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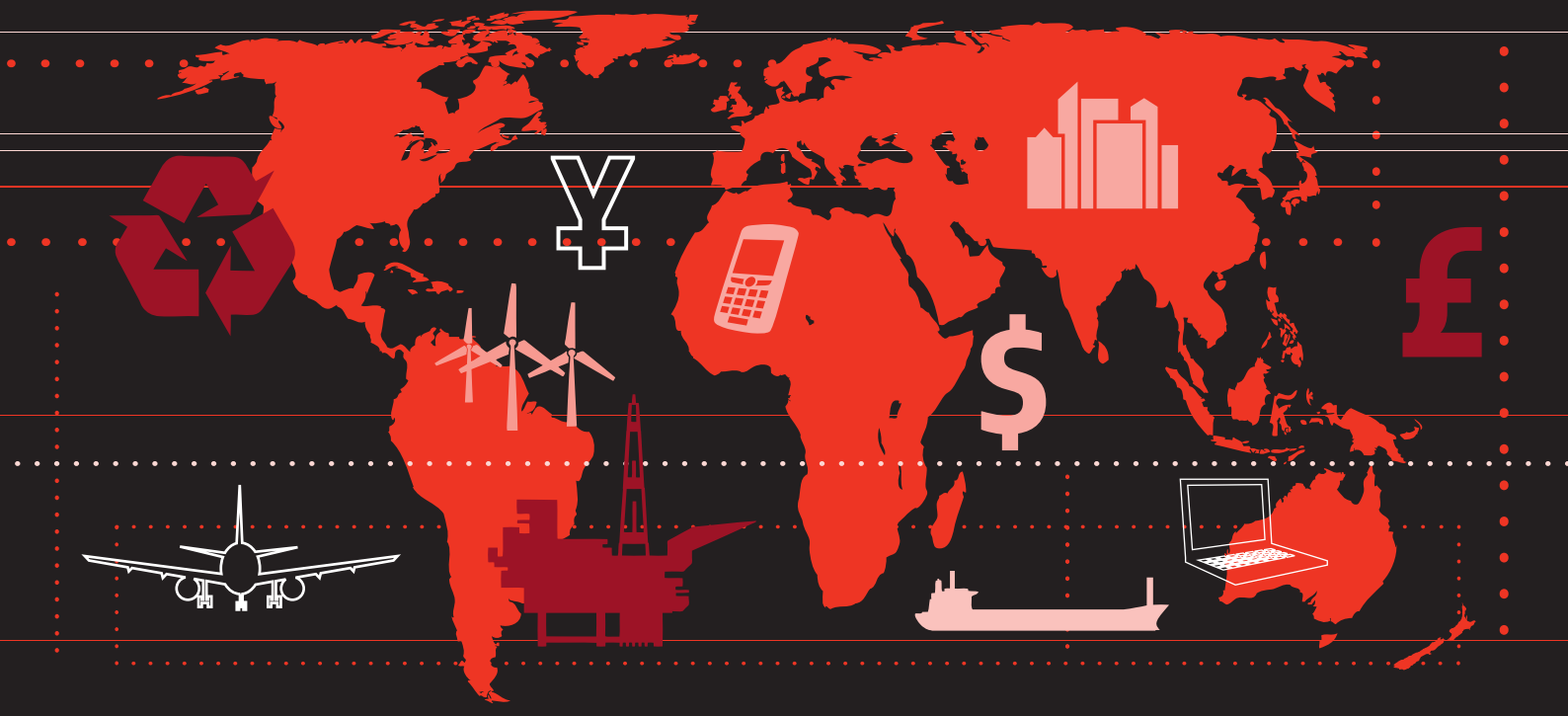
LLOYD'S 360° RISK INSIGHT

IN DEPTH REPORT

GLOBALISATION AND RISKS FOR BUSINESS

Implications of an increasingly interconnected world



THE JAMES MARTIN 21ST CENTURY SCHOOL
UNIVERSITY OF OXFORD

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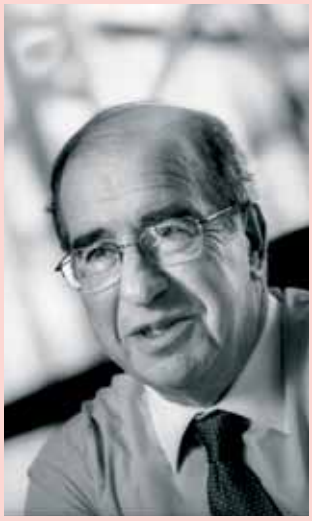
Boxes

FOREWORD
FROM THE CHAIRMAN OF LLOYD'S



Businesses have always had to face global risks. Lloyd's has insured ships travelling across the world, trading goods, for over three centuries. However, over the last 20 years or so, stimulated by the end of the Cold War and the start of the world wide web, globalisation has meant that a risk in one location can spread rapidly to another. Viewed positively, this means sharing wealth, health and prosperity. But the opposite side of the coin is contagion, with bad debts in the US triggering riots in Greece and the eruption of an Icelandic volcano, causing chaos for airlines worldwide and which cost the European economy £400m a day in lost productivity.

Over the past few years, the concept of a systemic risk – one which moves rapidly across countries and organisations – has gripped public imagination. This report highlights where potential systemic risks exist and suggests how business can begin to manage them.

Is globalisation a runaway train? Are we now vainly looking towards national governments to solve problems and crises which are international in nature? Has world trade grown too quickly to be governed by the rules which are currently in place?

I do not believe that globalisation is out of control, but we all – public and private sector alike – need to spend more time and care examining the potential impact of events, which happen many miles away from our own work.

This report examines the risks attached to globalisation – from finance to pandemics – and suggests some simple first steps which businesses can take to improve their risk management.

However, we do not suggest that there should be any reversal or attempts to stop globalisation. First, these would be futile, and second, globalisation has brought the world immense benefits. These may have been spread disproportionately in the developed world, but it is the great growth of international trade which has brought 500 million Chinese out of poverty in the last 25 years, and which has allowed many millions more to participate in a global economy which has helped life expectancy levels to rise.

If globalisation brings rewards, it also brings responsibility. Multinational businesses, which operate with offices, plants and factories in hundreds of countries, which source capital and repay shareholders across the world, have a central role in shaping globalisation. If they can manage their complex business structures and minimise the risks they contain, perhaps governments too can find the legal framework and intense co-operation required to govern a globalised economy.

Lord Levene
Chairman
Lloyd's

EXECUTIVE SUMMARY

1. THERE HAS BEEN A SURGE IN GLOBALISATION IN THE LAST TWO DECADES LEADING TO AN INCREASINGLY INTERDEPENDENT AND INTERCONNECTED WORLD

As a result of globalisation with its rapid integration of societies and economies, we are living in an increasingly interdependent world. National barriers to the flow of goods, capital and people are breaking down and platforms, processes and policies are standardising.

2. GLOBALISATION HAS BROUGHT IMMENSE BENEFITS BUT ALSO NEW, SYSTEMIC RISKS FOR BUSINESS

Fewer individuals and population groups are now excluded from the benefits of globalisation. And businesses have reaped unprecedented benefits from global trade. However, at the same time, globalisation has introduced new forms of risk, notably systemic risk. Due to the increasing interdependence of global systems, risks now transmit much further and more quickly than before, jumping from one industry or country into several countries or sectors.

3. GLOBALISATION POSES A RANGE OF NEW RISKS FOR BUSINESS

New and evolving threats and challenges include: vulnerabilities arising from shared infrastructure (such as transport, energy and the internet) through social, health and political risks, to challenges around supplies of increasingly scarce resources (water, food and energy). To add to the complexity of the challenge facing business all these risks are interlinked and interrelated.

4. IN THE LONG TERM, PROTECTIONIST TENDENCIES ARE UNLIKELY TO REVERSE THE OVERALL TREND TOWARDS GLOBALISATION

The global economic crisis has led to the re-emergence of protectionist tendencies on the part of some governments. With deep and integrated connections between societies and economies, and fuelled by emerging market growth, it is expected that globalisation will continue. However, with the revival of protectionist sentiments, multinational firms will have an important role to play in ensuring the benefits of globalisation are not eroded.

5. BUSINESS NEEDS TO DEVELOP RISK MANAGEMENT SYSTEMS TO MANAGE SYSTEMIC RISK

The first action for any business will be to understand the nature and drivers of systemic risks, as well as the potential vulnerabilities within their organisations. Businesses must then build their own resilience to systemic shocks by developing their risk management systems and strategies. Companies should conduct systemic risk audits, develop contingency and disaster management plans and test scenarios that explicitly include potential cascading failures and systemic risks. Business must also consider how they interact with governments to tackle these systemic risks facing the global economy and society.

INTRODUCTION
GLOBALISATION'S TIDAL WAVE

Globalisation is one of the most commonly used terms in contemporary business and politics and has both positive and negative connotations. By 'globalisation' we mean the cross-border connection and integration of societies, economies and cultures. This is not new - what is new is the scale and speed of globalisation over the past 20 or so years. There has been a tidal wave of globalisation, which has been associated with a step-change in the level of integration of societies and economies. This has brought immense and unprecedented benefits and opportunities to many, but not all, of the world's inhabitants.[1]

The first part of this report identifies the factors and trends leading to this rapid acceleration of globalisation and highlights some of its effects. Part 2 identifies a number of the discreet risks for business arising from globalisation. In Part 3, we show that globalisation has meant that what were previously regarded as independent risks are now, as a result of globalisation, interrelated. They are also much more complex and potentially systemic.

Three key drivers of globalisation over the past two decades are political and economic reform, rapid technological change, and population growth, and urbanisation. The seismic shifts in politics have included the collapse of the Berlin Wall, the end of dictatorships in over two-thirds of emerging markets, the opening of China, and the enlargement of the European Union. The period since 1990 has seen widespread global acceptance of market economics and a dramatic reduction in trade and investment barriers. Rapid innovation and the dissemination of new technologies, such as the internet and containerisation, have facilitated global change and integration. Population growth and urbanisation have led to much greater physical proximity, which in turn has spurred innovation and growth in markets. Globalisation has also led to greater virtual proximity, providing a springboard for a leap in the consumption of global products and services and for the establishment of global business.

While the benefits associated with globalisation are poorly understood, so too are its negative impacts. In particular, the full risk implications of globalisation have not been addressed. This report focuses on the other side of integration, which is interdependence. It shows that it has given rise to a new type of risk, notably systemic risk. By systemic risk we mean risks which arise in one sector, in one country and quickly transmit to other sectors and other countries. The recent financial sector crisis was the first crisis of the global age. We examine whether this is an indication of future crises to come.

The tidal wave of globalisation over the past 20 years has led to two new dimensions of risk which form the focus of this report. The first is that risks now transmit much further and rapidly than previously. The second is that, at times, they jump traditional risk boundaries and take on systemic properties in which the source and final impact of the risks may not be regarded as connected. Cascading failures in which the shock waves cross boundaries and can have a major global impact arise from the nature of globalisation. Managing these requires a rethinking of the nature of risk and contagion in the 21st century.

The purpose of this report is to explain the current phase of globalisation in fresh terms: as a set of worldwide, related phenomena that when taken together alter the very nature of risk. By so doing we aim to help senior business decision-makers and risk managers ensure that they are able to prepare for and build resistance to large-scale shock events. By building a better appreciation of the nature of these new risks we hope to stimulate business and society to develop policies and actions that will reduce the potential for systemic shocks, while at the same time building the capacity for more resilient and robust responses to future systemic crises. The development of risk management in this area is essential to the continued integration of economies and societies. Without such measures, successive systemic crises could well lead to a reversal of globalisation and the dramatic slowing, and even erosion, of the many benefits of globalisation that businesses and societies have enjoyed in recent decades.

A feature of any slowing down of globalisation is likely to be a resurgence of protectionism and retrenchment on the part of governments and therefore the role of multinational businesses in ensuring the positive benefits of globalisation are not eroded becomes even more important.

PART 1

TRENDS IN GLOBALISATION

The world at the start of this decade presents very few absolute barriers.

The latest phase of globalisation over the past 20 years can best be summarised in three distinct, yet mutually reinforcing, trends:

- The dismantling of national barriers: the breakdown of barriers to the flow of goods, services, capital, ideas and people, and the subsequent explosion in the volume, variety and complexity of those flows.

- Increasing standardisation and uniformity: the growing homogenisation of policy, infrastructure and ideas to conform to global platforms; from the articles of a treaty through to the dimensions of a shipping container or the protocols of a data network.

- Global participation: the multiplication in the number of people who take part in this wider world of opportunities, as individuals and population groups around the planet leverage economic and technological advances, to overcome the barriers that kept them isolated in the past.

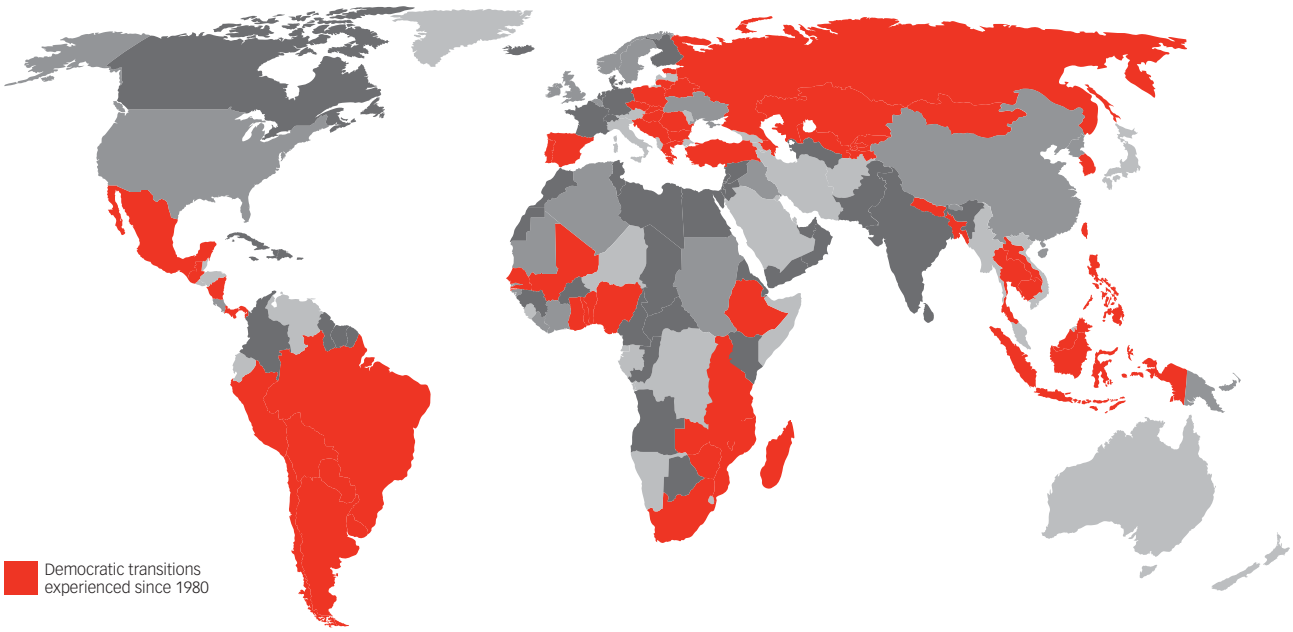
The next section will examine each of these three trends in more detail highlighting how the political, economic and social landscape has changed as a result of these globalising trends. In Part 2 we will explore the risks for global business arising as a result of these trends.

1. The dismantling of national barriers

The Berlin Wall divided Europe - politically, economically and socially - into Western Europe and the Eastern Bloc. And it divided the world into allied and non-allied zones. Threats of Cold War violence presented political risks that effectively closed off large parts of Europe, Asia and Africa to trade, investment, and productive participation in international dialogues and institutions.

In Latin America and in much of Asia and Africa, dictatorships presented their own ideological walls to the outside world: tight restrictions on flows of resources, capital and people, both in and out; the nationalisation of large and important sectors of the economy; and limits on citizens' economic and political involvement.

Figure 1: **Democratic transitions globally since 1980**[2]



China, meanwhile, stood aloof for more than 30 years while it conducted radical social experiments in revolution, self-sufficiency, and redistribution with which few others could find a common ground.

Then suddenly, in the span of a decade, these barricades crumbled. The Berlin Wall fell. The Soviet Union splintered. The Cold War ended. Deng Xiaoping opened up China, and the West normalised relations with her 1.3 billion person economy. Authoritarian regimes collapsed in more than 65 countries, to be replaced with a new wave of democratic systems (see Figure 1). Eastern Europe, Latin America and Africa were especially transformed.

The consequence of these events of the past two decades has been to reshape the international political environment from a world characterised by impenetrable walls - blocs of protectionism and isolation - to one of diplomacy, steadily rising cross-border flows of every sort, and collaboration on shared matters of core national interest.

Goods and services

The new political climate enabled nations to develop new opportunities for commerce. The Uruguay Round of GATT trade negotiations (concluded in 1993) established the World Trade Organisation as a permanent body to oversee the implementation and operation of multilateral trade agreements. It expanded trade liberalisation in goods to the vital, previously excluded sectors of economic activity - namely services and intellectual property - and it established the WTO's dispute settlement body.

The economic benefits of an enforceable multilateral trade agreement have meant that accession and acquiescence to the WTO's tariff reduction schedules have become an integral aspect of global integration. There are now 153 member countries of the WTO. With the accession in the first decade of the 21st century of China (2001), Taiwan (2002), Saudi Arabia (2005), Vietnam (2007) and the Ukraine (2008), today there are only three consequential world economies, Russia, Iraq and Iran, that have not bound themselves to the WTO's rules (although Russia has now started it accession process).

"Over the past 15 years alone, cross-border financing has risen fourfold: from $1.5trn in 1995, to over $6trn in 2007."

As a result imports and exports have increased more than sevenfold since 1986, when the Uruguay Round began. Over 17% of world output (which is around $60trn at market exchange rates) - $1,000 for every person on our planet - is being traded today.

Capital

International capital flows have similarly risen in leaps and bounds. Over the past 15 years alone, cross-border financing has risen fourfold: from $1.5trn in 1995, to over $6trn in 2007.[3] Today, the statistics show a quantum increase in longer-term international debt, portfolio equity, and direct investment activity - led by rich European countries financing the economic modernisation of newcomers to the European Union. Following close behind Europe are the central banks and sovereign wealth funds of rapidly developing economies, who have been buying up long-term stakes in the US and elsewhere with the foreign exchange generated by their booming export or resource sectors. In so doing, they've tied their fortunes to those of the developed world. In 1995, emerging markets furnished less than 20% of cross-border capital. By 2005, the figure was closer to 60%.

People

The expansion of the European Union in 2004 to include Central, Eastern and Baltic European countries (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia) granted their populations a mobility they had long desired but been denied.

Elsewhere, 3.5 million low-skill migrants are making the journey from developing countries such as the Philippines and India to higher income countries. Over 1.6 million students from developing countries are studying in richer countries, and 1.5 million people permanently resettle each year - almost one-fifth of them are Mexicans moving

to the US. Since 1980, the total world stock of migrants has doubled from 100 million to over 200 million, with this the result of sharp increases in migration in North America and Europe and similarly rapid increases in migration between developing countries, as for example has occurred in southern and western Africa. As the numbers have swelled, the mix has changed. From the 1990s onwards, a growing percentage of migrants are skilled workers engaged in jobs in the fields of new technologies, education and healthcare.[4]

According to the UN's Economic Commission for Africa, by 2005 there were already more African-born scientists and engineers living in the US than in the entire African continent.[5] Meanwhile, 35% of the rich world's official development assistance to Africa is spent employing expatriate professionals.[6]

But not all migrants cut themselves off from their origins; quite the opposite: many millions of people - and even some countries - have come to depend on their diaspora for much-needed income. Remittances by expatriate workers back to their home countries topped $316bn in 2009, a fivefold increase over 1990 flows. For small countries with large migrant populations, these capital inflows constitute a vital chunk of GDP: in Congo, 40%; in Moldova, 24%; in Jordan, 22%. These remittance flows have proved particularly resilient to shocks and tend to be counter cyclical. For example, while private investment flows to developing countries declined by 35% in response to the recent economic crisis, remittance flows in 2009 were only down 6% on the previous year.[7]

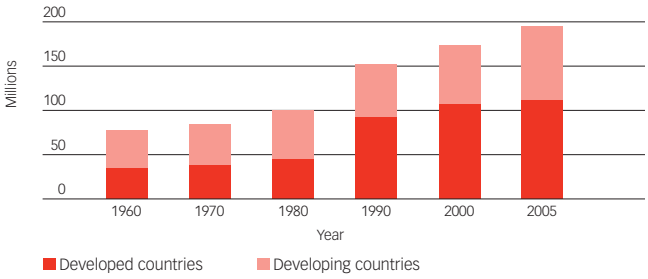
Summary

The world at the start of this decade presents very few absolute barriers. At the level of nation-states, they can be counted on one hand: North Korea and, arguably, Bhutan and Myanmar. Every other population and every other country and economy has, in the past 20 years, opened its borders; through which pass goods, services, intellectual property, vast sums of digital cash, and highly-skilled people. The clear trend almost everywhere is for the linkages between different economies and populations to intensify.

The net effect is a dramatically different landscape. Global ideas, people, and goods and services can be more widely and quickly shared. However, (as we show in Part 2), some

of the risks associated with globalisation are also shared more widely and more rapidly.

Figure 2: **Number of Migrants, 1960-2005**[8]



2. Increasing standardisation and uniformity

The world's populations today hear more voices, encounter more ideas and consume more variety in greater quantities than was ever possible at any other time in human history. As trade flows expand, imports as a share of GDP have also risen: in the US, from 10% to 17% between 1990 and 2008; in the UK, from 24% to 32%; in China, from 16% to 32% over the same time period.[9] Choice has increased even faster. US import data shows a threefold increase in the variety of products entering that country in the past 30 years.[10]

What delivers this vast volume and variety? Standardisation of processes and platforms has been a key driver. This has been facilitated through the development of policies and international treaties which strive to achieve global uniformity in practices as well as in the standardisation of infrastructure platforms, such as the dimensions of a shipping container.

Niche markets will always remain an important opportunity. But monocultures and mass production yield scale, scale drives down per-unit cost, and cost is the dominant concern of contemporary production systems.

Politics

The end of the Soviet Union discredited any form of economic organisation other than the market- and capital-centric models.

By the 1990s, economic isolation was confined to just two places: North Korea and Bhutan (and to an extent, Cuba). Meanwhile the countries that make up the Organisation for Economic Co-operation and Development, the former Soviet Union as well as China, India and other developing countries, recognised the laws of economics and the need for budget balances, low inflation and the importance of private investment. While differentiating greatly on the speed and extent of their actions, they converged around a broad commitment to economic orthodoxy and a gradual opening of domestic as well foreign trade and capital accounts. By the late 1990s, emerging markets had endured successive debt crises and, having digested the lessons, put their economic houses in order. The tragedy is that the rich countries, having lectured on the importance of living within ones means, had failed in their own policies to follow this rule. The result has been growing macroeconomic imbalances and debt, which now threaten the core of economic stability in the rich countries; while the emerging markets are growing on average by 6% in 2010 and are in the position to provide the much-needed locomotive of economic growth and foreign direct investment for the world economy.

Society

Standardising platforms are expanding in virtually every area of human activity:

- In transport: the cross-border flow of goods has been packaged into standard-dimension steel container boxes that have enabled the integration of ocean freight, rail, and trucking. Containerisation has grown sevenfold in the past 20 years - and doubled in the past 10 years - so that today, 90% of all non-bulk exports are shipped via containerised infrastructure.[11]

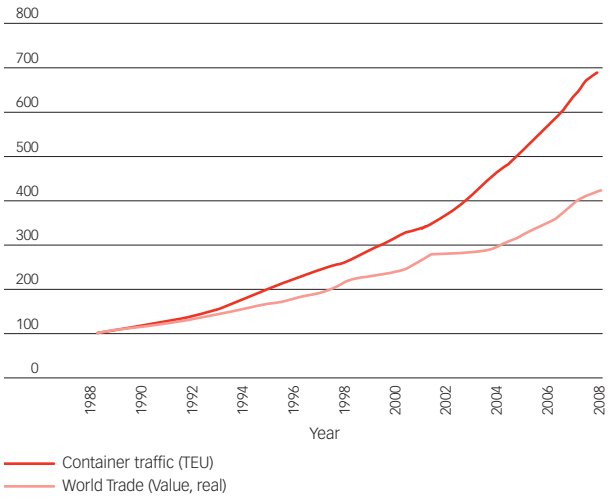
- In technology: the internet's ability to deliver the world's digital content to any connected device rests on processes and procedures that ensure compatibility. Compatibility concerns also promote standardisation in computer operating systems. For instance, translation software now allows businesses to communicate more easily across the globe and Software as a Service

products - along with Cloud computing - remove the need for physical operating platforms.

- In business: the standardisation of platforms has been an under-studied feature of business strategy and M&A activity for the past 20 years. Modern manufacturing has become a quest for common platforms, famously in the automobile sector, but evident in almost every industry from semiconductor chips to poultry farming. Meanwhile, 21st century e-commerce consists of, on the one hand, massively valuable platforms such as eBay, Google or the Appstore, and on the other hand, the millions of entrepreneurs who earn their diverse livelihood from them. Less attention is given these days to the equivalent model in brick-and-mortar retail, but Procter & Gamble and Unilever, Carrefour and Wal-Mart fulfil much the same platform role: enabling low cost, global content distribution. Since 1990, the number of Wal-Mart stores has grown from 1,500 - all in the US - to 8,900 worldwide in 2010, with 75% of new store openings slated for China, Central America and other international markets.

- In decision-making: the Masters in Business Administration (MBA) has become the global standard credential for managerial ability. The first MBA programme was introduced in mainland China in 1990, with an enrolment of just 86 students. By 2004, annual enrolment at more than 160 MBA programmes exceeded 10,000 Chinese students.[12] A prominent example of the convergence of management thought is the popularisation of lean manufacturing techniques in the 1990s, which accelerated outsourcing as an organisational cost-cutting measure. More recently, the increasingly powerful rankings of MBAs along uniform global criteria has served to erode differences in the offerings of the different courses and focus many, including in Europe and emerging markets, on the same long-standing company case studies developed at the leading US business schools.

Figure 3: **World container port traffic vs world trade, 1988-2008 (Index 1988 = 100)**[13]



Summary

The past two decades have led to a widening of opportunities and choices at the national and international level. Greater connectivity and integration of systems has brought new products and services to more people than was possible in the previous decades, which were characterised by the Cold War, inward-looking economic policies and nationalist rivalries. However, at the same time as diversity of opportunity has increased, there has been a rationalisation and harmonisation of commercial and technological platforms and standards. The identical goods and services, which previously were only offered in one country, are now offered in many. Furthermore, the internet, accounting and other standards which underlie this integration are now common across most of the world.

3. Global participation

New opportunities have developed for virtually every sector of human society, not least business. New, shared platforms for exchange and communication have made passing goods, services, money, people, and ideas through them easier, faster and more affordable. A globe-spanning network is taking shape, but there is no master architect or master plan behind it. Instead, individuals, groups and companies around the planet are themselves finding ways to free themselves from the traps that kept

"New, shared platforms for exchange and communication have made passing goods, services, money, people, and ideas through them easier, faster and more affordable."

them isolated in the past, so that they may take part in a wider world of opportunities.

Connectivity

Arguably the most powerful factor driving expansion of the global participation, among individuals and societies of every income level, has been information technology.

Information technologies are spreading at exponential rates. From essentially zero in 1990, the number of internet users worldwide has grown by more than 40% annually for 20 straight years, connecting over 1.6 billion people today.[14] In its first decade, the internet's usefulness consisted mainly of disseminating information quickly and cheaply. Now, with the spread of broadband access technologies, it invites users to participate in arenas where previously setup and distribution costs were prohibitive: the creation and publication of multimedia content like music and video; trading of stocks, bonds and financial derivatives; and the marketing and sale of goods, services and assets to global markets.

Africa, which was left behind by the fixed line communications revolution due to its high fixed costs, has been catching up in the wireless age. The continent is the fastest growing mobile market in the world. Since 2002, its wireless subscriber base has been growing by 50% per year. More than one in three African adults already has a mobile phone.[15] In 11 countries, penetration has surpassed one-in-two.[16]

Out of poverty

At the macroeconomic level, the experience of year-on-year emergence from poverty over the past couple of decades is unprecedented. Over the past 30 years, China (whose 1.3 billion people make up one-fifth of the global population) has reported, on average, annual growth of 10%.[17] The World Bank estimates that 500 million Chinese people have been lifted out of extreme poverty in the past 25 years. GDP per head has rocketed from $315 in 1990 to $3,250 in 2008.[18] The sum significance of these sustained trends has been to enable the world's single largest population group to take part in human economic and social advancement.

This unprecedented growth is not confined to China. India, with a population only slightly smaller than China's, has recorded year-on-year GDP per capita growth of almost 5% since 1990, with levels rising from $370 to over $1,000 by 2008. Brazil, the world's eighth largest economy and home to almost 200 million people, has seen its GDP per capita rise from just over $3,000 in 1990 to over $8,000 today. Cross-border direct investment grew from less than $1bn to $45bn over the same timeframe. Similarly, the end of command economics in the Soviet Union, after the initial transition shock associated with the adjustment to market economics, has helped achieve solid economic growth for Russia's 140 million people, and the 250 million citizens of the former Soviet Union and Warsaw Pact countries.

However, there is a starkly polarised debate between those who argue that globalisation has universal benefits and those who argue it only advantages the richest developed sectors of a global society. Globalisation has the potential to benefit everybody. However, at present the rich benefit proportionally more than the poor. In the 40 years from 1960 to 2000, per capita GDP in the 20 poorest countries inched upwards in real terms, from $212 to $267. In the 20 richest countries, it tripled from $11,417 to $32,339. Extreme poverty remains a sobering fact in many parts of the world - especially in Africa, where an estimated 25,000 people die from hunger each day.[19] For many of the poorest people the problem is too often not one of too much globalisation but too little, as they suffer from geographical isolation, corruption and

*In 2009, Lloyd's produced a 360 Risk Insight report in partnership with the Microinsurance Centre that discussed the role of Microinsurance in bringing people out of poverty.

autocratic governments, or absence of infrastructure, education and affordable food - meaning that they cannot enjoy the benefits of global integration.*

The economic growth associated with the current tidal wave of globalisation is generally making the world a better and more connected place for many global businesses and citizens. Desperate challenges remain, not least for the bottom billion people who remain in dire poverty.

Whether or not the exclusion felt by those that believe globalisation has not benefited the world grows into discontent, will depend on whether globalisation creates new opportunities and the extent to which systemic risks, such as those identified in this report, are managed. The danger is that those who feel that so dar they have not benefited from it may also be more vulnerable as a result of the systemic shocks which globalisation imparts.

Urbanisation

As societies and economies grow and become more integrated and inter-connected, individuals will move to cities to take advantage of proximity to each other and to infrastructure and services and most importantly to seek economic opportunities. The world's urban population is growing at nearly double the overall population growth rate. In 1990, just over 40% of the human population lived in cities.[20] By 2008, that share had already risen to more than 50% - the first time in human history that the urban population has outnumbered the rural.[21] China, which has already seen 400 million new urban dwellers since its economic modernisation commenced in 1978, expects an additional 300 million people to move to the cities between 2005 and 2020. In 2000, to accommodate this movement, the Chinese government announced its intention to erect 400 new cities by 2020 or 20 per year. If current trends continue, by 2025 there will be over 220 cities in China with populations over one million (versus 35 such cities in Europe), and eight mega-cities with over ten million residents each.[22]

Health and education

With higher incomes and city living comes better access to education and health care, two requirements to take part in contemporary economic activity. In China, enrolment in higher education has been expanding 15% per year from a 1990 base of 2 million students, to over 25 million students by 2007. Tertiary enrolment in India has jumped from 5 million to almost 12 million over the same period.[23] Elsewhere, throughout the middle-income world, university enrolment jumped an average of 77% between 1995 and 2005.[24]

In the past 20 years, several developing countries in Latin America and East Asia have also begun to implement national health insurance programmes. A prominent

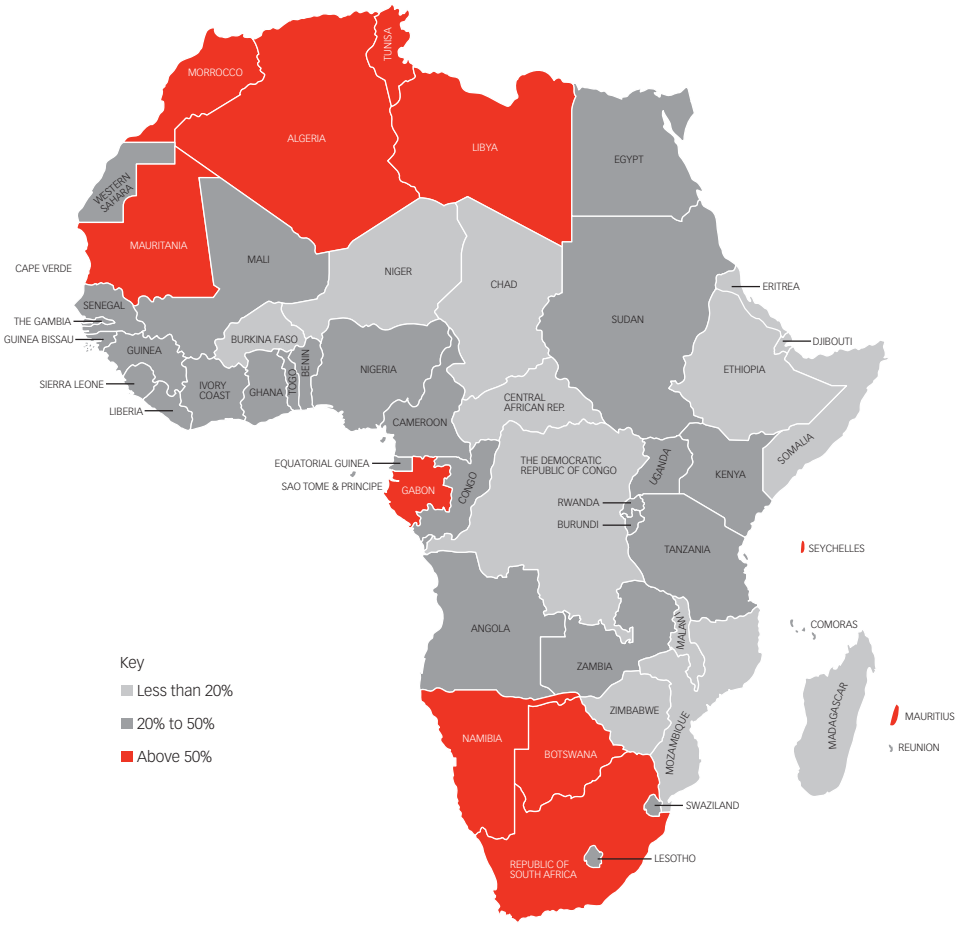
example is Mexico's Seguro Popular, introduced in 2002. The programme offers affordable or free healthcare to the 50% of Mexican families that are not already covered by other social security programmes. Meanwhile, in poorer countries, the emphasis has been on expanding immunisation programmes. Great strides have been made against some of the world's gravest health threats. For example, the number of people who died of measles worldwide fell by 75% between 2000 and 2007 and by 89% in Africa. Since 2000, reported malaria cases and deaths have declined by at least half in 25 countries around the world.[25]

Improved access to education and healthcare has a strong positive impact on life expectancy and infant survival rates. Average global life expectancy has lengthened four years since 1990 alone.[26] Global infant mortality has fallen nearly 30% over the same period, from 64 deaths per 1,000 births down to 46, which has enormous compounding effects on population growth. Consequently, by 2005, the human population had already doubled its 1950 total.

Summary

In comparison with 20 years ago, there are far fewer people standing on the world's sidelines today. The majority of the world's population have now escaped dire poverty and are healthier, more educated, urbanised, connected and able to participate in global exchanges of ideas, goods and services. They contribute talent and ideas and compete for resources and markets.

Figure 4: **Mobile telephony penetration in Africa (% of adults with a mobile phone)**[27]



PART 2

A NEW KIND OF RISK

The sources and the speed of transmission of risks have multiplied as a result of globalisation.

In Part 2 we show that while globalisation has brought unprecedented benefits and opportunities for businesses, it has simultaneously changed and raised the risks that society and business face. Both the sources and the speed of transmission of risks have multiplied as a result of globalisation. This poses a range of new dangers: from vulnerabilities arising from the use of shared infrastructure platforms (such as energy, internet and transport), to greater threats from new and largely unquantified systemic shocks. We highlight the importance of understanding and seeking to build resilience against these risks at the local and individual firm level. We also emphasise that there is a need to appreciate the political consequences of not managing these risks, and the danger of a possible backlash against globalisation.

People and organisations are more robust because they can tap a wider set of support and opportunity. But it is precisely this position, within an intensely interconnected and interdependent system, that has led to new, unexpected and potentially systemic risks. The expansion of democracy, an increase in wealth and education, and advances in technology have freed many from isolation. But in certain respects, integration has also increased the risks to business and society. This is despite the fact that , in many respects, individual risk has actually declined. Rising levels of incomes and savings, as well as the spreading of education and sharing of knowledge, allows individuals and societies to set aside resources for risk mitigation and management. Compared with 20 years ago, there are now more ways to spread and exchange risk; not only in finance, but in research, manufacturing, employment and relationships.

The new risks in a rapidly globalising world are the cascading failures caused by the collapse of some critical node in a network; both the physical damage which may be caused, as well as the rapid change in perceptions that can overwhelm society's and businesses' capacity to manage these risks.

The task for business is to become familiar with these risks across a wide range of sectors; to heighten sensitivity to activities or developments that constitute 'systemic' threats, and to become more alert to the warning signs that a destabilising event may already be gathering momentum. With this greater understanding business will be better prepared to plan for and respond to these risks.

Unless businesses build resilience and prepare for large-scale shock events, effective risk prevention and mitigation will be impossible.

In Part 2 we have selected a number of risks which have changed significantly as a result of the past 20 years of rapid globalisation. These are illustrative of the way in which global integration has led to new forms of systemic risk. It is not intended to be an exhaustive list and there are a number of risks, not least those associated with the environment and climate change, which are not covered within this report.

1. Economic and financial risk

The success of globalisation in generating global growth and rising incomes led to a dangerous complacency in economic orthodoxy and a failure to recognise the warning signs.[28] In a global environment characterised by rapidly opening markets, increasing connectivity, population expansion, and seemingly limitless computing power, government's and their ecomomic advisors felt confident that their policy recommendations would facilitate further growth.

In the US, successive economic liberalisation statues, in 1980 and again in 1982, substantially deregulated loan products. In 1991 the banking industry succeeded in repealing the 1933 Glass-Steagall Act, which had sectioned off the financial industry into discrete sectors with independent balance sheets and risk exposure (see Box 2

"Unless businesses build resilience and prepare for large-scale shock events, effective risk prevention and mitigation will be impossible."

on regulation). Breathtaking capital expansion and financial innovation ensued. Commercial lenders entered into investment banking activities, such as underwriting and collateralising mortgages and debt obligations.

Between 1998 and 2007 (the so-called 'Golden Decade'), the global over-the-counter derivatives market ballooned from $100trn to $600trn; a sum 16 times global equity market capitalisation and 10 times global GDP. New and increasingly complex financial instruments - such as credit default swaps, collateralised debt obligations and capital resale markets for sub-prime assets - enjoyed explosive growth. Sub-prime lending, which in 1998 accounted for just 5% of all mortgage lending in the US, swelled to a 30% share over the next ten years.

As the size and complexity of transactions multiplied, so too did the gulf between regulatory overseers and market innovators. Three international institutions are responsible for global financial stability: the IMF, the Bank for International Settlements (BIS), and (ever since the 1997 Asian financial crisis) the Financial Stability Forum. None of these institutions put forth globally binding international standards for reporting, transparency, or accountability.[29] The BIS's Basel 2 regulations, which sought to set an international standard for how much capital banks need to put aside to cover potential losses, failed to prevent banks limiting their risk exposure and proved highly vulnerable to their own flawed value-at-risk models.

Once capital reserve ratios were set, smart bankers developed credit default swaps to innovate around them, violating the spirit if not the letter of the risk-management rules. Gross exposures in the banks escalated in a manner that bore no resemblance to net exposures, and the ratio of financial company debt to GDP in the US soared from

16% to nearly 116% between 1975 and 2007.[30] Faced with a rapidly shifting array of complex products developed by financial engineers, regulators lacked the political backing, manpower and technical expertise to sort hazardous practices from the merely profitable and force a return to principle-based risk mitigation.

Neither the banks nor their global supervisors could untangle counter-party positions sufficiently to perceive correctly the systemic consequences of many banks holding highly correlated and interconnected asset and loan portfolios.[31] As credit swaps became commonplace, the homogeneous global financial network became increasingly susceptible to trigger events and feedback mechanisms.[32]

The trigger of the crisis was the bursting of the US real estate bubble, which peaked around 2006, but it rapidly developed and spread into a global crisis with the failure of several large financial institutions, the bailout of banks by national governments and dramatic falls in the values of stock markets. The crisis was unprecedented in the truly global reach of its origins and effects and it shook the world economic system. If globalisation gets the blame, much that is good may get thrown out with the bad. Neither businesses, consumers, nor regulators perceived the systemic risks accumulating. All sides believed that the system dispersed financial risk. At the individual level they were right, but the system does not make risk disappear. When all individuals bought into the same risk mitigation products, no one was safe from the herd behaviour which ultimately burst the property market real estate bubble and precipitated a worldwide recession.

Governments can be proud of the speed with which they organised a global response to the crisis. But still the costs propagated faster. The crisis and associated economic collapse have so far caused global losses of an estimated $4trn - the deepest financial malaise in four generations.

The systemic financial risk has not ended there. Public debt has reached historic levels for peace time in a number of advanced economies. Collectively, G20 budget deficits now stand at nearly 8% of their combined GDP. According to the IMF, by 2014, the average debt-to-GDP ratio of advanced economies within the G20 will climb from pre-crisis levels of 78% to 118%.

The problem is particularly acute in Europe, where the single monetary policy gives Greece few options. As the markets have woken up to the scale of their previously hidden deficits (and the extent of fiscal adjustment required to bring the economy into alignment), focus has turned to other countries with unsustainable deficits, so that contagion has been rapid. The economic shock waves threaten to engulf a number of OECD economies and are already having a widening political and social impact; with riots in Greece and sharp reductions in social and other expenditures in Spain, Portugal, Germany and the UK.

The world's major economies are now faced with a new set of tough choices. The most pressing is how to time a gradual and credible withdrawal of fiscal stimulus so that the recovery is sustained: not so late that fiscal deficits cripple sovereign credit ratings, not so soon that the momentum of recovery stalls. The problem is that the advanced economies have fired all their fiscal guns and there is little or no finance left to meet other looming crises or new systemic shocks should they arise.

The impact of the economic crisis on business is wide-ranging; virtually all businesses have been negatively affected in some way. The crisis has hit business in the OECD countries in at least three ways. Firstly, through the wealth effect; by which the economic collapse has translated into lower levels of consumption and sales. This effect has been heightened through pessimistic perceptions, driving consumers and others to postpone their spending decisions. Secondly, through the credit market; bank lending has been greatly curtailed and spreads have widened, making investments more costly and forcing firms to retain earnings and postpone investment. Thirdly, soaring government debt has resulted in higher taxes and lower government spending on projects which benefit society and business.

Box 1: Competition risk

The opening of global trade and the growth of large multi-national companies has created an increasingly competitive global market. Businesses need to invest or innovate to survive and prosper, adapting their products or services in order to meet rapidly changing consumer tastes. Without this adaptation, businesses who were previously the dominant or sole player in their traditional home markets may be left vulnerable to the global reach of competitor companies. The rise of the internet for instance, has led to the decline in high-street book sales and competition from internet sales was cited as a contributory factor to the collapse of UK book chain, Borders in 2009.[33] Kodak is an example of a company that has had to adapt to survive in the fact of international competition and demand for new technology. Digital photography has replaced traditional film and print photography. The ease of access to international markets, allowed global brands such as Sony to enter Kodak's traditional US market and exploit the gap in the digital market left by Kodak. However, over recent year Kodak has made drastic changes to its corporate strategy and has re-focused its business on digital markets retiring old products such as "Kodachrome" its popular colour film[34] and offering new products and services such as Kodak digital kiosks in larger Boots stores and the launch of ofoto.com.

Risks to business

Credit crunch

As banks and other financial institutions reduce the level of credit they are able to provide, there are several negative consequences for businesses:

- The availability of credit dries up and this greatly constrains firms' abilities to invest and to build up stocks. It is difficult for businesses to borrow money from financial institutions and therefore expand.

- Reduced credit adds to the pressures up and down the distribution chain. Suppliers are paid with increasing delays and customers are expected to pay more promptly. As these demands cannot be passed on, they in turn reduce the liquidity of suppliers of customers and can lead to a cascading liquidity crisis and bankruptcies.

- The globalisation of investment flows has provided a welcome boost to certain markets in good times, but can equally compound the difficulties when this turns into an investment drought during a global crisis. At the end of 2008, foreign investors owned 41.5% of shares listed on the London Stock Exchange.[35] In 2009, it was reported that the uncertainty created by the economic recession caused investors to pull £1trn out of the UK economy.[36] As fewer listings from both domestic and international sources combined with lower investment volumes, the pressure on the City from the financial crisis was compounded.

Consumption

As credit dries up and the government tightens the central budget, consumer confidence falls and they begin to re-assess their spending priorities. Demand for consumer goods and services has stagnated over the last two to three years in Europe and North America, with robust growth in China and other rapidly growing emerging markets cushioning the blow for global companies. The crisis has had a highly differentiated impact on different retail sectors, with some able to withstand the pressures of the downturn better than others. The 'fast casual' segment of the restaurant business in the US saw double digit growth in 2009, even though the overall sales of restaurant businesses declined over the year.[37] Luxury goods have seen a sharp contraction. For example, global sales of luxury apparel, jewellery and fashion accessories were estimated by consulting firm Bain & Company to have declined by about 8% in 2009, due to the declines in the three mature markets (US, Japan and Europe), which still make up around 80% of global sale. This is despite a 12% growth in China.[38] Businesses that are able to adapt their business models to provide the best value for customers, or diversify into new product or service areas, are more likely to withstand an economic recession. One option

is to benefit from the fruits of globalisation by increasing sales in fast growing emerging markets. China and India are projected to grow by over 8% for the next two years and emerging markets on average are forecast to grow by 6%. Another option, within the OECD markets, is to redirect sales to those segments of the markets that are capturing a growing share of a contracting consumer wallet. So, while in 2009 the auto industry was forecasting the worst year in nearly half a century, analysts were also indicating that it would be hard pressed to satisfy demands for hybrid vehicles.[39]

Government policies/risks

To respond to the current economic crisis, governments must balance the need to reduce government deficit with the risk that drastic spending cuts could risk a double-dip recession. A double-dip recession would mean businesses would continue to suffer from slow economic recovery and governments would have little choice but to rapidly raise government revenue through taxation, adding further economic strain.

Government projects that support businesses may also be shelved during periods of economic consolidation. For example, government funding for Sheffield Forgemasters - to allow them to build pressure vessels for nuclear power stations - has been shelved, as has government financing for a new visitor centre at Stonehenge.[40]

Box 2: Regulation

The financial crisis has been seen by many commentators as a failure of regulation. Critics have identified a loosening of the regulatory environment and a process of deregulation. This included the repeal of the Glass-Steagall Act of 1933 which had separated commercial and investment banking. The failure of the regulatory system to keep pace with financial innovation and, in particular, to not cover the explosive growth in derivative and "off balance sheet" activity has also been seen as a critical failure.[41] Under considerable political pressure, governments in North America, Europe and elsewhere have responded with a series of proposed reforms of the regulatory system. These include measures which seek to regulate executive pay, capital requirements, derivatives and proprietary trading by banks and other financial institutions. In the UK and Europe, there are also proposals to charge a levy on banking assets or profits, with a view to creating a fund or simply boosting government revenues.

Some regulation is vital and can reduce risk, and not least systemic risk. Whether it is in the regulations that cover planning and building codes or financial requirements, consistency and clarity of regulations is particularly important to allow businesses to plan for and abide by regulatory requirements. Regulations can be onerous, requiring considerable investment in systems and people. At times this may be excessive, and the benefits to be gained always need to be judged in the context of the costs which are imposed. In the UK, businesses are estimated to have spent at least £1.4m each year on advice on how to comply with regulations.[42] Recent reports suggest that the costs to business of over 200 new regulations would amount to £5bn annually.[43] While it is important to recognise that some regulation is necessary, excessive regulation may stifle innovation and hamper financial intermediation and lending. It could also be a crippling drain on businesses, especially small and medium businesses, which cannot shoulder the burdens imposed. The World Bank's Doing Business reports measures business regulations, their impact around the world and identifies reforms. While stressing the need for laws and regulations (not least in the areas of tax, health and safety and the rights of workers), it shows how many regulations serve to undermine competition and provide an avenue for abuse of power and corruption.[44] Finally it is also worth considering how any new regulations at a global level would be implemented as there is not the same frameworks and systems of enforcement that exist under national legislation. This is something global bodies and regulators will need to consider.

2. Global pandemic risk

As national borders open up to wider and more profitable exchange, we also expose ourselves to a wider range of pathogens and parasites. The fact that we have reduced natural diversity in order to expand our production and transport capacity multiplies the danger because diversity is nature's best defence against disease. Past wide-scale and devastating pandemics have occurred before the rise of the emergence of globalised networks of trade, people and services. The full impact of a pandemic today is therefore unknown.

A pandemic is a particular category of health threat: a highly infectious disease whose initial rate of transmission outpaces our capacity to detect, contain or inoculate against it, thereby endangering the human population as a whole. This threat typically begins as a communicable virus afflicting a specific animal population: pigs, chickens and cows are common culprits.

For such a virus to take on pandemic proportions, three conditions must be met. Firstly, the host animal population must be sufficiently large and concentrated to incubate and mutate progressively virulent strains. Secondly, infected animals must have intensive human contact to afford the virus opportunities to develop efficient bridges across the species barrier. Thirdly, once the virus accomplishes that feat, it needs a fast and extensive transport mechanism to enable it to stay ahead of naturally- and artificially-occurring immunities in populations that are already infected.

"The challenge for business is to understand how to prepare for an increased likelihood of pandemics."

Between 1995 and 2006, Chinese mainland livestock imports exploded sevenfold: from $151m in 1995, to $1.1bn in 2006. Across the former centrally-planned economies of Europe, livestock imports doubled from $5bn to $10.8bn over the same period. Developed world imports grew slower over this period: rising some 55% from $58.8bn to $90.8bn, but contributed the largest absolute volume growth.[45]

The dramatic growth in global flows of potential carriers - not only livestock, but also produce and people - all aggregated through a relatively small number of infrastructure hubs is the most significant form of assistance we've provided to pathogens. Today, the top 30 airports in the world encounter almost half (41.5%) of all international passengers and handle over two-thirds (68.5%) of all international freight.[46] In addition, the top ten ports in the world handle fully 50% of the global economy's container traffic.[47]

Globalisation has created conditions which threaten to propel pandemics across the globe. The challenge for business is to understand how to prepare for an increased likelihood of pandemics. Although there is no precedent as to how a pandemic may affect our modern globalised society, it is possible to identify three broad areas that could be impacted. Firstly, the direct impact on human resources as staff become ill or are quarantined at home or stranded by the collapse of transport systems which would be incapacitated due to lack of personnel or quarantines. Secondly, the impact of the above on suppliers and services as their staff are similarly affected. Thirdly, the impact on customers and markets as confidence in particular regions collapses and the means to transport or distribute products and services is reduced by restrictions.

Our prevention programmes have been slow to respond to the looming threat. Global vaccination efforts have focused on containing known virulent pathogens; especially diphtheria, tetanus, pertussis (whooping cough) and measles. But we remain dangerously exposed to the new flu strains that will afflict our future. A survey[48] conducted by the WHO of all the world's 36 current and planned flu vaccine manufacturers found the expected lead-time for developing a pandemic-specific vaccine to be four months. At current production capacities, four years would elapse before global demand was satisfied.[49]

Risks to business

Human resources

The impact of any pandemic on the human resources of a business will entirely depend on the nature of the pandemic and whether or not it targets people of a working age. However, a Department of Health publication advised businesses to assume, in the event of an influenza pandemic, that 50% of the workforce would require time off at some point for anything between seven to ten working days.[50] Employers will also need to consider their health and safety obligations during a pandemic, which may require additional costs in preventive measures.

Businesses that are able to provide their staff with vaccines will be in a relatively strong position, provided that these can be distributed in time. Where possible, businesses should have contingency plans that allow workers to remain at home or to work from remote localities. They should also have a clear prior knowledge of key workers and time-critical vulnerabilities, such as may occur in IT and other infrastructure systems.

Suppliers and services

A reduced global workforce will have knock-on effects on the provision of services and the delivery of essential supplies; this may be basic services such as energy supply, waste collection and food stocks. However, just-in-time business models would be left vulnerable to any

prolonged product shortages (see section 4 on supply chain risks).

Transport networks may be seriously affected by the outbreak of a pandemic. Closures may be unavoidable due to staff shortages or due to the imposition of travel restrictions in an attempt to stop the spread of the pandemic. Manufacturing businesses operate lean manufacturing processes whereby completed goods are immediately shipped out to their destination. The closure of transport networks would therefore force production to stop due to a shortage of on-site storage.[51]

A prolonged pandemic may lead to a shortage of the goods essential to many businesses manufacturing processes. As supply chains are increasingly spread out across the globe, a pandemic outbreak in one part of the world may affect the resilience of one businesses supply chain, even if the host country is not experiencing the direct effects of the pandemic.

Pandemic events threaten not only the human population, but populations upon which humanity depends for food and industry. The vector may be a virus, requiring us to cull the livestock we intended to trade or eat (as with cases of bovine 'mad cow' disease in 2004 or foot-and-mouth disease in 2001) or an imported parasite against which local organisms have no evolutionary defence. In 2008, pine beetles devastated an estimated 50% of Canada's west coast pine forests, wiping out over 700 million cubic meters of timber. This was equivalent to 15 years of harvest volume for leading investors in timber. The British Columbia Ministry of Forestry projects the industry's loss to peak at 75% of forest volume in 2015.[52]

Customers and markets

Illness, transport restrictions and physiological fear will also impact the choices customers make. Businesses who are used to a global market of customers may find their market has shrunk, and will therefore need to re-focus their business strategies on national or local markets. According to Morgan Stanley, the 1995 foot-and-mouth outbreak cost the UK beef industry $5.8bn due to reduced export and sales.[53]

Industries that rely on face-to-face contact will be especially hit by a pandemic outbreak. The tourism, hospitality and entertainment industries will notice a downturn in customers as people choose to stay away from areas of dense population. A report by the Trust for America's Health claimed that a pandemic flu would cause an 80% loss in demand for arts, entertainment, recreation, accommodation and food services.[54] Events such as concerts and festivals may have to be cancelled in order to contain the virus. This will have an economic cost for the organisers as well as for businesses that are reliant on the occurrence of this event, such as merchandise providers or local hotels, bars and restaurants.

Lloyd's has produced an Emerging Risks report Pandemics: Potential Insurance Impacts which discusses the impact of a pandemic on underwriting losses and investment returns.

Box 3: SARS - economic and social impact

SARS (Severe Acute Respiratory Syndrome) was first recognised in Guangdong Province, China, in November 2002. It had crossed over into the human population through live-animal markets in the countryside. From China it spread to other Asian countries, then to North America and Europe. Within nine months SARS had reached at least 30 countries across five continents, infected over 8,400 persons and caused 812 deaths. This equates to a fatality rate of nearly 10%, roughly 100 times more deadly than the common flu.

East Asian airlines were particularly affected by the outbreak, with shares in Cathy Pacific dropping by 7% (amid fears it would have to ground its entire fleet)[55] and a fall in passenger numbers of 75%, the airline were led to ask staff to take unpaid leave.[56]

Hong Kong's Retail Management Association said, in early April 2003, that retail sales had plunged between 50% and 80% since the outbreak of SARS.[57] The total economic impact of the SARS pandemic on the Asia-Pacific region is estimated to be around $40bn.[58]

So far, outbreaks have occurred predominantly in developed or rapidly developing economies, where sufficient health and security infrastructure were available to take the extreme measures necessary to contain the virus. Had less developed parts of the world - notably, Africa - hosted major outbreaks, their own response capacity could very quickly have been overwhelmed, with disastrous consequences. Currently, the lower mobility of people and trade in the developing world would probably prevent a possible continental humanitarian disaster. However, as globalisation gives people the means to move around more easily and more businesses trade on the international market, the risk of a widespread and devastating pandemic in these regions could become greater.

Scientists are carefully watching the progress of H5N1 ('bird flu'), a highly virulent and rapidly spreading avian disease, deemed to pose potentially as great a threat as the Spanish flu pandemic of 1918. By 2007, 38 countries had reported over 4,500 H5N1 outbreaks among poultry and wild bird populations.[59] The virus is now considered endemic among birds in Asia.[60] It has not yet developed an effective human-to-human transmission mechanism; however, humans with extensive exposure to infected birds have been known to contract the avian form of the virus, and some limited human-to-human transmission is suspected to have occurred in Thailand and Indonesia. Among some 300 reported human infections, 60% of the patients have died, which ranks H5N1 among the most virulent pathogens known to infect humans. If a mutated form, capable of human-to-human transmission, manages to retain this virulence (there is no reliable way to predict this), epidemic models show that it could surpass[61] the death toll of the 1918 Spanish flu, which killed between 25 million and 40 million people.[62]

In the event of an outbreak, development of a strain-specific vaccine would require several months. Mass production of doses would require up to a year, and global inoculation would require from two and a half to four years. As H1N1 ('swine flu') has proven, even with a vigorous global response, infection cases will reach into the hundreds of thousands or millions while populations wait for a vaccine to reach them. During that period, harsh quarantine regimes and travel bans may be the only means available to protect healthy populations.

3. Infrastructure risk

Since our economies and our safety both depend upon their proper functioning, the health of our critical infrastructure (electricity, gas, oil, telecommunications, water, agriculture, heating, health, transportation, financial services security) merits careful, constant monitoring. The double-trend of swelling populations who demand services, plus the intensifying per capita use of these services as economies develop, puts all infrastructure under enormous strain. The global integration of societies has provided the engine for this rapid economic growth. At the same time, the development of global networks has meant that the efficiency and effectiveness of infrastructure is central to business and national competitiveness. The quality of infrastructure is a significant determinant of the ability of businesses and societies to benefit from globalisation, especially in the area of global trade.

In the US, the world's largest power consumer, population and economic growth have tripled demand for electricity in the last 50 years (fossil fuels supply 80% of it). The invention and subsequent proliferation of long-haul fibre networks and internet data centres since the early 1990s has added an additional 7 to 9 gigawatts of demand to the US power grid, roughly equivalent to that country's total installed wind generating capacity to-date.[63] Globally, energy demand is expected to rise 43% over the next 20 years.[64]

The World Bank puts overall critical infrastructure investment in water, energy, communication and

"The development of global networks has meant that the efficiency and effectiveness of infrastructure is central to business and national competitiveness."

transport systems at $35trn globally over the next 20 years, including $500bn per year to meet the rapidly rising demands of rural areas in Africa, India and other parts of Asia. In the US, the American Society of Civil Engineers estimated in 2009 that $2.2trn of maintenance is required on basic infrastructure over the next five years alone.

In this environment of stressed infrastructure assets and network dependencies, businesses should increasingly expect to see outright denial of essential infrastructure services. Businesses should also expect to see cascade failures and security breaches. For business, understanding the nature of these complex global networks and the critical interdependencies has become an essential dimension of risk management.

Risks to business

Demand pressures

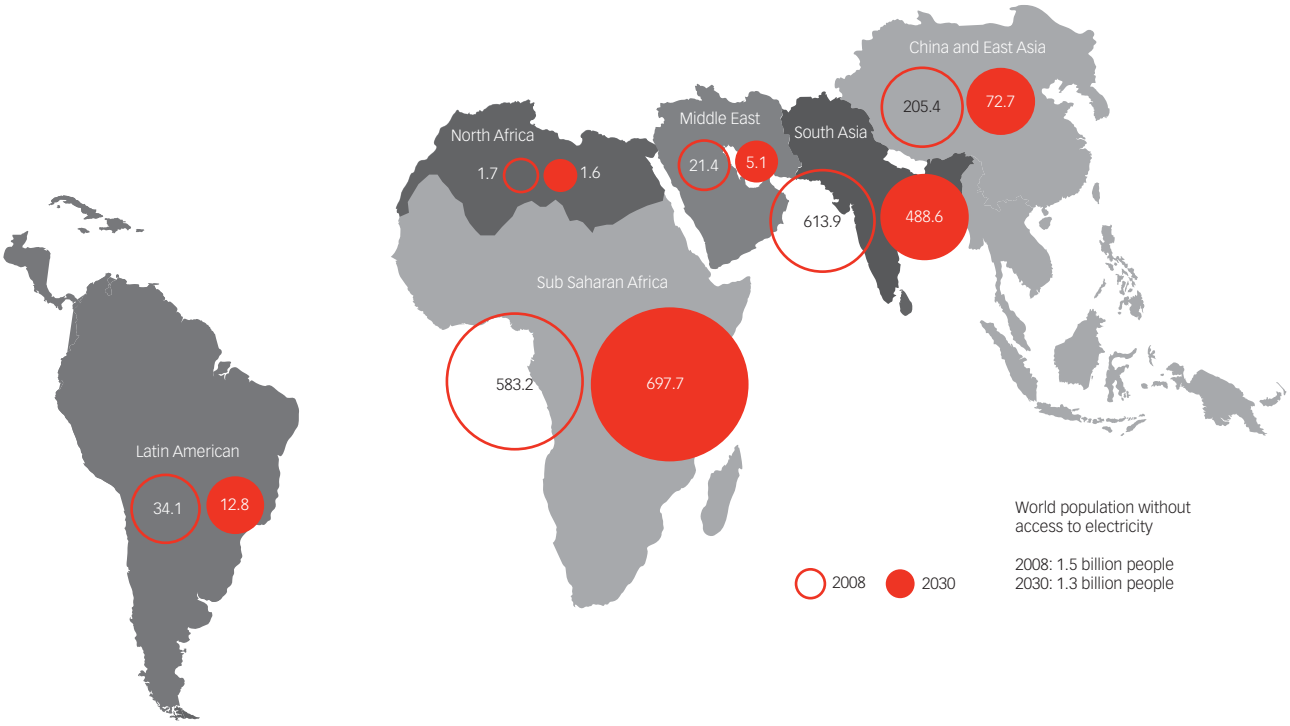
In rapidly developing parts of the world, supply of critical infrastructure resources is already failing to meet demand or is projected to do so soon. Energy supplies and transport are two networks that are particularly struggling to keep up with population growth, urbanisation and growing global trade. Globalisation has allowed businesses to expand, supplying goods and services on a global scale and to benefit from the ability to outsource key business functions, such as IT and customer services to international locations. However, this global reach makes them more dependent on overseas infrastructure networks and consequently more vulnerable to the risks associated with failing infrastructure in both the developed and developing worlds.

India suffers a persistent and increasingly severe electricity shortage. From 1990 to 2004, the annual shortfall in energy production grew from 21 billion kW/h to over 40 billion kW/h.[65] Power outages occur in urban centres on a daily basis (averaging three hours per day outside the monsoon season and 17 hours per day in the monsoon season) and roughly 40% of the rural population is entirely without electricity, according to World Bank research.[66] Companies, such as American Express, IBM, Citibank, AOL, General Electric and British Airways all

benefit from outsourcing processes to India, whether it is IT support or customer service help lines. Frequent power cuts due to failing infrastructure has forced extensive investment in standby generating capacity to avoid severe disruptions to the services provided by these companies, leading to potential reputational damage and loss of revenue. Both the OECD and IEA estimate that between 2008 and 2030, the number of people globally without access to electricity will fall only marginally, from 1.5 billion to 1.3 billion (this improvement must also be set against the backdrop of a growing global population). In many parts of countries as diverse as China, India and South Africa, the rapid growth in electricity generation has failed to keep pace with soaring demand, as electrification and the rise in use of appliances leads to power shortages. For business, the consequence is either costly disruptions or the need to purchase alternative standby generating capacity. Where businesses are dependent on supply chains, energy shortfalls can lead to significant delays in production. In South Africa, for example, power outages have at times led to the closure of mines. In 2008, the closure of three of the world's leading gold mines led to a 5% increase in the world gold price, which affected sectors that rely on gold, such as the jewellery and electronic industries, as well as impacting on market sentiment in other financial markets.

Shortages of power are not confined to rapidly growing emerging markets. Large-scale power failures in the North-East US and Canada in August 2003 deprived more than 50 million people of electricity; the estimated cost was between $4bn and $10bn. In Canada - in the month of August - GDP fell by 0.7% and 19 million work hours were lost. The cascading failure was the result of automated- and human-load management procedures which were unable to recognise or rebalance grid supply and demand. As grid capacity is reached, there are suggestions in many countries

Figure 5: **Number of people without electricity by continent, 2008-2030 (millions)**[67]



(including the UK) that cascading outages should be expected in the future, as under-investment in capacity and the growing interconnectedness and complexity of networks combine to place unsustainable pressures on the energy networks. Industry is heavily reliant on electricity, especially for manufacturing processes. In countries, such as the US, manufacturing forms a substantial percentage of total exports and in 2008 manufactured goods made up two thirds of exports in US.[68] Energy shortages and disruption in the developed world therefore have the potential to stall the growth of global trade.

Globalisation has enabled countries with limited natural resources or means of production to import raw materials or finished goods. For example, Japan has limited energy resources of its own and imports around 90% of its oil by sea, predominately from the Middle East.[69] As global energy demand pressures grow, particularly driven by the growth of emerging markets, such as China and India, international businesses that operate in developed economies that similarly rely heavily on foreign imports of energy, may find future energy supplies become increasingly vulnerable (see Box 6).

Transport networks are also coming under increasing strain. Between 1995 and 2009, seven million cars entered the UK road network.[70] A report by the Department of Transport shows that the UK moved 66% of its freight by road in 2007[71] Developed economies, such as the UK, urgently need to update their transport networks. However, the problem is more acute in developing countries such as India, China and Brazil. A PWC report states that the high population density of India will increase 22% by 2030, putting additional strain on the already limited transport infrastructure.[72]

Brazilian ports are struggling to cope with the increase in exports, leading to bottlenecks and increased waiting times for businesses attempting to unload their goods. To avoid problems at the busiest port of Santos, Volkswagen who had outsourced some of its production to Brazil, had to transport its unassembled car parts destined for China and India to another port further north, adding considerable time to the delivery time and increasing the overall costs of production.[73] Global businesses operating in countries with older or less well-integrated infrastructure, such as Brazil or India, or seeking to export globally to these countries, will need to consider how to continue to operate effectively with potential constraints on supplying their goods to customers quickly and efficiently.

"The internet has allowed businesses to operate across the globe, accessing expanding markets, working out of virtual offices and sending information at the click of a button."

Vulnerability of IT infrastructure

The invention of the public internet as a cheap and efficient form of networking revolutionised infrastructure control systems. Prior to its advent, most critical public works operated on physically and logically independent hardware, operating systems and software. The internet has allowed businesses to operate across the globe, accessing expanding markets, working out of virtual offices and sending information at the click of a button.

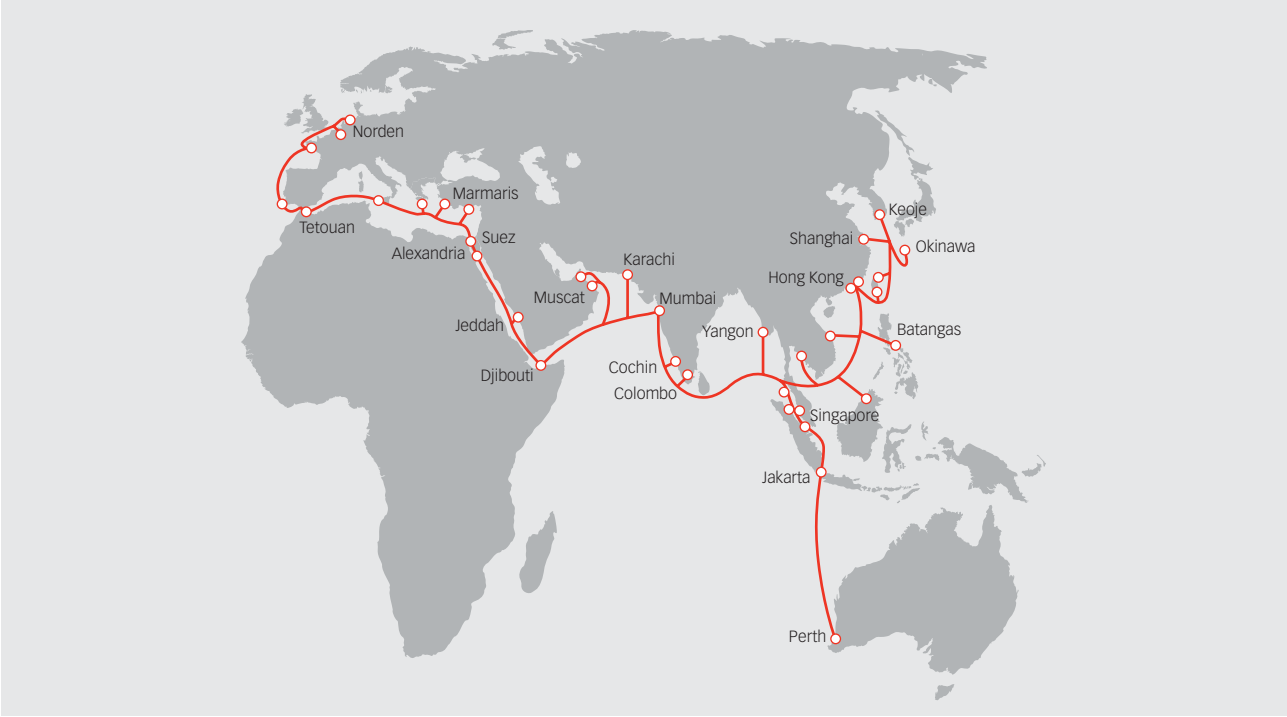
Public telecom infrastructure, as a shared resource, is far less expensive than proprietary private lines. Cost-cutting has led many public service and private sector infrastructure systems to migrate on to public networks. Globalisation has reduced variety among infrastructure control systems and unified control on a public data network that is accessible to anyone and protected by authentication, encryption, and other virtual security. There is growing concern that criminal and other interests are outpacing the protection offered by encryption and security and that this poses a growing threat to secure use of the internet. An independent study, conducted in 2007, of 465 businesses showed that 54% of them were "totally or completely dependent on uninterrupted internet connectivity".[74] Businesses'

reliance on public communication networks make them vulnerable to system failures (caused by power failures, technical faults, or even natural disasters) and cyber attacks (see Box 4). Loss of productivity can occur from unsolicited emails (spam) that can use up large amounts of businesses bandwidth. Financial transactions that also rely on broadband connections could be interrupted, and businesses are at risk of intellectual property theft, data protection breaches and espionage as a result of criminal access to their systems.[75]

In 2000, one of Telstra's (Australia's biggest internet service provider) major internet cables was damaged by an unknown cause. The failure of this one cable caused problems right across the Asia-Pacific, the Middle East and Europe due to the connection of the Australian network to other global networks (see Figure 6).[76] Similarly, in 2008, a ship attempting to moor in Egypt cut one cable that caused internet blackouts across the Middle East and India effecting 75 million people.

Control system innovation has accelerated as a result of the demands of managing complex and increasingly global networks, ranging from telecommunication and energy grids to national security and intelligence systems. The product of these advances is increasingly extensive interaction among and across infrastructure assets - including physical and electronic connectivity, common policies and procedures, or simply co-location in the same geographic neighbourhood. These linkages, most of them automated, create complex relationships that cross infrastructure boundaries and produce new risks. A failure in one system can now impact many more interdependent systems than was the case before these networks were established, and so business now faces new risks of cascade failures.[78] Research into such threats has shown that, for an isolated single network, a significant number of nodes must fail before the network breaks down. However, when nodes share dependencies with other networks, removal of only a small fraction of nodes can result in the complete fragmentation of the entire system.[79]

Figure 6: **South-East Asia - Middle East - Western Europe 3 telecommunications cable**[77]



Box 4: Cyber threats

In addition to the accidental breakdowns in energy networks identified above, there is a growing potential for deliberate assaults on the global infrastructure networks. Team Cymru, a non-profit network security consultancy based in the US and UK, has reported increasing levels of attack traffic (over the public internet) directed at SCADA systems in every year since they began monitoring the phenomenon in 1998. In May 2007, Estonia was struck by a three-week wave of such attacks that disabled the internet-based information networks of parliament, banks, newspapers and government ministries. The resulting loss of web services, communications, and the services they support (including cash machines) effectively paralyzed life in Estonia, which has one of the highest levels of internet penetration and most advanced e-government initiatives in Eastern and Central Europe. (Estonia is one of the first democracies in the world to offer internet voting services to its electorate, and 91% of Estonians file their taxes online.[80]) The attacks prompted NATO to enhance its cyber-war capabilities and to establish the alliance's first cyber-defence research centre in Tallinn, in 2008.

Further information on digital risks is available from Lloyd's Emerging Risks report Digital Risks: Views from a changing landscape.

4. Supply chain risk

The acceleration of globalisation over the past 20 years has been associated with major changes in supply chains. The rapid emergence of new global opportunities for production and sales, reductions in transport and logistics costs, and the new management imperatives arising from quarterly and other reporting requirements, have provided a strong impetus to creating supply chains which have a wider global reach and at the same time achieve the objectives of reducing stocks and tie-up capital. This has resulted in supply chains becoming more extensive and complex.

Companies have learnt three lessons that have been reshaping supply chain management in virtually all industries: speed creates advantage, inventories add more cost than value and excellence demands focus.[81] The past 20 years of globalisation have allowed entrepreneurs to push these principles to the limits of speed, savings and geography. Supply chain management today means identifying the 'best shore' for each discrete value-adding and support activity, from research and development through to post-sale services and support.

A 2009 survey of 300 global companies with sales over $1bn found that, on average, 51% of their component manufacturing, 47% of their final assembly, 46% of their warehousing, 43% of their customer service, and 39% of their product development now takes place outside of the home country.[82] All these disparate parts are stitched together by uniform global infrastructures that provide transportation (to move parts and products between steps in the chain), communication (to relay product specifications and volumes) and coordination via shared ideas (from business school best practices to ISO certifications). The classic Toyota Production System, has been explicitly adapted by organisations as diverse as hospital emergency departments,[83] the US Department of Defense[84] and telecom vendors.[85]

Risks to business

Less control over more complex supply chains

In a recent MIT survey of global supply chains, 90% of those executives surveyed believed that the size and frequency of supply chain shocks was increasing in their company. Globalisation has allowed businesses to expand across many countries and provided more choice of suppliers. However, as supply chains become more complex, additional layers of risk are added. Businesses may not have direct control over the day-to-day operations within every stage of their supply chains.

There have been several high-profile cases of product recall due to errors that have occurred along the supply chain. The major toy manufacturer, Mattel, had to recall 1.5 million toys in 2007; while its subsidiary, Fisher Price,

"Globalisation has allowed businesses to expand across many countries and provided more choice of suppliers. However, as supply chains become more complex, additional layers of risk are added."

had to recall just under a million popular character toys due to fears of lead poisoning.[86] As well as damaging a company's reputation, product recalls can lead to substantial fines and possible litigation from injured parties. Fisher Price had to pay a $2.3m fine for its breach of a federal lead paint ban.[87]

Among the risks which global supply chains introduce are those associated with sharp swings in exchange rates. While major global businesses may be in a position to hedge part or all of these risks, and may even be able to create natural hedges as their sales and purchases from any one currency zone balance, for most companies this is not a practical option. The effect on businesses depends on the extent to which they can pass on the impact of currency fluctuations through their sales. However, in competitive market conditions it is typically only possible to recover some of the currency loss. Major capital investments are particularly vulnerable to this uncertainty. Investors in sterling, euro and dollar based suppliers would have been sensitised to these effects in recent years, and even greater turbulence has been experienced in a number of other currencies, including the Canadian dollar.

Vulnerability of just-in-time business models

The risk to complex supply chains is heightened by the small margin of error that businesses build into them. Small changes to delivery schedules can have dramatic knock-on effects on production and sales. The disruption to supplies may arise at the point of production or in transport and delivery. The reasons are extremely wide-ranging and include problems further down the supply chain; such as fires, strikes, energy outages, bankruptcy, accidents or managerial failures. Lean manufacturing processes cut production costs by removing the need for large-scale warehouses and inventory control, so that goods and supplies are ordered as and when they are needed. Although globalisation has aided the creation of lean manufacturing (through the widening of the options and range of suppliers, through facilitating widespread adoption of compatible technologies and platforms, and through reducing the obstacles to cross-border trade), a globalised supply chain means that disruptions to the just-in-time supply chain take longer to rectify. The supplier could be on the other side of the world and the JIT business model does not factor in quick substitution of alternative suppliers.

At the same time, companies are trimming the human resources that might call out risks and pre-empt collapses. The recent credit crisis has seen both suppliers and manufacturers cut non-engineering and non-production headcounts to trim costs, including supply chain managers.

Box 5: Case study - Toyota

Toyota is an example of a car manufacturer that first adopted this new supply chain structure and achieved considerable market dominance over its rivals. At first, Toyota relied on efficient transportation platforms and data exchange networks to deliver parts when they were needed and not before. They substituted this for clever forecasting. They discovered the value of tying up with a single supplier who could then synchronise their production with their customer's. They demonstrated the principle that a value chain comprising many focused, independent companies can exploit scale economies at every step and thereby deliver better quality at a lower cost than a single, vertically integrated production company.

By the 1990s, Toyota's model had become a best practice to emulate. It opened multiple manufacturing facilities in over a dozen countries around the world. By taking advantage of the opportunities provided by globalisation, it overcame geographic, linguistic and cultural barriers to search out the best balance between production costs,

speed to market, access to talent and market intelligence. In the process, it more than doubled its production from just over four million cars in 1990 to nearly ten million cars in 2009, overtaking General Motors as the global volume leader. Profits grew steeply, from about $1bn in 1990, to over $17bn in 2008.

However, in 2009 and 2010 Toyota had to initiate a number of product recalls. The first recall in October 2009 demonstrated that small flaws can cause big problems. This recall was blamed on a poorly fitting floor mat with a per-unit cost of less than $10; precisely the kind of imperfection the company believed its global line staff had been trained to spot.

In January 2010, Toyota issued a further recall for 2.3 million cars to fix "sticky accelerators", which could cause unintended acceleration. Capacity constraints at CTS (the supplier of the faulty pedal), meant deliveries of replacement parts would take months to complete. By late January, the company announced an indefinite global shutdown of sales and manufacture of affected models until it could secure the necessary parts; an unprecedented step in the automobile industry and one that is believed to have cost Toyota between $5m and $15m, per day, in lost sales.

Cascade failure

There is strong evidence that as supply chains become more extensive and complex, the risk of a given disruption becoming serious or causing cascade failure has increased.

A cascade failure is a system-wide shutdown caused by the failure of one or more critical and non-redundant elements. It can be distinguished from routine failure, which is any unplanned disruption that degrades a system's efficiency but does not crash it.

Cascading failures, as the name suggests, are a particular threat to lean and long supply chains. Their causes are manifold and include operational and technological risks, social risks, natural hazards, economic variations, and legal and political disruptions. Breaks in supply chains are not a new phenomenon, but as these chains get tighter and are linked to an increasing number of global production networks, a small disruption in one location can quickly cascade to a production failure in another.

The difficulty lies in foreseeing when a routine failure might cascade into a systemic collapse. The first decade of the 21st century has already presented some spectacular examples of our limited ability to do so.

In 2000, an accidental fire put Ericsson at risk as (benefiting from globalisation) they had shifted vital components of their supply chain to one producer. The fire in New Mexico destroyed a large factory that served up critical components to Ericsson's and Nokia's handset businesses. Ericsson, who a few years prior had consolidated its global purchasing of the component to that single factory in order to achieve lower unit costs, was forced to shut down production and lost $390m in sales due to the resulting stock-outs. More costly, the company never recovered its market leadership from Nokia, who had re-engineered its phones to accept chips from multiple alternative suppliers.[88]

The economic and business impact of the attacks on the World Trade Centre in New York was severe, but rapid and effective action by the Federal Reserve and other authorities prevented this terrorist attack pushing what was already a weak economy over the edge into recession, as had been originally feared.[89] US border closures following the 9/11 terrorist attacks did however cause interruptions to whole industries. The airline industry lost approximately $1.4bn in revenue during the four-day shutdown in the immediate aftermath of 9/11 and was only saved by the provision of $5bn in short-term assistance and $10bn in loan guarantees.[90] The cascading impact on businesses was much more severe because - in a more globalised world - they had diversified their sources around the world and relied on airfreight for critical components. Similarly, as land and sea border crossings became more rigorous, Ford was forced to

idle five plants for seven days. Production dropped by 13% for the fourth quarter of 2001 because its Canadian-manufactured engine parts sat for days on trucks that were trying to cross the suddenly constricted US border to Ford's just-in-time assembly lines in Michigan.

5. Food security

Globalisation has led to a rapid increase in incomes, which, along with population growth, has fuelled an increase in food demand, as well as a transformation in the types of foods under demand, most notably processed foods. Continuing population and consumption growth will mean that the global annual demand for food will increase for at least another 40 years.[91]

The global shift towards standardisation is nowhere more stark than in the natural environment and the ecosystems that supply our food. Due to the growth in food demand, our standard practice is to replace natural diversity with artificial monoculture environments that can yield large harvests and herds with minimal labour inputs. Planting monocultures in the fields ensures that the whole regional agricultural support infrastructure, including research, development, suppliers, storage, transport and markets is also highly specialised, and therefore sensitive to fluctuations in crop yields and herd health.

Most estimates project that current levels of investment in agriculture will not be sufficient to drive the further 70% to 100% increase in food production that is necessary to feed an expected population of 9.1 billion people by 2050.[92] As population growth plateaus, per capita income will continue to grow, and with this higher purchasing power will come greater demand for processed food, meat, dairy, and fish; all of which add pressure to the food supply system. Global consumption of fish, for example, has doubled between 1973 and

1997 with the Chinese consumption growing from 11% to 36%.[93] Globalisation has also increased the diversity of food supply as global trade has given consumers access to food sourced from all over the world. However, increased choice fuels demand as customers expect to purchase the same products all year around, whether or not they are traditionally "in season".

Risks to business

Crop control

The increasing monoculture environments across the globe can be decimated by parasites and pathogens. To counteract that threat, we protect them with pesticides (for crops) and antibiotics (for livestock and herds) which can present a localised risk to populations and businesses. In the US, farmers spend over $40bn annually in pesticide control. Fertilisers also bear social costs; in the US it is estimated that more than 25% of all drinking water wells contain nitrate levels above the 45ppm threshold that is considered safe.

A second layer of protection is offered by crop breeding and recently by genetic engineering, to manufacture biological resistance to specific parasites or chemicals. The planting of genetically modified crops began with trials between 1986 and 1997. Today, after 15 years of double-digit growth in GM acreage, the practice is widespread in over 20 countries.[94] In North America, the GM acreage leader, an estimated 90% of the soybean crop, 83% of cotton, 75% of canola and 60% of corn in the fields is genetically modified. The scientific improvement of crops is vital to enable crops to be developed that can withstand the shocks which climate change, soil depletion, water scarcity and the loss of biodiversity will throw at food security.

However, GM crops also present intellectual property risks as manufacturers maintain strict control over their patented seeds, which must be purchased each year. For producers, consumer attitudes also pose a risk, as African and other farmers who have found their exports excluded from European markets due to the crops being identified as being genetically modified. This presents a risk to the future security of food supplies to a growing global population and limits the amount of food that commercial agribusinesses can profitably produce and go on to trade.

Quotas

The global fisheries catch stopped growing in the mid-1980s and has been flat or declining ever since, leading some fisheries experts to declare 'peak fish' for the world's oceans and to warn of imminent collapses in natural fish stocks.[95] Despite a down turn due to the economic recession, 37% of all global fishery production is destined for export to world markets.[96] In recent years, fishing moratoriums have been forced on the Coral Triangle of Indonesia (2010), the Beaufort Sea (2009), the South China Sea (1999), Newfoundland (1993), and many other zones of the ocean to save harvested stocks from extinction.

The closure of the Canadian North Atlantic cod industry in 1992 led to unemployment for over 30,000 fishermen and the largest industrial closure in Canada's history. In East Anglia, many small businesses are struggling to survive due to the contraction of government authorised quotas.[97] While it is important that governments exercise a strong lead in ensuring the necessary management of global resources, such as fish stocks, it is equally vital that the communities that bear the brunt of these policies are supported in a manner that recognises that their livelihoods are threatened.

Food shortages

In 2008, poor growing conditions and mass parasitic events - plus the unintended effect of biofuel consumption of maize - aligned to prompt a food crisis in the developing world. Between 2006 and 2008, average world prices for rice rose by 217%, wheat by 136%, corn by 125% and soybeans by 107%.[98] Shortages led to increased hunger and poverty in a number of countries and, in several cases, contributed to outbreaks of violent conflict, mainly in hard-hit parts of Asia and Africa. In addition to the moral and ethical impact, as with all geo-political risks, civil unrest creates unstable business environments for local and international businesses (see Section 6: Geo-political risk).

The shift of arable land to biofuel production as a result of climate change pressures has also led to food shortages in the developed world. Farmers in the US have chosen to plant corn, rather than barley or wheat, in order to meet global demand for ethanol. However, this has increased the market price for these products. The effects are wide ranging and have included many breweries considering alternative recipes or passing the higher costs on to their customers.[99]

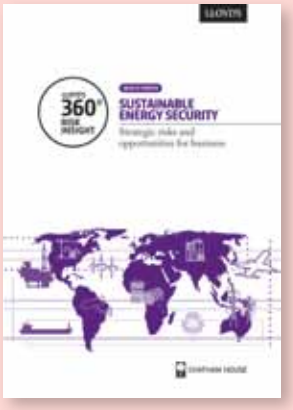
Exacerbating the looming threat of perpetual shortages are hazards that continue to plague existing production. Wheat leaf rust fungus emerged in 1999 to decimate wheat crops in Uganda and Kenya and has now started making inroads into Asia. Scientists worry that the fungus will continue travelling east facilitated by international trade and infect major wheat-growing centres in Pakistan, India and Bangladesh. Together, these countries produce nearly 15% of the world's wheat and feed more than a billion of the world's poorest people. It is now believed that 80% to 90% of all wheat varieties grown in developing countries are vulnerable to the fungus. The standardisation of our food crops has made them more vulnerable to hazards, leading to potentially negative consequences for food security and also for businesses that rely on these crops, such as breweries and bakeries.

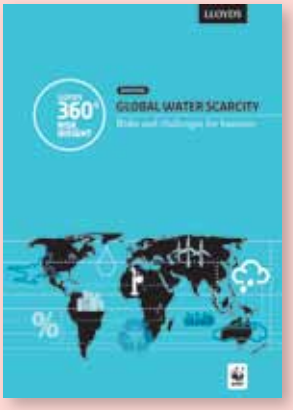
Box 6: Other resource risks

Water scarcity

Only 3% of the world's water is fresh and therefore suitable to sustain human civilisation. As populations become participants in the global economy, one of the first resources to experience a demand spike is water. Urbanisation and climate change also increases the strain on global water resources.

Water shortage is a risk for agri-businesses that rely on significant amounts of irrigation to produce food products and for manufacturers who need water for their operations. Through the impact of water discharge, extractive and chemical industries may actually pose a risk to sustainable water supplies as these industries expand to meet growing global demands. For more information on the risks to businesses such as regulatory restrictions, reputational damage and physical scarcity, please refer to Lloyd's 360 Risk Insight report Global Water Scarcity: Risks and challenges for business.





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Sustainable energy security

Global energy demand is expected to rise 43% over the next 20 years, with the supply of recoverable gas only expected to last until 2030. As with water and food risks, the increase in the number of people participating in the global economy has contributed to this predicted supply shortfall. The threat of climate change has also severely challenged fossil fuels as a sustainable source of energy in the future.

Businesses will have to contend with energy disruptions affecting their supply chains, greater scrutiny of their carbon portfolios, an uncertain investment environment, and high and volatile energy prices For more information on the risks of energy security in a globalised economy, refer to Lloyd's 360 Risk Insight report Sustainable Energy Security: Strategic risks and opportunities for business.

6. Geo-political risk

The nature of geo-political risk has changed. Traditional military events between large armies are, in general, a remote possibility. The change in power relations at the end of the Cold War from big states to small-state actors is a fundamental change in the nature of systemic risk, which is a consequence of the tidal wave of globalisation over the past 20 or so years. The same infrastructure, networks, technological development and economic investment that expanded the global population can also serve as platforms for coordination and assault by those who seek to undermine entrenched powers. For angry non-state actors, systemic vulnerabilities are tempting opportunities to inflict catastrophic damage.

We have seen these vulnerabilities to infrastructure, food, supply chains and to our economies. These systemic risks would exist even amidst a population of universally well-intentioned actors who studiously sought to identify and avoid them. However, there are small rogue states, individuals and small groups with access to far more destructive technologies than their medieval, and even 20th century, peers possessed who do not wish to play by the global rules.

In addition to providing remote access to critical public infrastructure, the internet and mobile telecom networks can be used to organize and disseminate hate, and train would-be hackers and bombers on the methods and tools of their trade.

Rapid advances in biotechnological power are facilitating a similar distribution of biocomputing power. Gene synthesis, still science-fiction in the mid-1990s, is now commonplace. Laboratories have successfully resurrected the deadly 1918 Spanish influenza that killed an estimated 50 million people worldwide and, in 2002, researchers in New York demonstrated how to manufacture a synthetic version of the polio virus using readily purchased base chemicals and now-commonplace DNA assembly procedures.[100] Even without access to such laboratory tools, there is a danger that well-financed, non-state organisations could produce a strain of anthrax or ebola. A biological weapon such as smallpox, distributed on New York's subways, could theoretically expand without limits. Aum Shinrikyo, the Japanese cult that carried out a sarin gas attack in Tokyo's subways in 1995, was in possession of anthrax and ebola cultures and had been experimenting with delivery systems for a biological strike.

The escalation of new geo-political risks, such as bio-terrorism, and the increasing power of small numbers of individuals creates major new challenges for businesses and governments alike. Older risks, such as those posed by nuclear and other conflict, remain. However, whereas the threat of nuclear war between states may not be growing with globalisation, and may well be reducing, there has been an explosive growth in trade including illicit trade in drugs, arms and even fissile material. It has also been associated with the collapse of some of the old powerful state actors, such as the Soviet Union, and the proliferation of rogue states with considerable potential to do harm.

Risks to business

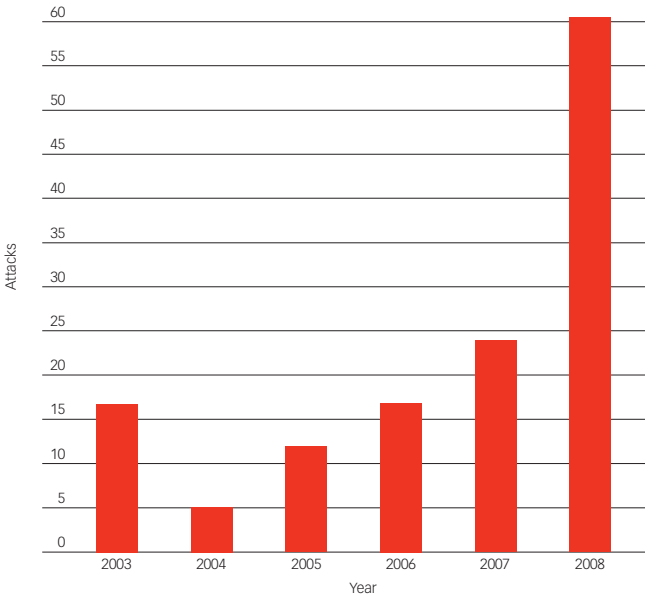
Piracy

Globalisation's reliance on key transport and other links has provided a boon to piracy, which has staged a remarkable comeback; now armed with new technologies such as GPS systems, satellite phones, and rocket-propelled grenade launchers. In 1994, 25 acts of piracy were reported in the Strait of Malacca. In 2000, the total count rose to 220. The collapse of state authority in Somalia, along the Gulf's southern shore, has seen a dramatic increase in pirate activity since 2005 that shows no sign of abating (See Figure 7).

Piracy adds to the supply chain risks associated with using certain key shipping routes. The Strait of Malacca is one of the most important shipping lanes in the world. It is the main channel between the Indian and Pacific Oceans, providing a sea-link for traded goods among India, China, Japan, South Korea and other Asian economies, as well as for Asia-destined oil from the

Persian Gulf. A full one-quarter of the world's traded goods pass through the Strait, which at its narrowest point (just south of Singapore) is only 2.8km wide. Globalisation has greatly increased the traffic through a small number of strategic choke points. The Gulf of Aden in the Arabian Sea is similarly significant. The waterway is part of the Suez Canal shipping route, which connects the Mediterranean Sea with the Arabian Sea and the Indian Ocean. More than 21,000 ships pass through the Gulf annually; one every 20 minutes. A pirate attack on a large oil tanker passing through the Gulf could cause major, long-term environmental damage. A well-placed strike on a freighter in the Bab-el-Mandeb, the narrow strait between the Gulf of Aden and the Red Sea, could shut down the shipping lane entirely, disrupting world trade and triggering an oil price shock.

Figure 7: **Actual and attempted attacks in Somalia and Gulf of Aden, 2003-2008**[101]



Businesses are now seeking to avoid regions of high piracy activity; however, the costs can be high. The Baltic and International Marine Council estimates that the cost of avoiding the Gulf of Aden by sailing around the Cape of Good Hope will cost a very large crude carrier (VLCC) $7m a year.[102] Many shipping companies, including Maersk, have begun to introduce piracy surcharges on each container shipped into or through that region, increasing the shipping costs for many businesses reliant on imports and exports.[103]

Globalisation has greatly increased the geographical spread and wealth of global companies and their corporate representatives. These businesses and their executives are highly vulnerable to being identified and to enduring kidnaps for ransom. For individuals, and for global firms, piracy and kidnapping greatly adds to the costs and stresses associated with doing business in certain parts of the world. The costs, too, are going up. Pirates in the Gulf extorted ransoms totalling as much as $150m annually in 2008 and 2009.[104] This caused average insurance premiums on voyages through the Gulf to jump forty-fold in the space of a year: from $500 in 2008, to $20,000 in 2009.[105] [106] The shipping and energy sectors are currently bearing the cost of these ransom demands, but if piracy attacks continue, it is expected that these costs will be passed on to other businesses.[107] In part as a result of these threats, Egypt's revenues from the Suez Canal are expected to fall from $5.1bn in 2008 to $3.6bn in 2010; a 30% drop in two years.[108] The tourism business has also been economically hit. Kenya's cruise tourism industry, for example, was down 95% in the first part of 2010, with the threat of piracy blamed for this decline.[109]

Terrorism

The most spectacular evidence of our present geo-political vulnerability are the New York terrorist attacks of 9/11 in 2001, the March 2004 train bombing in Madrid and the 7/7 attacks in London. These events demonstrated clearly that a competent, well-financed private organisation – in many of these cases, al Qaeda - can overcome contemporary public security measures in order to prepare, deliver and detonate effective weapons at strategically and symbolically important locations.

These events demonstrated that the same technology, communication networks and means of transport that facilitated globalisation can also be used to undermine it. Terrorists with grievances that focused on a local or national level can now bring their fight to any part of the world.[110]

In addition to killing almost 3,000 people and injuring 6,000 more, the 9/11 strike caused $40bn in direct insurance losses, pushed airlines into bankruptcy (and wiped billions off the surviving airlines' market value), temporarily decimated New York City's $25bn tourism industry, and destroyed or displaced 18,000 small businesses. [111]

London was similarly severely effected by the impact of the 7/7 attacks. Tourist attractions in the centre of London, such as Madame Tussauds and the Tower of London, saw a 15% drop in visitor numbers after the attacks, compared to the same period the previous year.[112] Retailers in one popular shopping district suffered due to the closure of the local underground station for three weeks.

Globalisation has spread the western model of capitalist economics so that even remote corners of the world will have their own branch of McDonalds or Starbucks. However, this profitable expansion has also left businesses vulnerable to attacks from those with clashing ideologies. The US National Counterterrorism Center lists 24 attacks on McDonalds, worldwide, between 1993 and 2005.[113]

Terrorists now can potentially have access to globally traded products in the same way as legitimate customers. Although a lower risk, businesses in certain sectors, such as the chemical industry, may be in breach of international trade law and risk financial penalties and reputation damage by unwittingly supplying terrorist elements with services, products or supplies for their planned attacks. For banks and for many other businesses, the cost of compliance, to ensure that the services and products are not being used by potential terrorists, may be expected to escalate even further.

In 2007, the Economist Intelligence Unit surveyed 154 board-level directors on their views on the threat of political violence to global businesses. Political violence (including terrorism) had led 37% of directors to avoid investment in certain regions, 22% to change their travel policy and 23% to increase their insurance spending.[114]

Political instability

As discussed in section 1, globalisation facilitated the growth of capital, innovation and interdependencies which contributed to the economic crisis. Many governments have had to take drastic action to stabilise their economies. However, this has created emotive and sometimes violent responses amongst national populations. This situation is especially acute in Greece, where following the introduction of austerity measures by the Greek government, violent riots broke out on the streets of Greece. Although directed against policies implemented by their government, this reaction was ultimately triggered by a chain of events caused by the global economic crisis. In the first week of May, 20,000 hotel rooms were cancelled in the Greek capital of Athens and new bookings were frozen,[115] seriously damaging the Greeks vital tourism industry. In addition to the impact on the tourist trade, civil instability will have an immediate impact on businesses who rely on secure passage of their goods through these countries or for businesses who outsource services such as production or IT support to these unstable regions. In the worst case, companies may be forced to relocate their facilities.

Businesses also need to consider the security of their existing assets and their vulnerability to expropriation by nationalist governments. Even before the economic recession, populist parties in some developing countries rode waves of discontent to wrest political power from the governments that had signed them up to the global economic orthodoxy. In 1999, Hugo Chavez led his Bolivarian revolution to displace Venezuela's faltering administration of Carlos Andrés Pérez. The expropriation of Cargill's rice plant in 2009 and the nationalisation of the Argentine controlled steel-maker Sidor, along with threats of nationalising other private investments, have led to a collapse of investor confidence.[116] This has been especially damaging in a Continent that has witnessed rapid economic development over the last decade. However, such threats of expropriation are not confined to Latin America, and in recent years have also undermined the investment climate in Africa in countries, such as the Democratic Republic of Congo.[117]

ARE WE EXPERIENCING A REVERSAL OF GLOBALISATION?

There are several trends which are certainly slowing down, if not reversing, the rapid pace of globalisation. There is evidence of protectionism, nationalist sentiments and renewed tight economic regulations as a response to the recent economic crisis as well as other risks involved in operating in a globalised world. Acting globally has become the norm for most companies and most people benefit from the success that globalisation can bring. However, when faced with some of the risks associated with globalisation, government and companies can revert to a more nationalistic and protectionist stance. Some of these responses and the risks they bring are discussed below. The recent economic crisis has certainly heightened the strength of some of these anti-globalisation trends, yet while this reaction is unlikely to reverse globalisation it may well slow its development and lead to more uneven development. Globalisation has built deep and integrated connections between societies and economies that will not be broken easily and in many ways globalisation has become a defining and permanent feature of the global system.

Failure of trade negotiations

Many countries are increasingly disillusioned by the WTO and other trade agreements that have invited foreign investments and competition in, but have not created reciprocal benefits for their domestic industries to reach out; particularly for agriculture, which continues to face daunting technical barriers (such as requirements regarding the control of animal and plant diseases) and rich-world subsidies which exceed the total income of the poorest countries. The trade negotiations initiated in Doha in Qatar, under the auspices of the WTO in 2001, aimed to reduce tariff barriers and to address many of the areas which remained incomplete after the previous Uruguay Round of trade negotiations. The Doha Round remains stalled after almost nine years of negotiations, largely because of developed world intransigence over agricultural subsidy reform. A close reading of the economic stimulus packages to the 2008 financial crisis reveals many instances of trade protectionism via the backdoor of domestic content requirements.

Resurgence of nationalism

Following 9/11, nationalism became the driver that threatened the flow of global capital. In 2006, the US Congress reversed administration approval for Dubai Ports' acquisition of P&O's US port management business, citing national security concerns. Even though, at the time, over 80% of American ports were already controlled by foreign owners. A year earlier, popular unease defeated a takeover of American oil company Unocal by China National Offshore Oil Corporation (CNOOC). The economic crisis has increased the protectionist pressures. For example, the US stimulus package passed at the height of the crisis contains controversial 'buy America'[118] provisions, last enacted during the Great Depression and designed to protect domestic jobs.

Nationalism has also affected migration flows. The economic crisis and the resulting higher levels of unemployment has already resulted in many countries restricting the supply of visas and reducing migration, which is a critical aspect of globalisation. As a result it has become more difficult for businesses to recruit key skilled personnel from abroad. The danger is that an overreaction in restricting migration may in fact lead to a further slowing of domestic growth, as well as a reversal of this vital element of globalisation

Faced with these barriers and popular resistance, some multinational corporations are rethinking their outsourcing and offshoring strategies, giving more weight to reputation, political, and transport risks associated with widely dispersed supply chains. In the current period of crisis and indebtedness in rich countries, rising reserves and assets in sovereign reserve funds have changed the nature of global investment supply and demand, with emerging markets, such as China, now having the opportunity to buy global assets, including those in developed countries. Protectionism in the rich countries is forestalling some of these efforts, while in developing regions, such as Africa, it is diversifying investment sources, even if these are a cause for concern in aid and other agencies in OECD countries.

Re-regulation

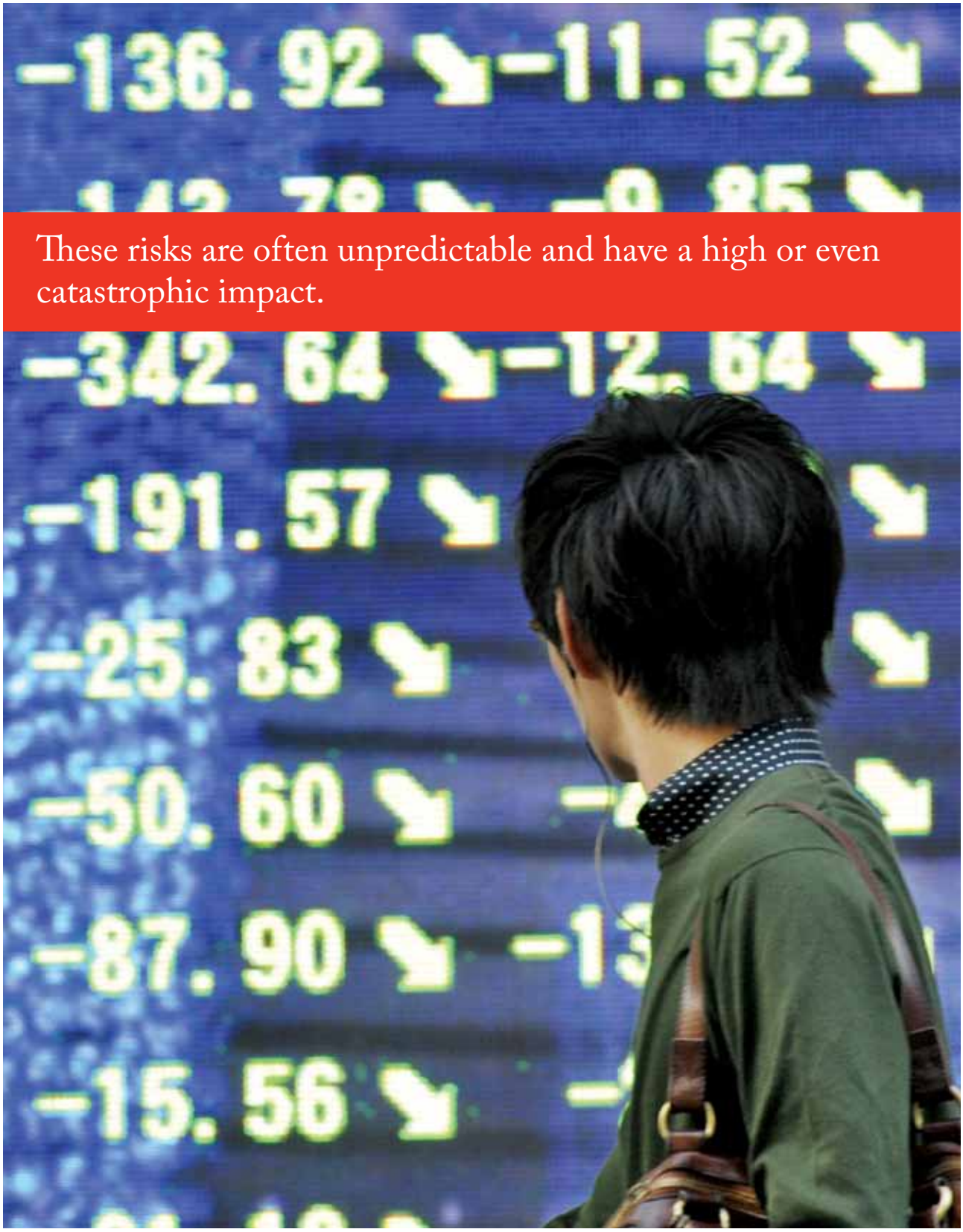
The financial crisis that began in 2008 has inspired fresh fears and resentment. Unemployment among OECD member countries alone has increased by 25.5 million people since the start of the crisis. The cause of the problem is seen by many as coming from abroad and being the result of excessive economic integration.

The challenge for regulators is to strike the right balance, where actions to secure the system against low-frequency, high-consequence events do not overburden private actors with high-frequency compliance costs. The danger for the financial system and for the global economy is that, as an overreaction to the banking crisis, governments may seek excessive regulation which, if this was not mitigated, would reduce bank lending. The knock-on effects for business could be felt in a declining availability of credit (see Box 3).

For business, the stakes are high. It has gained enormously from globalisation and is at risk from a slowing or, worse still, a reversal of globalisation. Anti-globalisation sentiment may also translate into anti-business sentiment. Global institutions such as the WTO and IMF, and national governments, will need to address the challenges outlined in this chapter. Business certainly also has its part to play. In Part 3 we outline the significance and urgency of this challenge.

PART 3

MANAGING SYSTEMIC RISK



These risks are often unpredictable and have a high or even catastrophic impact.

Globalisation over the past 20 years has given rise to new and different forms of risk. We have shown in this report that in many respects the financial crisis of recent years is indicative of the type of systemic risk we may expect in the 21st century. It arose from the rapid globalisation of finance, facilitated by rapid innovation and technological progress, and characterised by the homogeneity of products in multiple markets. It is vital that we learn the lessons of the financial crisis as we seek to ensure that the systemic risk that we have seen is not repeated in finance and in other sectors (including those we identified in Part 2).

As a result of globalisation, what were previously viewed as independent and unrelated risks, are now inter-connected and inter-linked. They are also increasingly complex and systemic. These risks are often unpredictable and have a high or even catastrophic impact. Due to their unexpected nature and huge potential impact, they pose a new form of threat to businesses and society. As a result of increased integration of societies and business, higher population density and higher asset values, these risks and their impact are growing. In order to be able to manage these risks, business requires to understand the key drivers and types of risks highlighted in this report. Companies should develop plans and strategies to tackle risks within their sphere of operations, but also consider how they interact and work with governments to tackle the wider potential systemic risks facing economies and societies.

Among all spheres of international global governance and management, the financial services sector boasts the most mature and well-endowed institutions, in terms of both their budgets and their number of highly qualified personnel. Nonetheless, as made evident by the recent financial crisis, even the IMF, BIS, central banks and their partner institutions were unable to anticipate systemic risks or prevent their outbreak. A comparable example is the 9/11 terrorist attacks in US, which were unanticipated in their nature and scale and had a profound impact on global security and society. We can therefore pose the question whether similar blind spots could impair global supervision over health, infrastructure and the environment.

One chief difficulty with building objective systemic risk assessments is that labelling activities as 'risky' threatens the interests of those who are invested in them. Biotechnology, for example, generates a polarised debate between those who want to develop the technology and those who view it as risky and wish to maintain the status-quo. When making risks assessments such differing views and interests must be taken into consideration and evaluated as objectively as possible. New thinking and risk management systems are required to manage these risks.

The role of business

An important first step for governments and the private sector is to devote far more effort to understanding the implications of systemic risk. The Bank of England has tried to understand the relationship between different types of systemic risks by drawing on a variety of different industries, as well as ecology, and this work provides promising fresh perspectives.[119] Among the vital lessons drawn is the need to aggregate individual, industry or national risks to higher levels, as what may seem reasonable and manageable at the individual or firm level may prove to be the source of systemic risks at higher levels of aggregation. While, in general, no individual part of the system should be classified as too big to fail, the aggregation of smaller risks may also lead to catastrophic failures. Business should first and foremost address the risks impacting them directly but then put in place systems and processes for monitoring and analysing aggregated risks.

Similarly the global community and regional organisations also need to consider the extent to which certain collective activities may actually be exacerbating certain risks. This has become starkly evident in finance.

Below are some recommendations of first steps business and risk managers can take to prepare for and manage the type of cascading and systemic risks highlighted in this report.

First steps for business

1. Conduct a systemic risk audit

Boards of directors, if they have not done so already, should encourage senior executives to assess their organisations' vulnerability to systemic risks: a shock triggered by some tipping point hitting its threshold; a cascade of failures caused by the collapse of some critical node inside or outside the organisation; or a public contagion (such as a crisis in the financial, health or environmental infrastructure or political sector, or even a runaway public relations catastrophe) that might overwhelm the organisation's reactive capacity. A good starting point would be for each corporate risk officer or manager to review significant episodes of corporate transformation within their part of the business over the past ten years - moves such as manufacturing system redesign, supply chain deconstruction or rationalisation, outsourcing and off-shoring, market expansion, or technology adoption - and look for new potential patterns or concentrations of risk exposure when taken collectively.

2. Explore different future scenarios

It is hard for business to plan and prepare for low-probability events that could potentially result in huge impacts and costs for business. The question for business is whether these events can be contained or whether they will spread beyond control with potentially catastrophic results. In April 2010, an off-shore oil well in the Gulf of Mexico unexpectedly blew out, causing a catastrophic explosion that killed 11 people and initiated the worst oil disaster in US history as oil spewed uncontrolled from the sea floor. BP, who as lessee of the off-shore platform was chiefly liable for the clean-up costs, lost one-quarter of its market value ($65bn) in the span of one month as the US government, coastal populations affected by the spill, scientists, environmentalists and shareholders all focused the spotlight on the company's response to the steadily worsening crisis. With the battle being waged in the court of public opinion, the Chief Executive of BP has indicated that the company could have been better prepared for low-probability catastrophic events.

What other low-probability, high-impact events should business plan and prepare for? The recent closure of European airports and airspace due to the volcanic ash cloud provides another costly demonstration of the lack of planning for low-probability events. The ash cloud is estimated to have cost the European economy £400m

a day in lost productivity, with workers unable to return home or get to work.

The pay-off of low-probability scenario work comes not from improving internal procedures and systems and lining up external resources and support for dealing with similar shocks. Therefore it is more a case of managing these risks rather than necessarily being able to mitigate them. In a systemic crisis, decision makers are exposed to a deluge of data and media coverage. Early information is often conflicting or highly technical and must be stitched together from innumerable sources. Good decisions will likely emerge from an organisation that has built frameworks for evaluating data under crisis conditions and built linkages with reliable networks, including experts outside the organisation that may have better real-time awareness of the environments in which it operates.

3. Examine industry codes of conduct

Industry codes of conduct can supply the coordination mechanism that helps businesses abide by a safer set of rules; they instil the sort of situational awareness that can help organisations spot risks before they materialise. Below are examples of some of the codes that global companies can scrutinse and learn from:

- The OECD Guidelines for Multinational Enterprises: a set of voluntary principles and standards for responsible international business conduct. The widely recognised Guidelines were first adopted by the OECD in 1976 and have since been revised in 1979, 1982, 1984, 1991 and 2000. They define good ethical practice for, among other things, employing local people, respecting human rights, maintaining the environment, disclosing information, combating bribery, paying taxes and protecting consumers. Their importance lies in helping multinational corporations, which maintain large staffs in a wide variety of business and social contexts, to define a universal set of appropriate and inappropriate actions for their employees to follow.

"Interaction with governments is vital, and business has an important role to play in ensuring that governments are aware of the new and potentially systemic risks facing firms."

- The Global Reporting Initiative (GRI): one of the world's most prevalent standards for sustainability reporting. More than 1,500 multinational organisations from 60 countries have adopted its guidelines to publicly communicate their economic, environmental and social performance. The GRI's popularity rests upon its usefulness in helping a given organisation to understand and manage its interdependencies with a broad set of stakeholders, and in encouraging those stakeholders to reciprocate with co-operative, rather than confrontational, engagement on the matters that affect them.

4. Work with governments

Interaction with governments is vital, and business has an important role to play in ensuring that governments are aware of the new and potentially systemic risks facing firms. These are some of the areas where business may hope to influence government on risk:
a) help build global capacities to objectively assess systemic risk; b) working with governments to ensure that the regulatory and planning environment reflect risks, for example with respect to future construction in flood zones; c) more funding for research, particularly on systemic risk; and d) working with governments to educate society as to the risks they face and the contribution of all members of society to reducing risk.

These points are expanded below.

a) Help build global capacities to objectively assess systemic risk. National governments and international institutions showed an impressive reactive capacity in

the face of the recent financial crisis, but their failure to prevent what (in hindsight) was an obvious threat had catastrophic consequences.

Among the activities that businesses can engage in is to form global associations of systemic risks analysts which share information between risk professionals in their own sector globally but also across sectors. The creation of a virtual internet platform may be particularly helpful in this regard, and provides a global source of expertise and information, as well as for the sharing of best practice in mitigation. Whereas it is generally the case that risk management for businesses is a source of competitive advantage, in the case of systemic risk the ability of the new risks to jump traditional risk barriers and to overwhelm existing mitigation increases the collective incentive to participate in a joint corporate risk sharing exercise, in which governments would also have a strong incentive to participate.

b) Companies have a key role to play in educating governments and regulators to the role that both governments and business can play in reducing systemic risks. By working together, many of these risks may be mitigated. This is clear in the area of flooding, for example, where planning regulations that prevent construction in flood prone areas are vital to deter investments. Similarly, construction codes and their particular adaptation to, for example, seismically sensitive areas, have a powerful role to play. In other areas, such as internet security and pandemic management, business has an important role to play; whether it is in working with governments to ensure the widespread dissemination of best practice, the development of practical codes or in order to provide specific advice and much needed resources (such as is necessary with respect, for example, to pandemic vaccine production).

c) Research is one of the key activities where new private and public funds ought to be injected to better understand some of the biggest threats and emerging risks facing the world over the coming decades. Within academia, funding for emerging issues or speculative topics tends to be extremely limited. A large-scale, multidisciplinary research effort is urgently needed to improve policy-makers' understanding of the drivers and implications of highly interconnected global risks. That improved understanding, in turn, should drive new private and public preparedness spending.

d) Working with governments to educate society to the risks they face. Climate change serves as a sobering example of how difficult it can be to marshal worldwide public support behind costly steps to mitigate wider, global risks. Even when the risk is immediate, for example during the 2009 H1N1 pandemic, the public's response can be muted. A survey[120] of 1,000 British households performed in the midst the H1N1 outbreak found that, despite intense media coverage and a major government advertising campaign, most people (72%) reported that they had not changed the frequency of their hand washing or increased the amount that they cleaned or disinfected things (83%) and only 2% reported feeling high anxiety about the pandemic.

One possible solution is an international institution or network of reputable institutions and individuals that serve as a respected and neutral body tasked with providing regular, transparent assessments of societal or systemic risks and communicating them to businesses and the public to create popular support for appropriate policy responses. This institution or network would need to work closely with other institutions examining societal risks within their own particular sector or region. The OECD has made a significant contribution to raising awareness of societal risks amongst its members and outlined a series of measures which would go some way to focusing governments, including the establishment of cabinet level Country Risk Officers, whose task it would be to coordinate and prioritise the national risk matrix.[121] Risk management and the governance of systemic risk in the 21st century require a multi-stakeholder approach in which transparency and public accountability is key. Multi-stakeholder platforms - such as the World Economic Forum, which has indicated an interest in its possible contribution to the management of systemic risks – working with UN and other agencies may also be well placed to bring different parties together and facilitate such an approach.

CONCLUSIONS

Natural catastrophes have always afflicted human civilisation, but systemic risks of the kind described here are a more recent development. Globalisation, by knocking down man-made walls, by driving increasing standardisation of process and platforms, and by connecting and empowering populations that had previously lived in a world apart, has created a new renaissance which has brought more opportunity to more people than any process in history. Yet, this same extraordinary process has exposed businesses to new risks.

The fact that globalisation has made us stronger, healthier, wealthier and more knowledgeable about the state of our planet and civilisation means we are more capable of coordinated global action. To ensure that the benefits of globalisation will continue to outweigh the costs will depend on the will and foresight of key decision-makers in business and government, upon whose shoulders now falls the task of redesigning private and public governance systems to meet the challenges of systemic risk in 21st century society. Business has to find ways to manage these new risks. It also has a vital role to play in helping governments and non-governmental organisations raise public awareness in order to ensure that the nature of these risks is understood, and that government is able to play its part in leading and protecting society from the worst and possibly catastrophic impacts of systemic risk.

The report has shown that we have witnessed a surge in globalisation over the past 20 years and that this has had profound impacts and implications for societies, economies and cultures throughout the world. Global mega-trends, including population growth and urbanisation, rapid technological advances, and political and economic reforms in all continents, have driven globalisation and provided unprecedented new opportunities for business.

We live in an increasingly interdependent and interconnected world which, while largely benefiting industry and commerce, and being partly driven by it, has also led to new risks for business. Business needs to understand these new types of cascading and systemic risks and develop plans to prepare and respond to them.

The risks arising from globalisation are wide-ranging and constantly evolving but some of the key risks business should consider include financial, pandemic, infrastructure, supply chain, resource and geo-political risks. There are also potential risks to business from anti-globalising trends, including the failure of trade negotiations and the impact of resurgent nationalism in some countries.

There is no doubt that business will benefit from the continued integration and growth of markets. However, the risks associated with this integration will also grow. Businesses everywhere need to focus on managing these risks and building resilience against systemic shocks.

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www.iea.org

Food and Agriculture Organisation of the United Nations
www.fao.org

World Economic Forum
www.weforum.org

RAND Infrastructure, Safety and Environment programme
www.rand.org/ise

World Health Organisation
www.who.int

International Chamber of Commerce
www.iccwbo.org

International Maritime Organisation
www.imo.org

Organisation for Economic Co-operation and Development
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