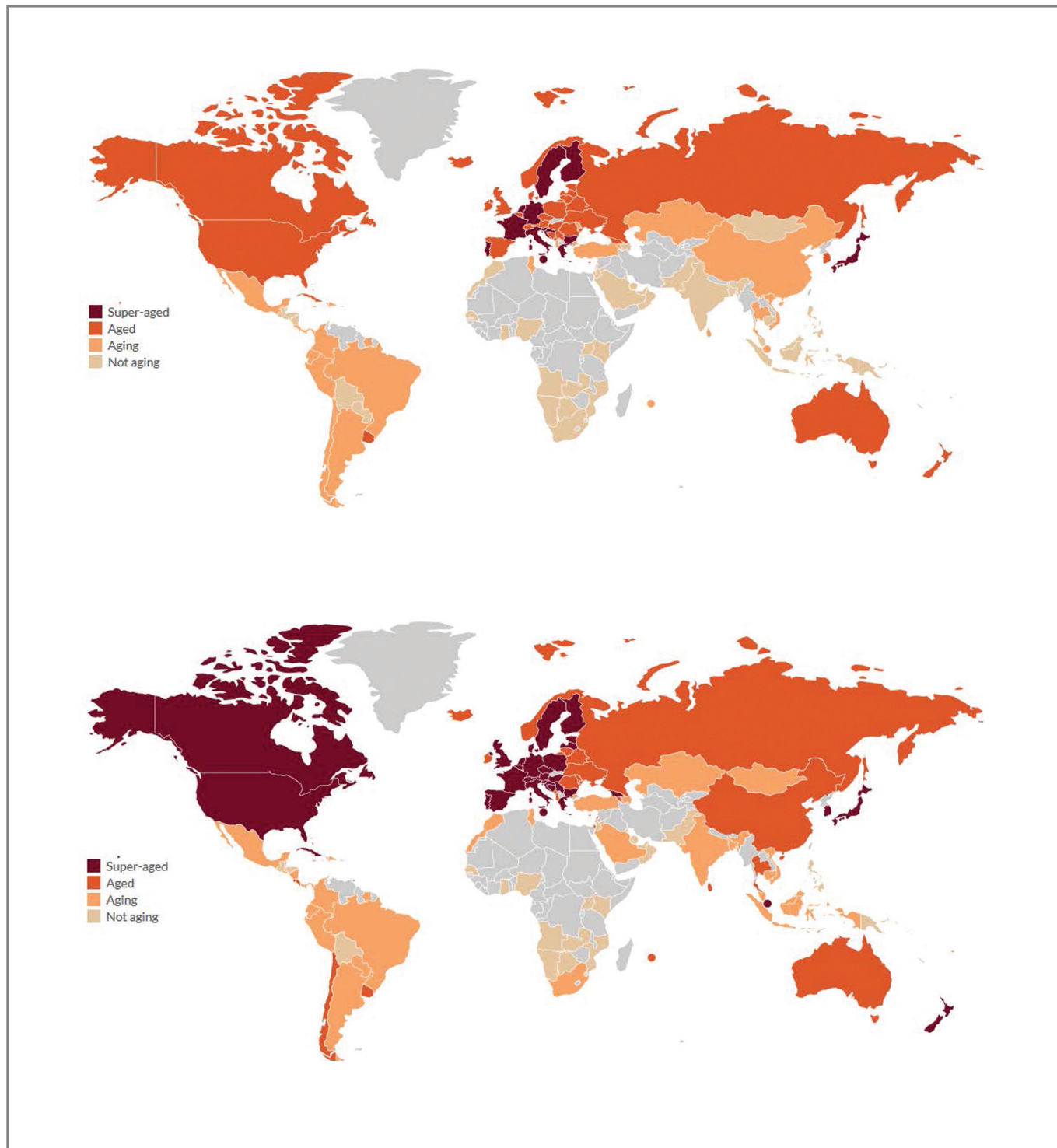
¹⁰¹ (McKnight and Hinton 2013)

¹⁰² (UN News 2017)

¹⁰³ (O’Connor 2014)

¹⁰⁴ (O’Connor 2014)

Figure 35: Super-aged nations by 2020 and 2030, where over 20% of the population will be over 65.



(Source: Moody's Investors Service, UN Data)¹⁰⁴

The tangible effects of a significant aging population have already been observed in many Asian economies, where the labour force and productivity rates are shrinking as demands on subsidised health care increase. A 2016 study determined that population aging in Asia would reduce the area's economic potential by 0.55 percentage points.¹⁰⁵ While the increased government consumption from an aging population stimulates some growth, the effects on productivity and labour taxes have a more significant impact on a country's economic potential. Recent studies concur that repeatedly revised forecasts of population aging in Japan "operated as a shock" to demand rates, unemployment levels and currency regulation through the 1990s, leading to the decline in national economic output. While there is a similar demographic shift in Europe, the economic impact may not be as dramatic given the marked wealth and comparative health of the post-war generation compared to any previous, which may stimulate consumer demand in goods, services and tourism as that generation enters retirement.¹⁰⁶

Adaptation to a prosperous older population may stoke investment, which softens the effects of an aging demographic in the longer-term. Part of this adaptation, particularly in the developed economies where labour is expensive and pensions and healthcare have deep institutional support, will involve development of robotics for aged care, replete with technical and ethical challenges. The topic of robotics is explored further in the next section.

Technology, AI and Robotics

The rapidly changing face of technology presents new business challenges and opportunities almost more frequently than can be noted. The Fourth Industrial Revolution identifies artificial intelligence (AI) mining big data and, in doing so, becoming the lever for endemic automation, where humans in organised but low-level activities such as driving, call centres and retail are replaced by physical or virtual robots. While promising cheaper goods and services, these developments will transform global attitudes to work and labour so fundamentally that it is difficult to presently imagine. This will, no doubt, present a monumental challenge to governments, regulatory bodies and commerce giants.

Following an examination of 702 professions, one study¹⁰⁷ determined that 47% of total US employment could become computerised; the percentage is higher for nations where manufacturing, agriculture, mining and construction industries dominate. Countries with a relatively low gross domestic product per capita are likely to be more greatly impacted, in terms of percentage of jobs replaced by automation, than high gross domestic product per capita nations. Certain modes of work, however, such as those requiring creative thinking (science, art), interpersonal trust and relationships (nursing, social care) and responses to unpredictable demands (maintenance), are likely to survive and therefore contribute to new and sharply defined social divisions.¹⁰⁸ Undoubtedly, our growing reliance on technology has already affected global politics and society in ways both positive and negative and this trend will only continue, even as the technologies change.

The arrival of the Fourth Industrial Revolution also signals the increasing significance of cyber risks. It seems inevitable that the growth of digital technology – which is becoming increasingly embedded and valuable in business and society – comes with unpredictable growth in the threat of disruption or damage from malign activity or defective implementations in cyber space. The very connectedness that is made possible in a digital world is also a source of systemic risk. The identification of Systemically Important Technology Enterprises¹⁰⁹ that are essentially private and unrecognised providers of information technology infrastructure, for example, database or internet address providers, demonstrates this clearly.

¹⁰⁵ (Otsu and Shibayama 2016)

¹⁰⁶ (Oosenbrug and Zoon, n.d.)

¹⁰⁷ (Frey and Osborne 2017)

¹⁰⁸ (Frey and Osborne 2017)

¹⁰⁹ (Cambridge Centre for Risk Studies 2014b)

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