

Lloyd's City Risk Index 2015-2025

Executive Summary

lloyds.com/cityriskindex

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

About Lloyd's

Lloyd's is the world's only specialist insurance and reinsurance market that offers a unique concentration of expertise and talent, backed by strong financial ratings and international licences. It is often the first to insure new, unusual or complex risks, providing innovative insurance solutions for local, cross-border and global risks. Its strength lies in the diversity and expertise of the brokers and managing agents working at Lloyd's, supported by capital from across the world. In 2015, more than 90 syndicates are underwriting insurance and reinsurance at Lloyd's, covering all lines of business from more than 200 countries and territories worldwide. Lloyd's is regulated by the Prudential Regulation Authority and Financial Conduct Authority.

Key contacts



Trevor Maynard

**Head, Exposure Management & Reinsurance
Performance Management, Lloyd's**

trevor.maynard@lloyds.com



Cambridge Centre for Risk Studies

Professor Daniel Ralph

**Academic Director
Cambridge Centre for Risk Studies**

Simon Ruffle

**Director of Technology Research and Innovation
Cambridge Centre for Risk Studies**

Dr Andrew Coburn

**Director of Advisory Board
Cambridge Centre for Risk Studies,
and Senior Vice President, RMS Inc.**

enquiries.risk@jbs.cam.ac.uk

About Cambridge Centre for Risk Studies

Cambridge Centre for Risk Studies is a multidisciplinary centre of excellence for the study of the management of economic and societal risks, and is an independent research centre at the University of Cambridge Judge Business School. The Centre's focus on the analysis, assessment and mitigation of global vulnerabilities for the advancement of business risk managers, individual decision-makers and policy strategists. The research programme pursued by the Centre explores catastrophic systemic risk and interconnectivity in the economy. The Centre is supported by the business community as well as the academic research councils and focuses on research that is highly application-oriented.

Disclaimer

Lloyd's City Risk Index 2015-2025 has been produced by, and/or on behalf of, Lloyd's for general information purposes only. While care has been taken in gathering the data and preparing the Index, Lloyd's does not make any representations or warranties as to its accuracy or completeness and expressly excludes to the maximum extent permitted by law all those that might otherwise be implied.

Lloyd's accepts no responsibility or liability for any loss or damage of any nature occasioned to any person as a result of acting or refraining from acting as a result of, or in reliance on, any statement, fact, figure or expression of opinion or belief contained in this Index. This Index does not constitute advice of any kind.

© Lloyd's 2015. All rights reserved

Foreword



The world is changing faster than at any time in human history.

Certain extreme weather events linked to climate change are increasing in severity and frequency.

The balance of economic power has moved from West to East, the digital revolution has replaced its industrial predecessor and globally more people now live in cities than in the countryside.

We live in a truly international society where financial, manufacturing and food systems are linked and wealth is concentrated. This is driving greater efficiency, but also makes us more exposed to systemic shocks with far-reaching and often unconsidered consequences.

The 2011 floods in Thailand proved that the local has truly gone global, disrupting Japanese car production in the United States.

In this respect, Lloyd's City Risk Index 2015-2025 is a wake-up call to us all.

It shows that trillions of dollars are at risk from manmade and natural disasters – disasters that have occurred in the past and are likely to do so again in the future.

It also identifies changes in the risk landscape. As companies expand into new markets and territories, they are increasingly encountering new risks that require different forms of protection.

This requires a twin-track approach.

First, we need to identify and quantify these risks better. Lloyd's City Risk Index 2015-2025, developed with the Cambridge Centre for Risk Studies at the University of Cambridge Judge Business School, contributes to this process.

Second, governments, businesses and communities need to think about how they can improve the resilience of infrastructure and institutions.

Insurance is part of the solution. Lloyd's research shows that a 1% rise in insurance penetration translates into a 13% reduction in uninsured losses – a 22% reduction in taxpayers' contribution following a disaster.

Insurance also improves the sustainability of an economy and leads to greater rates of growth – a 1% rise in insurance penetration leads to increased investment, equivalent to 2% of national GDP.

Insurance de-risks governments, business and communities. It takes the financial burden of recovery off the taxpayer and boosts economic growth.

Lloyd's City Risk Index 2015-2025 highlights the economic exposure of cities across the world to a range of threats. Governments and businesses, together with insurers, must work to ensure that the potential for losses is reduced.

Insurers must continue to innovate, ensuring their products are relevant in this rapidly changing risk landscape and offering customers the protection they need and, as a result, contribute to a more resilient international community.

At stake is future global economic growth, the protection of valuable assets, and improved business and community resilience.

Inga Beale
CEO, Lloyd's

Executive summary

The balance of economic power is shifting from the developed economies of North America and Western Europe to the emerging economies of Asia, Latin America and Africa.

Yet the world has never been more interconnected. Globalisation, driven by rapid improvements in communications technology, has linked us all in ways previously unimaginable.

These factors are playing a key role in driving global economic growth.

But they are also concentrating wealth in vast urban centres, which is leaving the global economy and national economies more exposed than ever to the impacts of manmade and natural disasters.

Lloyd's City Risk Index 2015-2025 (lloyds.com/cityriskindex) presents the first ever analysis of the economic output at risk (GDP@Risk) in 301 major cities from 18 manmade and natural threats over a ten-year period.

Based on original research by the Cambridge Centre for Risk Studies at the University of Cambridge Judge Business School, the Index finds that a total of \$4.6trn of 301 cities' projected GDP is at risk from all threats – out of a total projected GDP between 2015 and 2025 of \$373trn.

The changing risk landscape

The analysis identifies three important emerging trends in the global risk landscape:

1. Emerging economies will shoulder an increasing proportion of risk-related financial loss as a result of their accelerating economic growth – more than 70% of Total GDP@Risk is associated with emerging economies, with their cities often highly exposed to single natural catastrophes. Earthquake alone represents more than 50% of both Lima's and Tehran's Total GDP@Risk, for example.
2. Manmade threats are becoming increasingly significant. Market crash, cyber attack, power outage and nuclear accident alone are associated with almost a third of Total GDP@Risk. Market crash puts the most GDP@Risk globally

– representing nearly a quarter of all cities' potential losses.

3. New or emerging threats – cyber attack, human pandemic, plant epidemic and solar storm – are also having a growing impact. Together, they represent nearly a quarter of Total GDP@Risk.

Economies under threat

Cities with high asset values are the most financially exposed in absolute terms. Tokyo, Seoul, New York, Hong Kong, Shanghai and London all have significant levels of economic exposure to the impacts of catastrophic events.

Taipei, Tokyo, Istanbul and Osaka exemplify those cities that have a combination of high economic value and high exposure to both natural catastrophes and manmade risks, such as market crash and oil price shock.

The same is true of Los Angeles and New York, where cyber attack is also a significant emerging risk. In Hong Kong and Shanghai, human pandemic is an additional risk.

Implications for the insurance industry

Lloyd's City Risk Index 2015-2025 supports the case for more resilient infrastructure and institutions, and increased global access to insurance. How quickly a city recovers after a catastrophe is a key component of the total risk. The impact of events is mitigated by rapid access to capital to help to restore the economy afterwards.

Insurance claim payouts are a key source of capital injection after a catastrophe, and insurance plays an important part in the recovery and reduction of the impacts of catastrophes. Investment in risk management measures, including increasing insurance take-up, could mitigate the economic losses associated with all threats – both manmade and natural.

In principle, about half of Total GDP@Risk can be protected by improving aspects of all cities' infrastructure and crisis management, with insurance playing a key role in this process.

To do this, the insurance industry must:

- **Innovate** – continue to research, design and deliver products for new and emerging risks.
- **Collaborate** – work with other risk stakeholders and research partners to enhance the quality of data available and continue to develop probabilistic modelling.
- **Communicate** – better promote the vital role its products and services can play in protecting GDP from the impacts of natural and manmade disasters.

Lloyd's City Risk Index 2015-2025 is the first step in this process. We hope it will raise the awareness of risks across the world, drive innovation in the insurance sector and prompt the managers and policy-makers who govern, invest in and live in these cities to manage risks appropriately and reduce them over time.

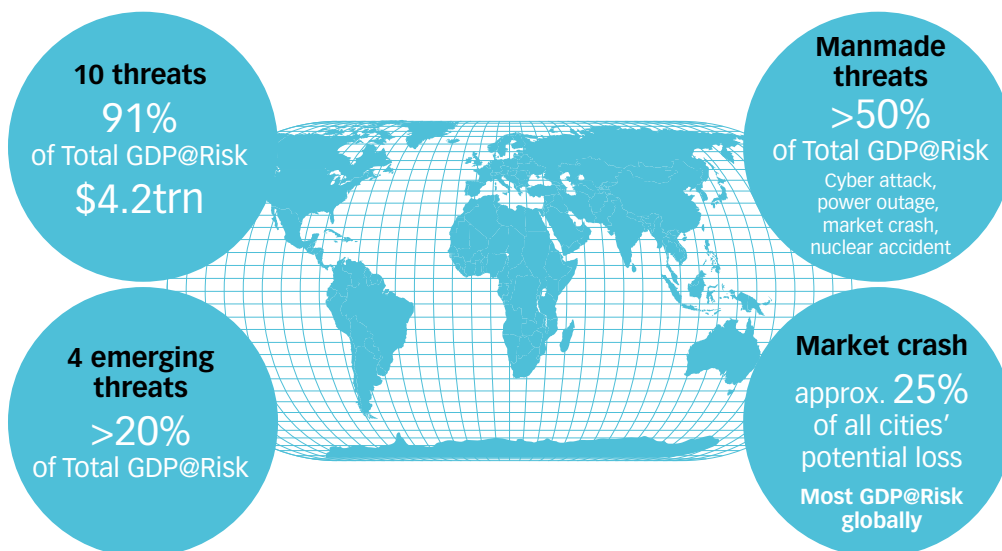
References and supporting documentation

- ➔ Cambridge Centre for Risk Studies; 2014; Cambridge World City Risk Atlas: Threat Hazard Maps of the World; World City Risk 2025 project; Cambridge Risk Framework series; Centre for Risk Studies, University of Cambridge.
- ➔ Coburn, A.W.; Evan, T.; Foulser-Piggott, R.; Kelly, S.; Ralph, D.; Ruffle, S.J.; 2014; *World City Risk 2025: Part II Methodology Documentation*; Cambridge Risk Framework series; Centre for Risk Studies, University of Cambridge
- ➔ Cambridge Centre for Risk Studies; 2014; Cambridge World City Risk Atlas: Threat Hazard Maps of the World; World City Risk 2025 project; Cambridge Risk Framework series; Centre for Risk Studies, University of Cambridge.

Documentation and other supporting materials available from: cambridgeriskframework.com/wcr

Facts and figures

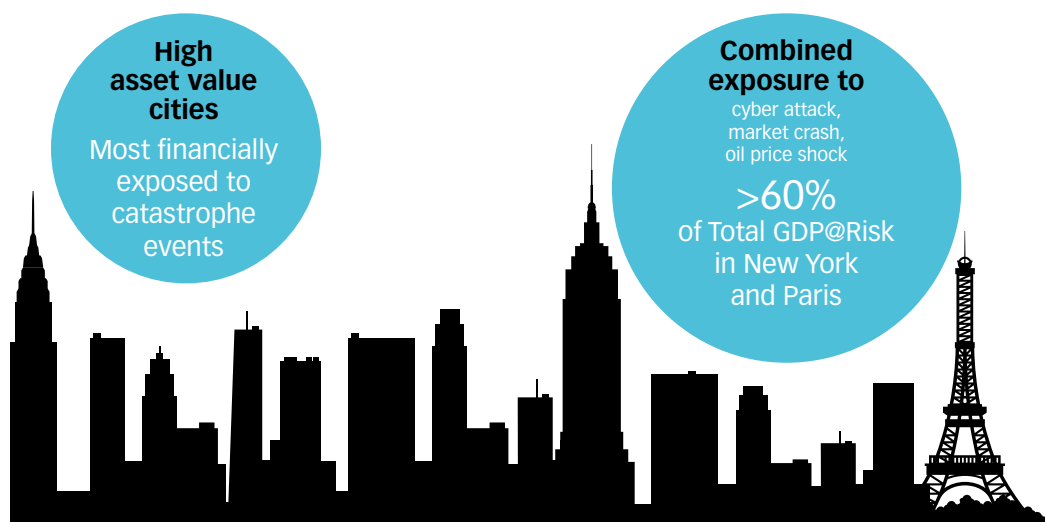
Global



Emerging economies



Developed cities



About Lloyd's City Risk Index 2015-2025

Lloyd's City Risk Index 2015-2025 is the product of the research partnership between Lloyd's and the Cambridge Centre for Risk Studies at the University of Cambridge Judge Business School.

To view the Index, visit lloyds.com/cityriskindex

GDP@Risk

When a catastrophic event such as an earthquake, pandemic or financial crisis strikes a city, it reduces that city's economic output. Its economy may recover but it could take several years. The loss of economic output, relative to the economic output that would have been expected, is the GDP@Risk from an event. Because economic recovery from some catastrophes can take many years, Lloyd's City Risk Index 2015-2025 takes the first five years of lost economic output as the standard measure of GDP@Risk from an event.

Cities are at risk from multiple threats; the Index considers 18 of them. Each threat type has a range of events of differing magnitudes that could affect the city in the future. The Index estimates the likelihood of each city being affected by events of differing magnitudes between 2015 and 2025 through a Threat Assessment Grading or TAG.

The range of possible magnitudes was simplified into three representative scenarios – a “small”, “moderate” and “severe” event. These likelihoods vary from city to city depending on their locations and risk characteristics but all of these events are rare and the probability of a city being impacted by any particular event scenario in the ten-year period may be only a few per cent.

The GDP@Risk was estimated from each individual event were it to occur and the amount of impact it would have on each city was measured. The “expected loss” from that event is the loss combined with its probability, so if a moderate pandemic is likely to affect New York with a 10% probability in the period 2015-2025, and if it were to cause a loss in economic output of \$50bn, the expected loss for that scenario would be \$5bn (10% of \$50bn).

Summing all the expected losses from the different threats and their representative scenarios that could occur in each of the years from 2015 to 2025 gives the Total GDP@Risk for the city from all threats. This is a probability-weighted expected loss to the economy of that city from all threats. GDP@Risk values are broken down by different threats and cities in the Index. We compare this with the average annual GDP of the city expected over 2015-2025 to provide a risk index in terms of a percentage of average annual GDP.

Selection of the regions

The 301 cities are grouped into ten regions based on Lloyd's interpretation of the United Nations Geoscheme.

Definition of emerging economies

Emerging economies are defined as any countries that fall outside the G8 (Canada, France, Germany, Italy, Japan, Russia, the UK and the US).

Choosing the 301 cities

The 301 cities represent the world's leading cities and were selected from the more than 5,000 cities in the world with populations over 250,000 because of their significance to global GDP. The selection includes all cities of more than three million people, the largest cities from the 50 largest national economies and includes half of all the national capital cities in the world. The largest economies have more cities represented. Together, these cities are expected to produce about half of the world's GDP in 2015 and around two-thirds by 2025. The selection inevitably entails making choices and almost certainly omits some cities that arguably ought to belong on a list of the “world's leading cities”.

Choosing the 50 cities for further analysis

Among the 301 cities, 50 cities have been selected for further analysis of their GDP@Risk, to include those with the highest risks in the world, and to reflect their national economic importance and their relevance to Lloyd's. This information is found in city factsheets that can be downloaded from the Index.

Cities at risk

For the threats we have analysed, this Index represents our assessment of the cities most at risk from catastrophic disruption to their economies. However, it is not a prediction of when any of the 18 threats might occur.

For further details see *World City Risk 2025: Part II Methodology Documentation*, available from: <http://cambridgeriskframework.com/wcr>

