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Global Risks 2011
Sixth Edition
An initiative of the Risk Response Network

World Economic Forum
in collaboration with:
Marsh & McLennan Companies
Swiss Reinsurance Company
Wharton Center for Risk Management,
University of Pennsylvania
Zurich Financial Services

World Economic Forum
January 2011
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<tr>
<td>- Air pollution</td>
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<tr>
<td>- Biodiversity loss</td>
</tr>
<tr>
<td>- Climate change</td>
</tr>
<tr>
<td>- Earthquakes and volcanic eruptions</td>
</tr>
<tr>
<td>- Flooding</td>
</tr>
<tr>
<td>- Ocean governance</td>
</tr>
<tr>
<td>- Storms and cyclones</td>
</tr>
</tbody>
</table>
Figure 1: Global Risks Landscape 2011

The diagram visually represents various global risks across different dimensions, including Economic Risks, Geopolitical Risks, Environmental Risks, Societal Risks, and Technological Risks. Each risk is plotted along a scale indicating its perceived impact in billions of USD and likelihood to occur in the next ten years. The risks are color-coded and positioned according to their potential impact and likelihood.

Key risks include:
- **Economic Risks**: Asset price collapse, extreme commodity price volatility, extreme consumer price volatility, extreme energy price volatility, fiscal crises, global imbalances and currency volatility, infrastructure fragility, liquidity/credit crunch, regulatory failures, retribution from globalization, slowing Chinese economy.
- **Geopolitical Risks**: Corruption, fragile states, geopolitical conflict, global governance failures, illicit trade, organized crime, space security, terrorism, weapons of mass destruction.
- **Environmental Risks**: Air pollution, biodiversity loss, climate change, earthquakes and volcanic eruptions, flooding, ocean governance, storms and cyclones.
- **Societal Risks**: Chronic diseases, demographic challenges, economic disparity, food security, infectious diseases, migration, water security.
- **Technological Risks**: Critical information infrastructure breakdown, online data and information security, threats from new technologies.
Figure 2: Risks Interconnection Map 2011

- Global imbalances and currency volatility
- Slowing Chinese Economy
- Higher perceived price volatility
- Asset price collapse
- Fiscal crises
- Regulatory failures
- Illicit trade
- Space security
- Corruption
- Organized crime
- Environmental risks
- Fragile states
- Threats from new technologies
- Infrastructure fragility
- Geopolitical conflict
- Critical information infrastructure breakdown
- Food security
- Climate change
- Biodiversity loss
- Online data and information security
- Water security
- Ocean governance
- Terrorism
- Weapons of mass destruction
- Financial market volatility
- Fiscal crises
- Asset price collapse
- Asset price collapse
- Economic disparity
- Global governance failures
- Financial market volatility
- Economic disparity
- Asset price collapse
- Economic disparity
- Global governance failures

Higher perceived likelihood
Higher perceived impact
Higher perceived interconnection

The macro-economic imbalances nexus
The illegal economy nexus
The water-food-energy nexus
Introduction

What is the Global Risks Barometer?

The Global Risks Barometer presents an overview of each of the 37 risks examined in Global Risks 2011, Sixth Edition. The barometer displays selected influencing factors and global impacts, as well as the perceived likelihood and impact of each risk. The influencing factors and global impacts were identified and refined during 18 workshops involving experts in each of the following fields: economic, geopolitical, societal, environmental and technological. The risk perception characteristics, which include collective assessments of each risk's likelihood and severity, are drawn from the Forum’s Global Risks Survey 2010, which included responses from 580 leading experts and decision-makers.

How can I use this document?

The barometer is designed to trigger discussions on global risks and support analysis of risk impacts at multiple levels:

- At an individual risk level, to better understand the factors that influence each risk as well as its potential consequences, described in terms of global impact.
- In relationship with other, highly interconnected risks, to understand the directionality and potential feedback loops that exist between key risks, as illustrated in the Risks Interconnection Map (RIM).
- At a systemic level, to understand the likelihood and severity of the constellation of global risks, as illustrated in the Global Risks Landscape.

Combined, these analyses alert readers to key risk drivers and potential risk impacts at an organizational, national or regional level.

The barometer is designed to be a living document for several reasons:

- First, the risks that have been captured at a global level do not necessarily play out at a local or sectoral level in the same manner; hence, there is a need for further discussion and tailoring for different stakeholders.
- Second, the risk characteristics evolve over time, changing throughout their 10-year horizon and requiring regular updates.
- Lastly, there are many interpretations of how these risks may be influenced and how their impact may play out; hence, there is a broader need to reflect the multiple perspectives of risk analysis as methodologies and data sources change.

Where can I find out more?

Economic Risks
Economic Risks

Asset price collapse

Perceived likelihood to occur in the next ten years

Perceived impact in Billion US $

A collapse of real and financial asset prices leads to the destruction of wealth, deleveraging, reduced household spending and impaired aggregate demand.

Drivers and indicators

- Sharp increase and volatility in the prices of financial assets including mortgages, asset-backed securities and debt instruments
- Sharp increase and volatility in prices of real assets (commercial and private real estate)
- Excessive capital flows to emerging markets, inducing asset price bubbles
- New arbitrage opportunities, causing currency carry trades from low-to-high-interest rate countries
- Changes in central bank policy frameworks which allocate more weight to overall financial stability rather than just price stability
- Policy shifts encouraging domestic consumption and creating further productive investment opportunities in emerging economies
- Greater transparency and stronger financial regulation regarding surveillance, capital and liquidity ratios, risk retention and counterparty risk management in over-the-counter derivative markets

Global impact

Reversals of global economic growth as collapse in asset prices undermines consumer confidence and the allocative efficiency of the financial system (the current financial crisis reduced world output by roughly 2% and contracted advanced economies by roughly 4%).

Possible collapse of banking systems as investors lose trust in financial markets and governance institutions.

The symbols in the “Drivers and indicators” denote the following

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk

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Economic Risks

Extreme commodity price volatility

Volatile mineral, metal and agricultural commodity prices create uncertainty for governments and business as well as costs for producers and consumers.

Drivers and indicators

- Government policies such as price ceilings on food prices, lead to reallocation of production and food shortages
- Fluctuating economic growth in emerging market economies
- Fluctuations as a function of the global business cycle
- Currency devaluation should a number of countries attempt to shift the relative strength of their currencies to spur exports
- Climate change and extreme weather events which increase production uncertainty
- Retrenchment from globalization, through e.g. protectionist barriers and “resource nationalism” from countries possessing rare metals
- Advances in new information and communication technologies that smooth price fluctuations by improving information flow between sellers, buyers and middlemen
- Advances in agricultural technologies that create more resilient crops
- Advances in financial instruments that allow consumers and producers of commodities to manage better risks associated with volatile production levels

Global impact

Lower growth as volatility causes uncertainty for investments by individuals and companies (such as farmers and mining companies)

Volatile and rising food prices lead to hunger and malnutrition among the poor where food accounts for a large proportion of household spending or earnings.

The global business cycle may be exacerbated by commodity price fluctuations.

The symbols in the “Drivers and indicators” denote the following

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk

Perceived likelihood to occur in the next ten years

Perceived impact in Billion US $
Economic Risks

### Extreme consumer price volatility

Volatile prices for consumer goods and services distort demand, create uncertainty for governments and business, and increase costs for both producers and consumers.

#### Drivers and indicators

- Aggressive quantitative easing
- Volatile commodity prices
- **Collapse in asset prices** leading to widespread failures in the financial sector with attendant recessionary impact
- **High unemployment rates** in combination with large and protracted output gaps
- **Effective monetary policies** that reduce the chance of severe swings towards inflation or deflation

#### Global impact

- **An inflationary spiral** could impoverish savers and creditors and have adverse consequences for investment, growth and future prosperity.
- **A deflationary spiral** could foster precautionary spending patterns that may exacerbate recessionary trends.

---

The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- ◯ Drivers that could both increase or reduce risk
- ▼ Drivers that reduce risk
Economic Risks

Extreme energy price volatility

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Low</th>
<th>Med</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived impact in Billion US $</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Volatile energy prices create uncertainty for governments and business as well as costs for producers and consumers.

Drivers and indicators

- **Geopolitical tensions** and fear of terrorist activities especially in oil-producing and transit regions
- **High growth rates in emerging economies**
- **Underinvestment** in the exploration and refinement of fossil fuels
- **Regulatory uncertainty** over impending carbon pricing mechanisms and governance
- **Increase in alternative energy production** (e.g. solar and wind power) possibly leading to reduced dependency on fossil fuels

Global impact

- **Dampened economic growth** as business planning is disrupted and price volatility feeds through into other goods.
- **Social unrest** in countries where heating costs account for a high proportion of household budgets.
- Substantially higher oil prices generate current account surpluses in producing countries and deficits in importing nations, exacerbating **global macroeconomic imbalances** and fuelling turbulence in financial markets.
- **Possibility of an oil supply crunch.**

The symbols in the “Drivers and indicators” denote the following

- ▲ Drivers that increase risk
- ▲ Drivers that could both increase or reduce risk
- ▼ Drivers that reduce risk
## Economic Risks

### Fiscal crises

Excessive debt burdens generate rising interest rates, inflation pressures and sovereign debt crises.

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rising debt levels and fiscal deficits in advanced economies</td>
<td>High government debt-to-GDP ratios stifle economic growth and exert upward pressure on real interest rates.</td>
</tr>
<tr>
<td>Rising market interest rates</td>
<td>In highly indebted economies, spreads on government bonds may rise significantly, exacerbating sovereign debt crises, particularly in some OECD countries.</td>
</tr>
<tr>
<td>Increasing dependency ratios and demographic challenges (for example due to ageing in advanced economies)</td>
<td>Sovereign debt crises in Eurozone countries threaten European economic integration, with negative impacts on other blocs considering currency unions and the potential to precipitate wider retreats from globalization.</td>
</tr>
<tr>
<td>Clear exit strategies on behalf of governments holding high and rising levels of debt</td>
<td>Fiscal austerity leads to cutbacks in innovation and education programmes with long-term opportunity costs.</td>
</tr>
<tr>
<td>Persistently high rates of inflation</td>
<td>Potential for social unrest and political instability resulting from the breakdown of social safety nets.</td>
</tr>
<tr>
<td>Social security and healthcare systems reform to a sustainable level while providing necessary level of social safety net</td>
<td></td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- ▼ Drivers that could both increase or reduce risk
- ▼ Drivers that reduce risk

Figure 1

Rising debt levels and fiscal deficits in advanced economies

Rising market interest rates

Increasing dependency ratios and demographic challenges (for example due to ageing in advanced economies)

Clear exit strategies on behalf of governments holding high and rising levels of debt

Persistently high rates of inflation

Social security and healthcare systems reform to a sustainable level while providing necessary level of social safety net
Economic Risks

Global imbalances and currency volatility

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (light red)</td>
<td>Low (light red)</td>
</tr>
<tr>
<td>Med (medium red)</td>
<td>Med (medium red)</td>
</tr>
<tr>
<td>High (dark red)</td>
<td>High (dark red)</td>
</tr>
</tbody>
</table>

Global savings and investment imbalances foster unsustainable current account imbalances, unsustainable levels of external debt and ultimately wide swings in foreign exchange rates.

### Drivers and indicators

- **Increase in the absolute size of current account imbalances**
- **Substantial changes in the conduct of monetary policy** such as quantitative easing
- **Competitive devaluations of currencies**
- **High number of potentially misaligned currency pegs** maintained
- **Continued reliance on the US dollar** despite its loss in value due to no other alternative international settlement currency, particularly in the context of a disruption in the Euro
- **Extent to which debtor countries are able to address fiscal challenges** and surplus countries are able to balance consumption with savings
- **Meaningful growth policies** that change the incentives for the use of income in both deficit and surplus countries so as to reduce imbalances

### Global impact

- The correction of global imbalances typically comes at the price of sharp income contractions and adverse foreign exchange developments in deficit countries.
- Currency volatility adversely affects trade and may lead to an increase in protectionist measures, retrenchment from globalization and additional global governance failures.
- Running sustained and large current account deficits requires capital inflows on the part of deficit countries. This implies an increase in public debt when accompanied by fiscal deficits, leading potentially to fiscal crises.

The symbols in the “Drivers and indicators” denote the following:

- ▲: Drivers that increase risk
- ◆: Drivers that could both increase or reduce risk
- ▼: Drivers that reduce risk
Economic Risks

### Infrastructure fragility

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constraints on fiscal budgets and decisions to reduce infrastructure spending</td>
<td>Increased transaction costs and disruption to business caused by inadequate or failing infrastructure.</td>
</tr>
<tr>
<td>Lack of security standards and guidance provided by governments to address vulnerability of critical information infrastructure and power grids to attempted attacks</td>
<td>Unsustainable demand for natural resources and associated damage to the environment caused by inefficient distribution of water, energy and sanitation services.</td>
</tr>
<tr>
<td>Increasing capacity and inclination of terrorist networks to target infrastructure for political objectives</td>
<td>Domino effects from interdependencies of critical infrastructure, intensifying crisis situations.</td>
</tr>
<tr>
<td>Population growth and urbanization increasingly putting stress on existing infrastructure</td>
<td></td>
</tr>
<tr>
<td>Increases in access to credit by the private sector to finance large infrastructure projects</td>
<td></td>
</tr>
<tr>
<td>International cooperation on regionally facing critical infrastructure</td>
<td></td>
</tr>
</tbody>
</table>

The failure to adequately invest in, upgrade and secure infrastructure networks severely hinders growth and development, and reduces the resilience of infrastructure networks to endogenous or exogenous shocks.
Economic Risks

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>▲ Lack of availability of credit leading to credit rationing</td>
<td>Collapse of asset prices, including financial assets and real estate, leading to a sharp and protracted recession.</td>
</tr>
<tr>
<td>▲ Negative financial conditions both in deposit-taking banks and the shadow banking (non-bank) sector, including deteriorating capital ratios and asset impairments</td>
<td></td>
</tr>
<tr>
<td>▼ New regulations which successfully address moral hazard and conflicts of interest in the financial system</td>
<td></td>
</tr>
<tr>
<td>▼ Consistently low interest rates, guarantees and other measures which encourage inter-bank lending</td>
<td></td>
</tr>
</tbody>
</table>

Reductions in the availability of liquidity, loans and credit from banks and capital markets increase borrowing costs for governments, businesses and consumers, deter investment and negatively impact financial markets and economic activity.

The symbols in the "Drivers and indicators" denote the following:

▲ Drivers that increase risk
▼ Drivers that reduce risk
★★ Drivers that could both increase or reduce risk
Economic Risks

Inadequate, fragmented or obsolete regulations, institutions or reforms negatively impact industry structures, capital flows and market competition, constraining both investment and innovation, and the effectiveness of international cooperation.

Drivers and indicators

- **Impact of interest groups** on regulatory process in the form of short-term responses to structural challenges
- Commitment to **multistakeholder and international dialogue** on regulatory challenges with a focus on understanding opposing incentives and conflicting perspectives
- **Higher levels of effective coordination** among national regulators

Global impact

- Distortions to capital allocation and/or increased costs of doing business, leading to **reduced profitability and higher product prices**.
- Increased risk of **failure of international structures** such as the G20 with knock-on geo-economic and geopolitical effects.

The symbols in the “Drivers and indicators” denote the following:

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk
Economic Risks

### Retrenchment from globalization

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>med</td>
<td>med</td>
</tr>
<tr>
<td>high</td>
<td>high</td>
</tr>
</tbody>
</table>

Economies adopt policies that create barriers to flows of goods, capital and labour, while failing to engage with multilateral governance structures to address global challenges.

#### Drivers and indicators

- **Implementation of implicit and explicit trade barriers** through tariffs, subsidies, national content requirements, etc.
- Increasing populist politics fed by **slow growth and high levels of unemployment**
- Increased hurdles to cross-border migration
- Tangible progress in **international trade negotiations** such as the Doha Round
- Successful negotiations in **bilateral and regional trade agreements**

#### Global impact

- Declines in global trade and the efficiency of global capital markets lead to **decreases in innovation and economic growth**.
- Welfare losses and **higher levels of poverty** globally.

The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- ▲ Drivers that could both increase or reduce risk
- ▼ Drivers that reduce risk
### Economic Risks

#### Slowing Chinese economy (<6%)

China’s growth slows to 6% or less.

**Drivers and indicators**

- **Social unrest**
- **Excessive savings and investment into unproductive assets**
- **Demographic pressures** due to China’s ageing population
- **Chinese government’s ability to maintain political stability** in the wake of loss in growth momentum
- **Chinese government’s success in maintaining stable renminbi** in the wake of loss in export momentum

**Perceived likelihood** to occur in the next ten years

<table>
<thead>
<tr>
<th>Low</th>
<th>Med</th>
<th>High</th>
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</thead>
</table>

**Perceived impact** in Billion US $

<table>
<thead>
<tr>
<th>Low</th>
<th>Med</th>
<th>High</th>
</tr>
</thead>
</table>

**Global impact**

Adverse effects on global capital and commodity markets could foster a *reversal in globalization*, as China is a large importer of commodities from other emerging market countries. Its reserves are invested abroad (predominantly in US government bonds) and it has a sizeable presence in other countries through direct investments in land and commodity producers and through development aid.

- Bursting of an investment-driven, large-scale infrastructure and construction projects bubble.
- Socio-economic unrest due to rising unemployment rates.

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The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- △ Drivers that could both increase or reduce risk
- ▼ Drivers that reduce risk

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Geopolitical Risks
### Geopolitical Risks

The abuse of power for personal gain by businesses and public officials undermines the rule of law, governance, investment flows and economic development.

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institutional weakness in fragile states</strong></td>
<td>Increased transaction costs for businesses, governments and individuals.</td>
</tr>
<tr>
<td><strong>Economic disparity</strong> and low wages</td>
<td>Creating <strong>barriers to growth</strong> by reducing willingness to take business risks and deterring foreign investment.</td>
</tr>
<tr>
<td><strong>Continuing or increasing levels of organized crime and illicit trade</strong></td>
<td><strong>Reduced levels of citizen trust</strong> in government.</td>
</tr>
<tr>
<td><strong>Regulatory and global governance failures</strong></td>
<td><strong>Erosion of institutions and civil service functions.</strong></td>
</tr>
<tr>
<td>Citizen education and information, including literacy, which increase opportunities for legitimate activities and raise awareness on the impacts of corruption</td>
<td>Increasing security concerns for individuals threatened by coercion.</td>
</tr>
<tr>
<td>Increased transparency of global financial flows</td>
<td></td>
</tr>
<tr>
<td>Stronger links between international civil society and legal institutions in advanced economies</td>
<td></td>
</tr>
<tr>
<td>National laws containing extraterritorial provisions to hold companies liable for corruption, such as the US Foreign Corrupt Practices Act and United Kingdom Anti-Bribery Bill</td>
<td></td>
</tr>
<tr>
<td>Increasing private sector engagement and commitment to reduce corruption</td>
<td></td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- ◆ Drivers that could both increase or reduce risk
- ▼ Drivers that reduce risk
## Geopolitical Risks

The symbols in the “Drivers and indicators” denote the following:

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk

### Fragile states

One or more systemically critical countries experience the significant erosion of trust and mutual obligations between states and citizens, leading to state collapse, internal violence, regional or global instability and, potentially, military conflict.

### Drivers and indicators

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imbalances in internal centres of power (civilian, military, economic, religious, etc.) and competition between domestic actors for economic and political resources</td>
<td>Increasing economic disparity, both within and between countries.</td>
</tr>
<tr>
<td>The proliferation of newly independent states with low economic and political resilience</td>
<td>Civil war and reduced human security.</td>
</tr>
<tr>
<td>Weakening social, political and economic bonds as a result of internal or external conflict</td>
<td>Migration and displacement of vulnerable populations.</td>
</tr>
<tr>
<td>Increasing incidence of corruption, organized crime and illicit trade</td>
<td>Disruptions to international trade and exchanges because of illicit trade and organized crime.</td>
</tr>
<tr>
<td>Effective investments in local institution-building, education and health care</td>
<td>Increasing likelihood of geopolitical conflict and terrorism.</td>
</tr>
<tr>
<td>Strong global governance and cooperation regarding international intervention and support for fragile states</td>
<td></td>
</tr>
</tbody>
</table>

### Global impact

- **Perceived likelihood to occur in the next ten years**
- **Perceived impact in Billion US $**
## Geopolitical Risks

### Geopolitical conflict

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>med</td>
<td>med</td>
</tr>
<tr>
<td>high</td>
<td>high</td>
</tr>
</tbody>
</table>

Military actions or aggressive foreign or trade policies on the part of global or regional powers disrupt political or social stability, negatively impacting populations, investment and financial markets.

### Drivers and indicators

- **Rising political populism at the national level**
- **Increased tension over territorial disputes**, particularly those linked to access to natural resources or strategic assets
- **Fragile states** which have the potential to fuel regional conflict
- **Rising tensions** in the Middle East and the Korean peninsula
- **Global governance successes** which decrease the likelihood of misunderstandings and miscalculations among states, and increase the potential for dispute resolution

### Global impact

- **Loss of human lives** through warfare.
- **Loss of property and economic resources**, at both personal and national levels through warfare.
- Reinforces global governance failures by creating new levels of distrust among nations.
- Breaks **global trade patterns** and may lead to reduced growth at a global level due to protectionist reactions (though national economies may be stimulated through innovation).

The symbols in the “Drivers and indicators” denote the following:

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk
### Geopolitical Risks

#### Global governance failures

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
<th>low</th>
<th>med</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>in Billion US $</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Weak or inadequate global institutions, agreements or networks, combined with competing national and political interests, impede attempts to cooperate on addressing global risks.

#### Drivers and indicators

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>▲ Discrepancies in political views, incentives and decision-making systems between advanced and emerging economies</td>
<td>Increased impact and likelihood of other global risks and less-effective global risk response.</td>
</tr>
<tr>
<td>▲ Reluctance of established powers to acknowledge and adjust to the rising power of emerging economies</td>
<td>Increasing likelihood of geopolitical conflict through reduced means of peaceful settlement.</td>
</tr>
<tr>
<td>▲ Increasing interconnectedness and complexity of global risks, which defy traditional governance responses</td>
<td>Reduced global growth and economic inefficiency due to increasing protectionism.</td>
</tr>
<tr>
<td>▲ Disintermediation of traditional forms of leadership and governance through technological and social shifts</td>
<td>Reduced trust among states by heightening divisions rather than commonalities.</td>
</tr>
<tr>
<td>▲ Sustained success in implementing global agreements on climate change based on UN mechanisms</td>
<td>Regulatory arbitrage opportunities.</td>
</tr>
<tr>
<td>▲ Development of a well-informed and well-mobilized global public opinion sharing norms and values of global citizenship</td>
<td></td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

▲ Drivers that increase risk

▲▲ Drivers that could both increase or reduce risk

▼ Drivers that reduce risk
Geopolitical Risks

<table>
<thead>
<tr>
<th>Illicit trade</th>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases in the illegal trafficking of goods and people cause social, political, economic and environmental harm by increasing the burden on supply chains, exacerbating wealth inequalities and financing destabilizing activities.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Drivers and indicators

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State fragility</strong> which fosters illicit trade by facilitating the production and export of illicit goods and services</td>
<td>Reduces public and private sector revenues and, in time, innovation, by distorting markets and reducing tax bases.</td>
</tr>
<tr>
<td><strong>Rising economic disparity</strong> which creates incentives for engaging in illicit trade as a source of employment and wealth creation</td>
<td>Stimulates corruption, organized crime and state fragility.</td>
</tr>
<tr>
<td><strong>Global governance failures</strong>, particularly in law enforcement, supply-chain security and customs regulations</td>
<td>Threatens biodiversity through unregulated activities.</td>
</tr>
<tr>
<td><strong>Increased consumer education</strong> and awareness of the aggregate impact of illicit trade</td>
<td>Criminalization/marginalization of segments of the population.</td>
</tr>
<tr>
<td><strong>Increasing financial and goods transparency</strong>, and tracking</td>
<td></td>
</tr>
<tr>
<td><strong>Regulatory and global governance reforms</strong> which reduce opportunities for regulatory arbitrage</td>
<td></td>
</tr>
<tr>
<td><strong>Legalization</strong> and decriminalization that shifts the dynamics of demand and supply of illicit goods</td>
<td></td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

- **Drivers that increase risk**
- **Drivers that could both increase or reduce risk**
- **Drivers that reduce risk**

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## Geopolitical Risks

The unlawful activities of highly organized, disciplined associations weaken state authority, negatively impact investment climates, undermine the rule of law and slow growth.

<table>
<thead>
<tr>
<th>Organized crime</th>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak institutions, attributable to both state fragility and corruption</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Rising economic disparity which creates incentives for engaging in organized crime as a source of employment and wealth creation</td>
<td>Med</td>
<td>Med</td>
</tr>
<tr>
<td>Global governance failures, particularly in law enforcement and intelligence gathering</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Illicit trade activity, which is a primary occupation of organized criminal activities as well as a main source of income</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Legalization and decriminalization of illicit goods that alter the flow of goods and financing to organized crime</td>
<td>Med</td>
<td>Med</td>
</tr>
<tr>
<td>Increasing financial and goods transparency and tracking</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Global cooperation on intelligence-sharing and law enforcement across jurisdictions to identify and prosecute organized criminals</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

- **↑** Drivers that increase risk
- **↓** Drivers that could both increase or reduce risk
- **↓** Drivers that reduce risk

Reduces public and private sector revenues by creating grey and black markets, creating unfair competition, and reducing tax bases. Negative impacts reduce social stability and security by creating unsafe environments, which in turn deter tourism and investment.
# Geopolitical Risks

The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- ♦ Drivers that could both increase or reduce risk
- ▼ Drivers that reduce risk

## Drivers and indicators

<table>
<thead>
<tr>
<th>Space security</th>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Space security</strong></td>
<td>low</td>
<td>med</td>
</tr>
<tr>
<td><strong>Drivers and indicators</strong></td>
<td><strong>Global impact</strong></td>
<td></td>
</tr>
<tr>
<td>▲ Increasing levels of activity in space make tensions or conflict in space more likely</td>
<td>Possible direct impact on traditional geopolitical conflict on Earth due to the intricate nature of state interest on Earth and in space.</td>
<td></td>
</tr>
<tr>
<td>▲ Rising risks of traditional geopolitical conflict increases the likelihood of conflict spilling over into space</td>
<td>Reduced opportunities presented by space as a new avenue for economic and human development by creating extreme uncertainties for investors, public and private.</td>
<td></td>
</tr>
<tr>
<td>▲ Lack of global governance, in particular related to space technologies and territorial rights</td>
<td>Human injury and loss of life from attacks from or accidents in space.</td>
<td></td>
</tr>
<tr>
<td>▲ Increasing levels of space debris that make space activities increasingly unsafe</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The insufficient regulation of commercial and military activity in space jeopardizes potential economic, commercial and technological benefits derived from space exploration and leads to geopolitical tension and confrontation.
Geopolitical Risks

Terrorism

Non-state actors are successful in impacting large-scale human or material damage.

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political and religious radicalization</td>
<td>Human injury and loss of life.</td>
</tr>
<tr>
<td>Social fragmentation in both advanced and emerging economies</td>
<td>Fear and psychological trauma, both in anticipation of terrorist acts and in</td>
</tr>
<tr>
<td>Rising economic disparity, which contributes to marginalization</td>
<td>the aftermath of attacks.</td>
</tr>
<tr>
<td>Increased mobility of people and information</td>
<td>Reduced trust, among people within and between societies by creating stigmas.</td>
</tr>
<tr>
<td>Existence of fragile states which serve as safe havens and training grounds for terrorist organizations</td>
<td>Economic opportunity costs, through preventive measures, fear of attacks and the direct impact of incidences, particularly related to travel and tourism.</td>
</tr>
<tr>
<td>Decreasing costs and barriers of access to low-end weapons of mass destruction</td>
<td>Diplomatic and military escalations, which can both result from and drive terrorist incidents.</td>
</tr>
<tr>
<td>Geopolitical tension, instability and conflict</td>
<td></td>
</tr>
<tr>
<td>Improved intelligence and tracking of terrorist-related activities through the Internet</td>
<td></td>
</tr>
<tr>
<td>New and credible peace efforts in Israel/Middle East</td>
<td></td>
</tr>
<tr>
<td>The West’s pressure on terrorists’ sanctuaries in Afghanistan and the Horn of Africa</td>
<td></td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk
Geopolitical Risks

Weapons of mass destruction

The proliferation of nuclear, chemical, biological and radiological technologies and materials leads to crises.

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Iran’s nuclear ambitions</strong>, particularly whether it will test a nuclear device or seek de facto nuclear status with the capability to develop a nuclear device on short notice</td>
<td><strong>Geopolitical conflict</strong> driven by fears of rogue states acquiring WMD capabilities which existentially threaten other nations.</td>
</tr>
<tr>
<td><strong>Rising demand for nuclear technologies</strong> for civilian use, which lower the cost of technologies and increase the risk of misappropriated nuclear material</td>
<td><strong>Terrorist attacks</strong> with unprecedented consequences because of new capabilities.</td>
</tr>
<tr>
<td><strong>Rising levels of organized crime, illicit trade and fragile states</strong></td>
<td>Increased need for spending on intelligence and surveillance.</td>
</tr>
<tr>
<td><strong>Geopolitical conflict</strong> and related arms races which increase the demand for nuclear weapons</td>
<td><strong>Global power shifts</strong> as more countries increase diplomatic bargaining power thanks to the acquisition of WMD capabilities.</td>
</tr>
<tr>
<td><strong>Technological advances and increasing access to information</strong> which lower the cost and difficulties of manufacturing biological and chemical agents</td>
<td></td>
</tr>
<tr>
<td><strong>Continued survival of the Non-Proliferation Treaty</strong>, bilateral agreements and negotiations designed to limit nuclear technologies</td>
<td></td>
</tr>
</tbody>
</table>
Environmental Risks
# Environmental Risks

## Air pollution

Declining air quality due to pollution and climate shifts threatens social stability, health outcomes and economic development.

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human activities that release particulate matters, such as the use of fossil fuels</td>
<td>Detrimental effects on wildlife, vegetation and broader biodiversity and environmental impacts (e.g. acid rain caused by smog and holes in the ozone layer holes, etc.).</td>
</tr>
<tr>
<td>Particulate-releasing natural catastrophes, such as volcanic eruptions and forest fires</td>
<td>Air pollution increases human health hazards such as heart disease and respiratory diseases (e.g. asthma) resulting in loss of life, higher healthcare costs and loss of productivity.</td>
</tr>
<tr>
<td>Shifts in weather patterns which influence air pollution levels on a local and regional basis</td>
<td></td>
</tr>
<tr>
<td>Government policies and regulations controlling pollution and incentivizing businesses and consumers towards greater use of non-polluting energy sources</td>
<td></td>
</tr>
<tr>
<td>Technological innovation that contributes to spread of clean energy production and shifts to alternative energy</td>
<td></td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- ▲ Drivers that could both increase or reduce risk
- △ Drivers that reduce risk
Environmental Risks

Biodiversity loss

The degradation of biodiversity in multiple biospheres around the world results in stocks of renewable resources below regenerative capacity and reduced species diversity, with potentially irreversible consequences for the environment and associated industries.

Drivers and indicators

- Population growth and increases in resource-intensive consumption patterns
- Continuing deforestation, driven primarily by logging, mining and agricultural land use
- Decline in the number of pollinators, such as bees, that contribute to reproduction of many plants
- Growth in intensive agriculture and monoculture
- Infrastructure development and other investment decisions which can drive either acute destruction and ill-use, or actively improve long-term sustainability of resource use
- Conservation and preservation policies which are successfully implemented at local levels to manage the impact of human activity on ecosystems
- Legal and economic support to population segments who currently rely on unsustainable land-use practices for survival and income
- Increasing levels of awareness of the economic importance of biodiversity, in particular the economic and social value maintained by biodiverse systems and the trade-offs involved in ensuring their continued existence
- International agreements which help lower externalities affecting biodiversity and/or prevent unsustainable exploitation of renewable resources

Global impact

- Irreversible environmental damage, including extinction of flora and fauna and shifts in habitat.
- Increases in the rate of climate change.
- Negative impact on food and water security, as agricultural yields fall and ecosystems supporting water sources are damaged.
- Significant economic loss for those who depend on healthy and well-functioning ecosystems to generate income (e.g., farmers).
- Destabilization of communities and traditional activities which lead to psychological trauma, economic damage, and migration.

The symbols in the “Drivers and indicators” denote the following:

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk
### Environmental Risks

**Drivers and indicators**

<table>
<thead>
<tr>
<th>Drivers</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ <em>Population growth</em> and increases in <em>resource-intensive consumption patterns</em></td>
<td>Declining crop yields and risk of <em>starvation</em>, especially in Africa. Prolonged drought and high temperatures.</td>
</tr>
<tr>
<td>♦ <em>Degree of ocean acidification</em>, which affects the CO2 absorption level in the ocean, drives calcification of organisms and impacts global warming</td>
<td>Impacts on marine ecosystems of rising temperature and acidification include <em>destruction of coral reefs</em> threatening marine biodiversity.</td>
</tr>
<tr>
<td>♦ Extent to which <em>mitigation measures</em> are adopted and rigorously enforced by governments, including international agreements on reducing carbon and other greenhouse gas emissions</td>
<td>Economic losses from climate shifts were estimated by the British government at 5-20% of the annual global gross domestic product.</td>
</tr>
<tr>
<td>♠ <em>Financial innovation</em> in instruments to help spread risk and economic burden of climate change</td>
<td>Increase in the <em>spread of infectious diseases</em>, particularly because warmer temperatures allow disease-carrying insects, animals and microbes to survive in areas where they were once contained by cold weather.</td>
</tr>
<tr>
<td>♣ <em>Technological advances</em> in agriculture to adapt crops to droughts and extreme temperatures</td>
<td>Possible <em>unintended consequences from interventions meant to reduce climate change</em>, such as geo-engineering.</td>
</tr>
</tbody>
</table>

Droughts, extreme temperatures and other chronic weather events caused by climatological shifts cause harm to lives, human health, infrastructure, property, economic activity and the environment.

### Climate change

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

- ↑ Drivers that increase risk
- ♦ Drivers that could both increase or reduce risk
- ♣ Drivers that reduce risk
Environmental Risks

Earthquakes and volcanic eruptions

Earthquakes, volcanic action and other geophysical catastrophes cause harm to lives, human health, infrastructure, property, economic activity and the environment.

Drivers and indicators

[Earthquakes and volcanic eruptions themselves are caused by natural geophysical phenomena; these influencing factors address the scale of the impacts]

- **Increasing population growth and density** in disaster-prone areas
- **Rigour of and compliance with building codes**, affecting how buildings and critical infrastructure are able to withstand varying frequencies and durations of earthquakes; encompasses factors such as cost of bringing older buildings up to standard, and quality of materials and workmanship
- **Effective crisis management capabilities in affected areas**, such as resident awareness, rapid response mechanisms, mitigation plans and execution efficiency, (including to secondary effects such as aftershocks, fire, landslides and tsunami)
- **Advances in technologies that enable more sensitive detection and early warning systems**.

Global impact

- **Significant economic loss**.
- **Loss of life** through immediate trauma and subsequent diseases where infrastructure is chronically affected.
- **Displacement of people** as a consequence of the destruction of residences and businesses.
- ** Interruption to the global logistics and transport networks** with indirect impacts including economic damage, reduced production, interruption of flows of food, critical materials and other resources.
- **Increased costs** related to stricter building codes.

The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- ◆ Drivers that could both increase or reduce risk
- ◼ Drivers that reduce risk
Environmental Risks

### Flooding

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
</tr>
</tbody>
</table>

Severe flooding causes harm to lives, human health, infrastructure, property, economic activity and the environment.

#### Drivers and indicators

- **Increasing population growth and density** in flooding-prone areas
- **Climate change** through extreme rainfall, rising sea levels, melting ice-sheets, glacial lake outburst floods, etc.
- **Deforestation** and destruction of ecosystems that provide natural barriers and absorption of water
- **Urbanization** and development that increase the concentration of people and economic assets in high-risk areas such as floodplains and coastal zones
- **Infrastructure investment** to build and maintain levees, drainage and flood control
- **Governance systems** that support preparedness, rapid response, evacuation plans and regional/international cooperation in the event of a disaster
- **Advances in technologies** that enable more sensitive detection and early warning systems
- **Systematic and long-term plans** to remove people and property from danger zones

#### Global impact

- **Coastal flooding** inundates wetlands and other low-lying lands, erodes beaches and increases the salinity of rivers, bays and groundwater tables.
- **Economic loss** in the form of affected agriculture, damage to residential areas and critical infrastructure, as well as disruption to regional and global supply chains.
- **International displacement, migration and resettlement.**
- **Erosion of fertile surface soil,** affecting biodiversity and food production.
- **Water contamination** as floodwater picks up household and industrial waste, pesticides, heavy metals and other toxic chemicals.

The symbols in the “Drivers and indicators” denote the following:

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk
Environmental Risks

Inadequate global regulation, authority and coordination create conflict over the appropriate use of the sea for transport and marine resources, threatening economic development and regional stability.

Drivers and indicators

- **Subsidy schemes** incentivizing overexploitation
- **Population growth** and increases in resource-intensive consumption patterns
- **Declining yields from land resources** which increase pressure to exploit marine resources
- Extent to which **international coordination on ocean governance** can address territorial disputes and the marine resources are exploited (“tragedy of the commons”)
- **Advances in technologies** which enable more effective exploitation of marine resources, but which come with the threat of unintended consequences (such as oil spills during deepwater drilling)
- **Increasing levels of awareness** of the economic importance of ocean resources and governance, in particular the economic and social value maintained by stable marine ecosystems and the trade-offs involved in ensuring their continued existence
- **Governance on seaborne waste** such as the Great Pacific Garbage Patch, where pelagic plastics, chemical sludge and other debris have been trapped by the currents of the North Pacific Gyre

Global impact

Overexploitation of marine resources leads to **environmental degradation and biodiversity loss**, threatening the estimated US$ 375 billion per year in goods and services which depend on marine biodiversity.

Increased competition for marine resources leads to **geopolitical tensions and conflict** between nations.

Potential **wide-spread environmental degradation, loss of habitat and wide-scale pollution** affecting marine, birds and human life.
## Environmental Risks

### Storms and cyclones

Storms, cyclones and other acute weather events cause harm to lives, human health, infrastructure, property, economic activity and the environment.

**Drivers and indicators**

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing population growth and density in flooding-prone areas</td>
<td>Economic loss in the form of affected agriculture, damage to residential areas and critical infrastructure.</td>
</tr>
<tr>
<td>Climate change and shifts in weather patterns through rising ocean temperatures which increase the energy potential of hurricanes and tropical storms</td>
<td>Loss of life through immediate trauma and subsequent diseases where infrastructure is chronically affected</td>
</tr>
<tr>
<td>Rigour of and compliance with building codes, affecting how buildings and critical infrastructure are able to withstand varying frequencies and durations of storms and cyclones; encompasses factors such as cost of bringing older buildings up to standard, and quality of materials and workmanship</td>
<td>Displacement of people as a consequence of the destruction of residences and businesses</td>
</tr>
<tr>
<td>Emergency preparedness such as resident awareness, early warning and rapid response mechanisms (including to secondary effects such as fires, flooding and landslides)</td>
<td>Interruption to the global logistics and transport networks with indirect impacts including economic damage, reduced production, interruption of flows of food, critical materials and other resources.</td>
</tr>
<tr>
<td></td>
<td>Increased costs related to stricter building codes.</td>
</tr>
<tr>
<td></td>
<td>Crop damage, impacting food security.</td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk
Societal Risks
### Societal Risks

#### Chronic diseases

<table>
<thead>
<tr>
<th>Chronic diseases</th>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rising levels of chronic diseases, such as obesity, cancer and heart disease, increase health costs and threaten productivity and economic growth.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Drivers and indicators

- **Increase in risk factors** such as high cholesterol, high blood pressure, obesity, smoking and alcohol combined with environmental factors and sedentary lifestyle.
- **Increasing economic disparity** where this results in larger proportions of the population having inadequate access to healthcare.
- **Policies which successfully raise awareness and incentivize healthy behavioural choices** in terms of diet and exercise.
- **Effective prevention, screening and wellness programmes**.
- **Advances in diagnostics, drug development and therapeutics**.
- **New scientific data on and improved understanding of causal links, genetic factors and precise treatment mechanisms**.

#### Global impact

- **Increased death rates** due to these diseases.
- **Decrease in labour force productivity and savings**.
- **Decrease in quality of life**.
- **Increased burden on human resources** to provide healthcare.
- **Increased financial burden** both for states and individuals to cover healthcare costs.
- **Increased prevalence of mental illness and depression** for both working age and elderly cohorts.

---

The symbols in the “Drivers and indicators” denote the following:

- ▲ Drivers that increase risk
- 🔹 Drivers that could both increase or reduce risk
- ▼ Drivers that reduce risk
Societal Risks

Ageing populations in industrialized economies and young populations in emerging economies threaten economic growth and social stability.

### Drivers and indicators

- Increasing proportion of the ageing population becoming dependent on **social safety nets**
- Concurrent **decreases in fertility and mortality** in advanced economies
- Continuing **lack of economic opportunities** for young populations in emerging economies
- **Increase in fertility rate** in fragile states
- **Decreasing fertility rates** in emerging economies due to higher levels of education, job market changes, women’s empowerment, contraception etc.
- Older cohorts becoming more **economically active**
- **Migration** of economically active populations to redress labour-market imbalances
- Changes in retirement policies such as **raising legal age of retirement**

### Global impact

- Growing economic and financial burden of **social safety nets** such as healthcare and pension systems.
- Threats to **fiscal solvency**, particularly for advanced economies, because of long-term liabilities of ageing populations.
- **Growing impoverishment** in old age.
- Skewing of democratic political systems towards protecting the interests of the elderly.
- **Resentment of younger generations** because of economic burdens and lack of opportunity.
- Threats to social stability from **large numbers of unemployed youth** in emerging economies.
Societal Risks

Economic disparity

Perceived likelihood to occur in the next ten years
Low Med High

Perceived impact in Billion US$

Wealth and income disparities, both within countries and between countries, threaten social and political stability as well as economic development.

Drivers and indicators

- Executive pay and incentive structures which distort national income structures
- Decline of labour institutions and collective bargaining
- Access to education at the levels necessary for participation in the modern labour market
- Access to employment opportunities, particularly for the younger and the elderly generations
- Social safety nets and transfer policies with the effect of efficiently redistributing wealth where appropriate

Global impact

- Social fragmentation, including higher rates of social unrest, crime and marginalization.
- Mistrust in the system of governance at both the national and international level, leading to democratic disengagement and rise of direct action.
- Shorter life expectancies and higher rates of chronic disease and depression, as the intergenerational transmission of wealth creates growing disparities in health.

The symbols in the “Drivers and indicators” denote the following:

- 🟥 Drivers that increase risk
- 🟢 Drivers that could both increase or reduce risk
- 🟢 Drivers that reduce risk
Societal Risks

### Food security

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
<th>med</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived impact in Billion US $</td>
<td>high</td>
</tr>
</tbody>
</table>

Inadequate or unreliable access to appropriate quantities and quality of food and nutrition threatens social stability, health outcomes and economic development.

#### Drivers and indicators

- **Low levels or quality of infrastructure** involved in distributing food and related commodities, with the potential to restrict supply
- **Population growth and increasing caloric consumption per person**, resulting in rising demand
- **Rising food prices**, particularly in the context of rising economic disparity
- **Trends reducing arable land available for sustainable food production**, e.g. competition from biofuels
- **Rising water scarcity**
- **Increases in climate change-related natural disasters**, including flooding, droughts, storms and cyclones
- **Protectionist policies and market distortions** such as export controls, price floors and subsidies
- **Technological advances** which improve crop yields and/or resilience to extreme temperatures, lower water availability and weather events

#### Global impact

- **Destruction of local ecosystems** because of monoculture, forest clearing and soil exhaustion.
- **Social and political unrest**.
- **Loss of locally suitable knowledge and skills** because of shifts to industrial food production.
- **Malnutrition**, which may result in permanent physical impairment and lost productivity.
- **Migration pressures**.
- **Commodity price volatility** as shortages ripple through global markets.

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The symbols in the “Drivers and indicators” denote the following:

- Red triangle: Drivers that increase risk
- Blue triangle: Drivers that could both increase or reduce risk
- Green triangle: Drivers that reduce risk
Societal Risks

Infectious diseases

The incidence and patterns of both known and emerging infectious diseases shift to new regions and population segments through a series of pandemics or sub-pandemic outbreaks, threatening global health and economic activity.

Drivers and indicators

- Surge of medication/ vaccination-resistant strains
- Emergence of H1N1 and new strains of the virus
- Increasing transmissibility of new viral strains (viral evolutionary rule)
- Contamination of food and water sources because of humanitarian crises or poor sanitation
- Level of enforcement of intellectual property rights affecting the development and distribution of new and generic drugs at affordable prices
- Effective international preparedness, monitoring and coordination for pandemics, including vaccine availability, supply-chain preparedness, emergency communication, transportation and treatment infrastructure
- Effective international monitoring and coordination for managing known infectious diseases, including policy and legal support at international and national levels
- Coverage of basic immunizations to entire populations
- Improved sanitation facilities and hygiene behaviours, particularly in rural areas and urban slums

Global impact

- Significant loss of life.
- Critical disruption in commercial and trade activities as well as critical services that may result in widespread economic and social loss.
- Severe burden on health systems.
- Public panic, which may amplify the overall impact of infectious diseases.
- Ongoing loss of productivity because of long-term infectious disease burdens the labour force.
- Emergence of drug-resistant bacteria and other pathogens.

The symbols in the “Drivers and indicators” denote the following:

- Drivers that increase risk
- Drivers that could both increase or reduce risk
- Drivers that reduce risk
Societal Risks

Migration flows place economic and social benefits and costs on both receiving and sending countries.

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal, regional and international conflicts</td>
<td>Contribution to or strain on social services and safety nets such as healthcare, pensions, housing and education.</td>
</tr>
<tr>
<td>Increasing demand from ageing societies to bring in migrant workers for elderly care</td>
<td>Social tension especially involving lower paid workers in the receiving country’s labour force.</td>
</tr>
<tr>
<td>Increasing parochialism in receiving countries, especially given current and expected economic conditions</td>
<td>Emerging economies suffering from brain drain.</td>
</tr>
<tr>
<td>Effectiveness of limits on migration imposed by industrialized countries seeking to accept only the most skilled migrants</td>
<td>Suffering of people and destruction of resources in forced migrations.</td>
</tr>
<tr>
<td>Skilled migrants returning to their countries of origin as improving economic conditions offer greater opportunities</td>
<td>Reduced productivity and economic activity because of restrictions on the global movement of talent.</td>
</tr>
<tr>
<td>Pre-emptive social measures to deal with economic issues and ensure equitable sharing of resources and infrastructure</td>
<td>Where migration is inhibited, loss of remittances from diaspora.</td>
</tr>
<tr>
<td>International frameworks, agreements and effective governance which take into account the economic hardships of poor countries on one hand and ageing populations on the other</td>
<td></td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

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### Societal Risks

#### Water security

Declines in the quality and quantity of potable water which threaten to undermine social stability and economic development and to promote both inter-state and intra-state conflict.

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population growth, especially in areas where water is scarce</strong></td>
<td>Reduced agricultural yields, reduced food security and economic challenges for agricultural communities.</td>
</tr>
<tr>
<td><strong>Short-term, piecemeal and unsustainable water management policies and practices</strong></td>
<td>Physical and economic conflict over access to scarce water.</td>
</tr>
<tr>
<td><strong>Increased competition for water</strong> among resource-intensive systems such as food and energy production</td>
<td>Spread of infectious diseases because of contaminated water.</td>
</tr>
<tr>
<td><strong>Low levels or quality of infrastructure</strong> for water distribution and management</td>
<td>Loss of biodiversity through water shortages in fragile ecosystems.</td>
</tr>
<tr>
<td><strong>Subsidies and other market distortions</strong> which encourage excessive water use</td>
<td>Migration pressures.</td>
</tr>
<tr>
<td><strong>Water quality degradation through acidification, eutrophication (addition of artificial and/or non-artificial substances, such as nitrates and phosphates in fertilizers or sewage, to a fresh water system) or oil spills</strong></td>
<td>Reduced human security for populations forced to travel long distances for water.</td>
</tr>
<tr>
<td><strong>Changing climate conditions</strong> which shift rainfall patterns</td>
<td>Social and political unrest.</td>
</tr>
<tr>
<td><strong>Extent to which industrial, agricultural and household users are empowered to implement suitable water management solutions</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Increasing awareness and engagement</strong> by business and government on the importance of demand-side management of water use</td>
<td></td>
</tr>
<tr>
<td><strong>Improved understanding of the social and economic costs of unsustainable water use</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Progressive, market-led pricing regimes for water</strong> which include the full cost of water (including externalities) and lower demand</td>
<td></td>
</tr>
<tr>
<td><strong>Success in managing transboundary water sources, including upstream and downstream water management by multiple stakeholders</strong></td>
<td></td>
</tr>
</tbody>
</table>

The symbols in the “Drivers and indicators” denote the following:

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- Drivers that reduce risk
Technological Risks
Technological Risks

Critical information infrastructure breakdown

Systemic failures of critical information infrastructure (CII) and networks negatively impact industrial production, public services and communications.

Drivers and indicators

- Lack of **generalized and comprehensive security standards**, making networked critical infrastructures as vulnerable as their weakest link
- **Extreme weather** and **catastrophic events** such as earthquakes damaging key infrastructures that are highly networked
- **False perceptions of security** leading to lack of urgency or incoherent measures creating new vulnerabilities
- Increase in **malicious infiltration in CII** through cyber-terrorists or enemy states
- **Pervasive small-scale data breaches**, such as phishing, that could develop into systemic problems
- **Early detection** of events and effectiveness of business continuity management
- Deterrent effect of clear **legal framework to penalize offenders**
- **Adequate investment in maintaining infrastructure, hardware and software** to meet new demands
- **Shared contingency plan and sharing of infrastructure in emergency situations**
- Degree of **data, information and infrastructure sharing** among governments and with private institutions

Global impact

- **Severe disruptions to critical government, communication, energy and financial systems.**
- Disruption of business services, resulting in severe economic loss.
- **Decreased trust in systems** profoundly changes ways of life.
- Unforeseen cascading effects on other highly interconnected networks.
- Potential **loss of life** as CII breakdown hampers emergency responses.
### Online data and information security

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Global impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of transparency on meta collection of data and algorithms</td>
<td>Disruption of global e-commerce and network communication as security concerns make users retreat from online services.</td>
</tr>
<tr>
<td>Difficulty of tracing altered data and infiltrator activity and the lack of agreement on how to intervene when erroneous data is created or misallocated</td>
<td>Paralysis of business and governance as trust decreases in data collection, storage, distribution systems and organizations processing mass data.</td>
</tr>
<tr>
<td>Incompatibility of new and old systems, carrying risks of destabilizing the network</td>
<td>Increased degree of tolerance to breaches of privacy.</td>
</tr>
<tr>
<td>Increased reliance on cloud services for data storage and analytics</td>
<td>Negative blow to the open source society affecting data and process sharing which hampers innovation and trust.</td>
</tr>
<tr>
<td>Extent to which policy and regulatory frameworks can keep up, given the lag between innovation cycles and government decision-making cycles</td>
<td>Unexpected second- and third-order effects through the interconnectedness of systems and data which are generally poorly understood.</td>
</tr>
<tr>
<td>Deterrent effect of clear legal framework to penalize offenders</td>
<td></td>
</tr>
<tr>
<td>Information sharing among governments and private firms regarding loss events</td>
<td></td>
</tr>
<tr>
<td>Improved education and personal awareness on ethical and moral responsibilities of online activities, including a false sense of security from encryption</td>
<td></td>
</tr>
<tr>
<td>Development of best practices for data security</td>
<td></td>
</tr>
</tbody>
</table>

The accidental loss of data or fraud online triggers a loss of confidence in data sharing, negatively affecting e-commerce and communication.

<table>
<thead>
<tr>
<th>Perceived likelihood to occur in the next ten years</th>
<th>low</th>
<th>med</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived impact in Billion US $</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

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- ◆ Drivers that reduce risk
Technological Risks

Threats from new technologies

<table>
<thead>
<tr>
<th>Drivers and indicators</th>
<th>Perceived likelihood to occur in the next ten years</th>
<th>Perceived impact in Billion US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing development of &quot;dual use&quot; items, such as nuclear technologies</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Lack of progress in designing internationally agreed governance systems related to the spread and use of new technologies</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Legal obligation of the producers to label the negative effects of product use</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Public awareness of potential unintended consequences</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Advanced research into the potential long-term impact of new technologies on the environment and human health</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

Negative consequences for human, animal or plant life created when know-how, technologies, materials, or equipment are diverted to or developed specifically for malevolent purposes or when harmful substances are accidentally released.

Strong public concerns and mistrust over new technologies (e.g. synthetic biology) which could hold back highly beneficial research and development.

Long-term negative impacts on health and healthcare systems.

Proliferation of unconventional weapons based on new technologies.

Plethora of court cases on product liability as well as insurance claims.

The symbols in the “Drivers and indicators” denote the following:

▲ Drivers that increase risk

▲ Drivers that could both increase or reduce risk

▼ Drivers that reduce risk
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