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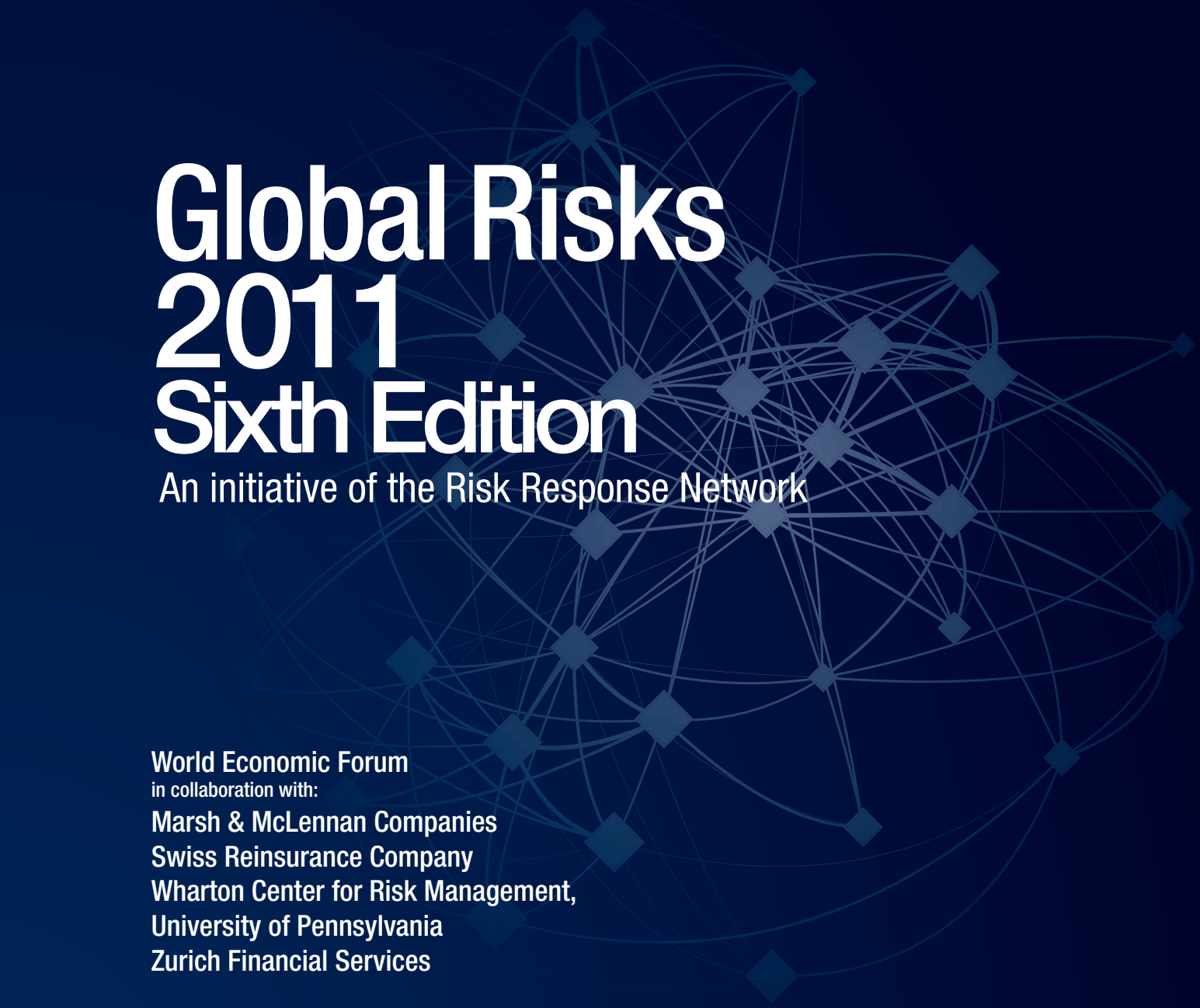
Global Risks 2011 Sixth Edition

An initiative of the Risk Response Network



World Economic Forum
in collaboration with:
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Swiss Reinsurance Company
Wharton Center for Risk Management, University of Pennsylvania
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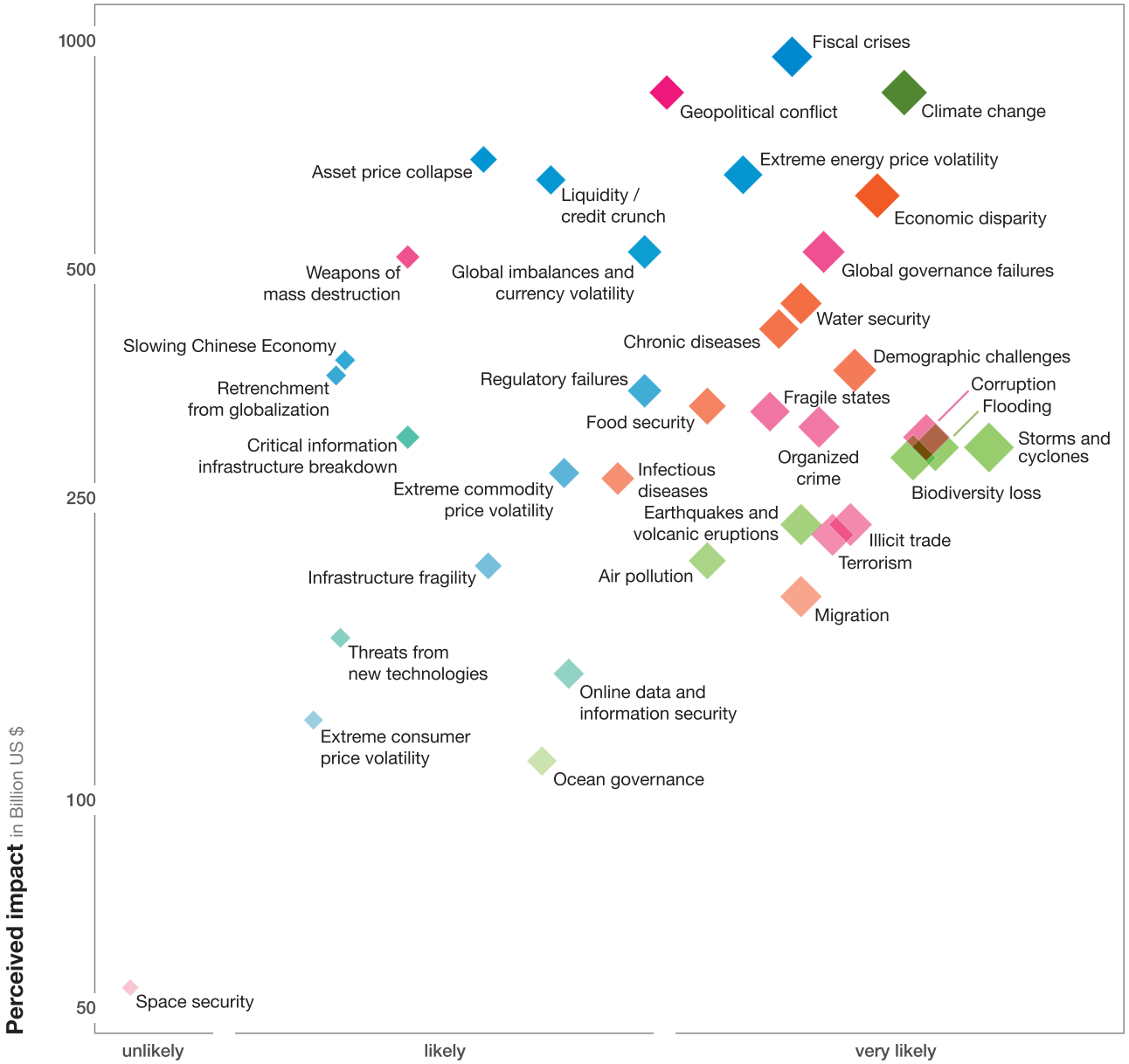
Figure 1 | Global Risks Landscape 2011: Perception data from the World Economic Forum's Global Risks Survey



Perceived likelihood to occur in the next ten years

Higher perceived **likelihood**

Higher perceived **impact**

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
Retrenchment from globalization
Slowing Chinese economy (<6%)

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

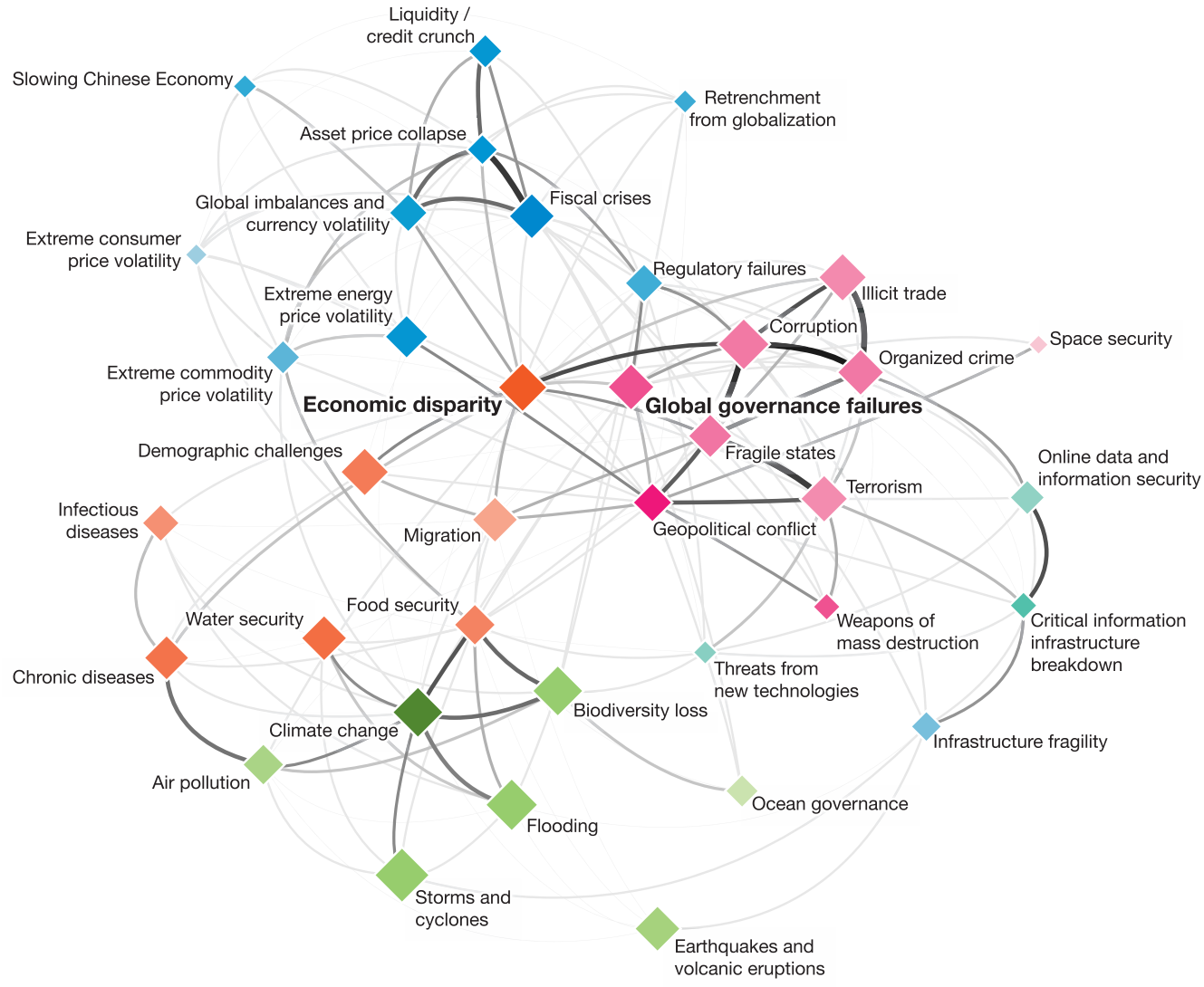
Geopolitical Risks

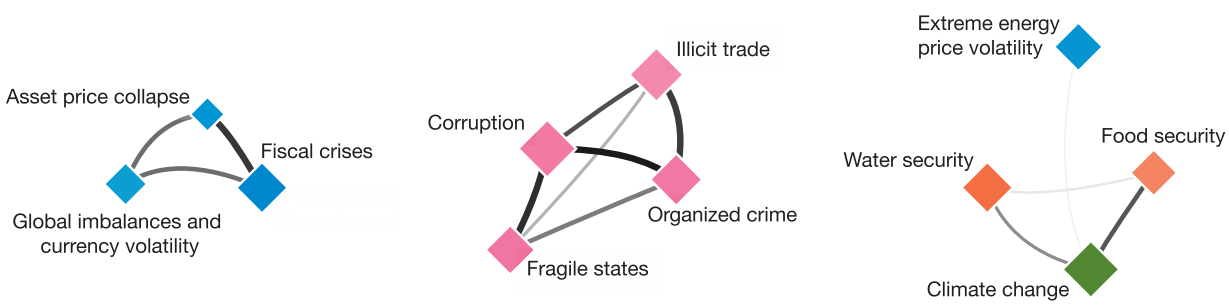
Corruption
Fragile states
Geopolitical conflict
Global governance failures
Illicit trade
Organized crime
Space security
Terrorism
Weapons of mass destruction

Technological Risks

Critical information infrastructure breakdown
Online data and information security
Threats from new technologies

Figure 2 | Risks Interconnection Map (RIM) 2011





The macro–economic imbalances nexus

The illegal economy nexus

The water–food–energy nexus

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Preface

Since 2006 the World Economic Forum's Global Risks report has provided a unique and timely analysis of the risks that are shaping the global environment. Underscored by an unprecedented pace of change, stakeholders from across business, government and civil society face a new imperative in understanding and managing emerging risks.

Global Risks 2011, Sixth Edition provides a high-level overview of 37 selected global risks as seen by members of the World Economic Forum's Global Agenda Councils and supported by a survey of 580 leaders and decision-makers around the world. The report also benefits from the expertise and thought leadership of the World Economic Forum's Global Risk Partners: Marsh & McLennan Companies, Swiss Reinsurance Company, Wharton Center for Risk Management, University of Pennsylvania, and Zurich Financial Services.

This report aims to enhance understanding of how a comprehensive set of global risks are evolving, how their interaction impacts a variety of stakeholders, and what trade-offs are involved in managing them. *Global Risks 2011, Sixth Edition* is a useful tool for policy-makers, CEOs, senior executives and thought leaders around the world. It aims to equip institutions to understand and respond to global risks and to embrace change as a source of innovation.

Most importantly, I hope that focusing on the critical connections between key global risks, stakeholders and decision-makers will inspire all to engage collectively in efforts to improve the global system's overall resilience.

At the World Economic Forum Annual Meeting 2011 in Davos-Klosters, the Forum will go beyond its current global risk work in launching the Risk Response Network (RRN). The RRN will build on the understanding embodied in *Global Risks 2011, Sixth Edition* to provide a platform for our Partners and constituents to collaborate in multistakeholder efforts to shape a more secure, innovative and resilient future.

I hope you find the report both informative and provocative.

Klaus Schwab
Founder and Executive Chairman
World Economic Forum

The World Economic Forum's Risk Response Network

Global Risks 2011, Sixth Edition is a flagship product of the World Economic Forum's new Risk Response Network (RRN).

The RRN is a unique platform for global decision-makers to better understand, manage and respond to complex and interdependent risks. It will bring a rigorous approach to understanding the complexity of risks that face corporate, government and civil society leaders, and will provide tools enabling them to better mitigate risks and capture associated opportunities. It will combine:

- **The most compelling insights**, drawn from the World Economic Forum's communities and contributors, including active expert groups such as our Network of Global Agenda Councils and a formal network of the world's top universities and private sector content providers;
- **The most relevant global decision-makers**, brought together through a community of Risk Officers from top corporations, governments and international organizations;
- **The most suitable tools and services**, including analytic tools and risk management processes to enable decision-makers to better understand key risks in depth and in context, to respond to them proactively and mobilize quickly and efficiently in times of crisis.

This report lays the foundations for the RRN by highlighting three ways for leaders to improve their response to complex and interdependent risks:

- **Proactively address the causes, rather than the symptoms, of global risk**, identifying effective points of intervention in underlying structures and systems – in particular with respect to global governance failures and economic disparities;
- **Devise coordinated response strategies** to address the existence of difficult trade-offs and the threat of unintended consequences caused in part by increased interconnectedness;
- **Take a longer-term approach to assessment and response**, particularly when seeking to manage global risks that emerge over decades rather than months or years.

The RRN will build on these insights over the coming months by launching a series of initiatives and workstreams focused on a variety of global risks highlighted in this Report. We hope that you will find *Global Risks 2011, Sixth Edition* to be thought-provoking. But, more importantly, we hope many of you will join the World Economic Forum's initiative to collectively better understand and respond to the new world of risk.

Executive summary

The world is in no position to face major, new shocks. The financial crisis has reduced global economic resilience, while increasing geopolitical tension and heightened social concerns suggest that both governments and societies are less able than ever to cope with global challenges. Yet, as this report shows, we face ever-greater concerns regarding global risks, the prospect of rapid contagion through increasingly connected systems and the threat of disastrous impacts.

In this context, *Global Risks 2011, Sixth Edition* reveals insights stemming from an unparalleled effort on the part of the World Economic Forum to analyse the global risk landscape in the coming decade.[1]

Two cross-cutting global risks

Two risks are especially significant given their high degrees of impact and interconnectedness. **Economic disparity**[2] and **global governance**[3] failures both influence the evolution of many other global risks and inhibit our capacity to respond effectively to them.

In this way, the global risk context in 2011 is defined by a 21st century paradox: as the world grows together, it is also growing apart.

Globalization has generated sustained economic growth for a generation. It has shrunk and reshaped the world, making it far more interconnected and interdependent. But the benefits of globalization seem unevenly spread – a minority is seen to have harvested a disproportionate amount of the fruits. Although growth of the new champions is rebalancing economic power between countries, there is evidence that economic disparity within countries is growing.

Issues of economic disparity and equity at both the national and the international levels are becoming increasingly important. Politically, there are signs of resurgent nationalism and populism as well as social fragmentation. There is also a growing divergence of opinion between countries on how to promote sustainable, inclusive growth.

To meet these challenges, improved global governance is essential. But this is another 21st century paradox: the conditions that make improved global governance so crucial – divergent interests, conflicting incentives and differing norms and values – are also the ones that make its realization so difficult, complex and messy. As a result, we see failures such as the Doha Development Round of the World Trade Organization (WTO) and the lack of international agreement at the Copenhagen Conference on climate change. The G20 is seen as the most hopeful development in global governance but its efficiency in this regard has not been proven.

[1]For more information see Appendix 2.
[2]Wealth and income disparities, both within countries and between countries
[3]Weak or inadequate global institutions, agreements or networks

Executive summary

Three important risks in focus

Beyond these two cross-cutting global risks, three important clusters of risks have emerged in this year's analysis:

The "macroeconomic imbalances" nexus: A cluster of economic risks including macroeconomic imbalances and currency volatility, fiscal crises and asset price collapse arise from the tension between the increasing wealth and influence of emerging economies and high levels of debt in advanced economies. Savings and trade imbalances within and between countries are increasingly unsustainable while unfunded liabilities create extreme long-term pressure on fiscal positions. One way out of these imbalances would be coordinated global action but this is challenging given the conflicting interests of different states.

The "illegal economy" nexus: This nexus examines a cluster of risks including state fragility, illicit trade, organized crime and corruption. A networked world, governance failures and economic disparity create opportunities for such illegal activities to flourish. In 2009, the value of illicit trade around the globe was estimated at US $1.3 trillion and growing. These risks, while creating huge costs for legitimate economic activities, also weaken states, threatening development opportunities, undermining the rule of law and keeping countries trapped in cycles of poverty and instability. International cooperation – both on the supply side and on the demand side – is urgently needed.

The "water-food-energy" nexus: A rapidly rising global population and growing prosperity are putting unsustainable pressures on resources. Demand for water, food and energy is expected to rise by 30-50% in the next two decades, while economic disparities incentivize short-term responses in production and consumption that undermine long-term sustainability. Shortages could cause social and political instability, geopolitical conflict and irreparable environmental damage. Any strategy that focuses on one part of the water-food-energy nexus without considering its interconnections risks serious unintended consequences.

Five risks to watch

Five risks have been designated as "risks to watch", as survey respondents assessed them with high levels of variance and low levels of confidence while experts[4] consider they may have severe, unexpected or underappreciated consequences:

- **Cyber-security** issues ranging from the growing prevalence of cyber theft to the little-understood possibility of all-out cyber warfare
- **Demographic challenges** adding to fiscal pressures in advanced economies and creating severe risks to social stability in emerging economies
- **Resource security** issues causing extreme volatility and sustained increases over the long run in energy and commodity prices, if supply is no longer able to keep up with demand
- **Retrenchment from globalization** through populist responses to economic disparities, if emerging economies do not take up a leadership role
- **Weapons of mass destruction**, especially the possibility of renewed nuclear proliferation between states

Effective risk response is not only about proactively reducing the downsides associated with global risks; it is also about seizing the opportunities for innovation and growth that may arise. Throughout this report, a series of risk response strategies are explored that can help stakeholders achieve both goals.

[4]Unless otherwise noted, in this report "experts" refers to the Global Agenda Council members and other contributors who are acknowledged at the end of this report. They provided input through various means, including participating in the Global Risks Survey, taking part in workshops, reviewing the report and providing individual advice and counsel.

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Cross-cutting global risks

Economic disparity and global governance failures

Cross-cutting global risks: Economic disparity and global governance failures

Economic disparity and **global governance** failures emerged from the Forum's Global Risks Survey 2010 as the two most highly connected risks and were perceived as both very likely and of high impact (see Figure 1, Global Risks Landscape, and Figure 2, Risks Interconnection Map, at the beginning of the report). They influence the context in which global risks evolve and occur in two critical ways: first, they can exacerbate both the likelihood and impact of other risks; second, they can inhibit effective risk response.

Economic disparity and social fragmentation

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

The Global Risks Survey identified **economic disparity** as one of the most important risks in the coming decade. The Forum's Global Agenda Council survey also supports this finding, having ranked economic disparity as the second most important trend in terms of impact on the business community and as the most underestimated trend in terms of its impact.

Economic disparity is tightly interconnected with corruption, demographic challenges, fragile states, global imbalances and asset-price collapse. Respondents perceived economic disparity as influencing chronic diseases, infectious diseases, illicit trade, migration, food (in)security, terrorism and weapons of mass destruction. They saw economic disparity as influenced by climate-change related risks and global governance failures. The data indicate that economic disparity and geopolitical conflict reinforce one another.

Economic disparity plays out between and within countries. Ease of communication has made inequalities between countries more visible. Despite robust growth in some emerging economies, many countries remain trapped in a cycle of poverty with tremendous implications ranging from lack of access to basic social infrastructure such as good education, healthcare and sanitation to political fragility of the state.

Stakeholders also expressed concerns over evidence of rising economic disparity within countries, in advanced and emerging economies alike. Economic analysis by the OECD and others suggests that real income growth of the top income quintiles of the populations in Finland, Sweden, the United Kingdom, Germany, Italy, and the USA was twice as large as that of the bottom quintiles between the mid-1980s to mid-2000s.[5] Income inequality as measured by the Gini Index over the past decade has also increased rapidly in emerging economies such as India, China, or Indonesia. While such studies are subject to methodological criticisms and there is disagreement over the findings, the risk of rising economic disparity, even in terms of perception alone, is concerning.

Many factors may have contributed to this trend within countries, including the erosion of employment culture, the decline of organized labour, and failures of education systems to keep pace with the increasing demands of the workplace.

Economic disparities are also seen as contributing to a broader process of global ***social fragmentation***. Globalization has led to different groups within countries having divergent economic interests, undermining a sense of broader national solidarity. At the same time, transnational associations are becoming more important in individual and group identity, enabled by the internationalization of media and communication. Traditional forms of association have been eroded. Trust in institutions seems to have dropped.

In part, it may be that vertically-integrated national societies are being replaced by more fluid, transnational societies. This naturally offers a range of opportunities for cross-cultural communication and community-forming unhindered by geography. However, it also creates tensions within countries that lead to global risks, and undermines governments' political capacity to respond to local manifestations of those risks.

[5] *OECD (2008), Growing Unequal? Income Distribution and Poverty in OECD Countries*

Global governance failures

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

While risks are increasingly globalized and interconnected, global governance capacities are highly fragmented. **Global governance failures** create and exacerbate systemic global risks, Survey results showed strong interconnections between global governance failures and regulatory failures, corruption and economic disparity, with retrenchment from globalization and global governance failures being seen as mutually reinforcing.

Global governance failures cited by experts include: UN climate change negotiations; the uncompleted Doha Development Round of trade negotiations; lack of progress on some of the Millennium Development Goals; the stalling of United Nations' Security Council reform; and challenges to frameworks designed to prevent the proliferation of the capability of nuclear weapons. There is a growing sense of paralysis in responding to global challenges. The Washington Consensus is no longer accepted as the baseline model for economic development, but neither has it been replaced by an alternative set of unified values.

The United States' National Intelligence Council and the European Union's Institute for Security Studies recently concluded that current governance frameworks will be unable to keep pace with looming global challenges unless extensive reforms are implemented. Increasingly, emerging economies feel that unfairly they have insufficient influence in international institutions as they are currently designed. Yet there is uncertainty over the ability and willingness of rising powers to shoulder a greater share of global responsibilities, as well as reluctance on the part of established powers to recognize the limits of their own power.

It is uncertain whether global governance will muddle along with an increasingly ill-fitting institutional framework, whether we will find the capacity and will to embrace more agile structures enabled by global networks and new forms of collaboration, or whether the idea of coordinated global governance will be discarded entirely.

Effective global governance is also held back by ineffective decision-making structures at the national level. Arguably, technological and social shifts have weakened the ability of leaders to implement internationally agreed commitments which are unpalatable in the short-term, as the cost of mobilizing interest groups has fallen. The difficulties in achieving an international climate change agreement, as well as resistance to internationally coordinated macroeconomic policy measures, are cases in point.

A counterbalance would be a well-informed and well-mobilized global public opinion sharing norms and values of global citizenship, but this is not yet fully developed.

Recognizing the importance of global governance failures, the World Economic Forum in 2009 launched the **Global Redesign Initiative**. Its purpose has been to stimulate a strategic thought process among all stakeholders about ways in which international institutions and arrangements should and could be adapted to contemporary challenges.

A series of specific proposals on how some of the gaps and failures in international cooperation might begin to be addressed was presented for initial discussion with senior representatives of about 50 governments and 20 international organizations at a special summit in Doha, Qatar, on 30-31 May 2010. The proposals are also available at: http://www.weforum.org/globalredesign

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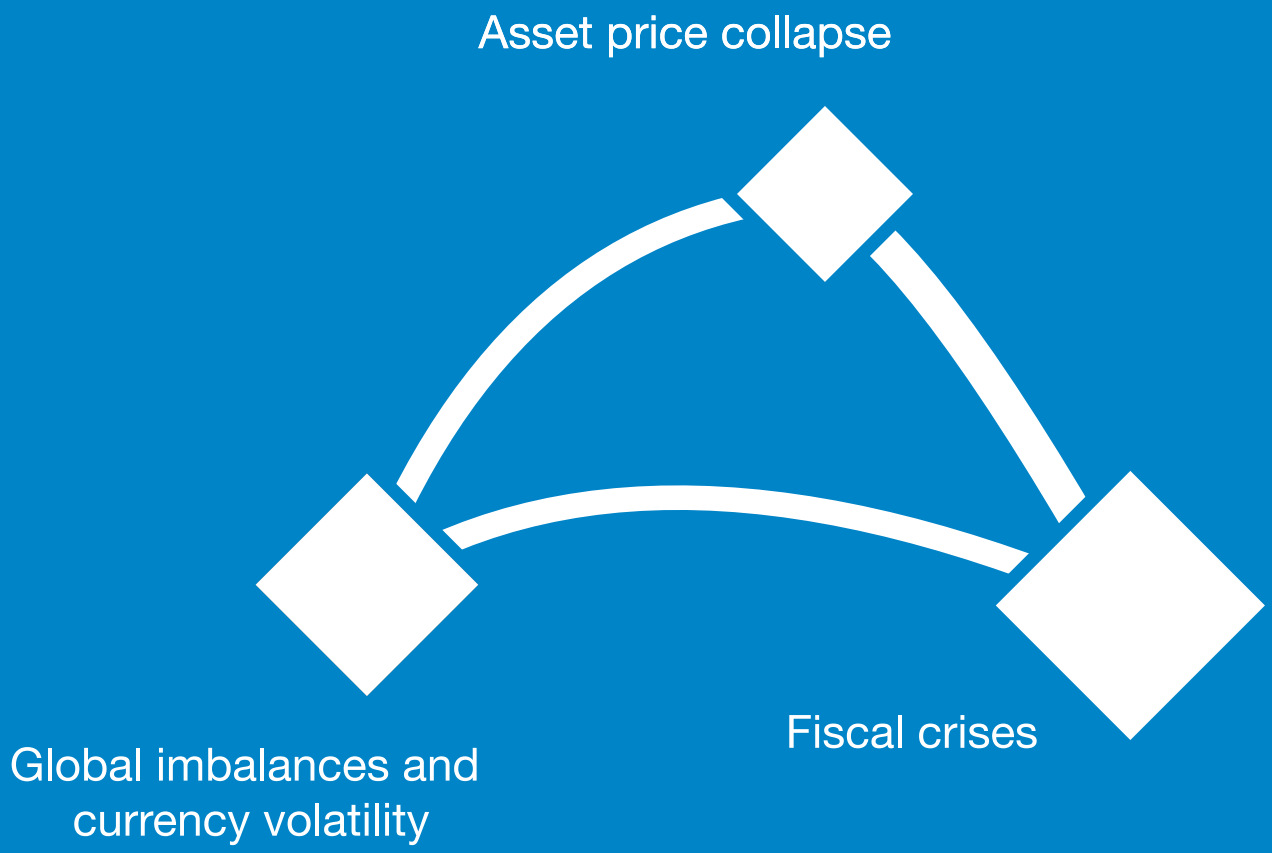
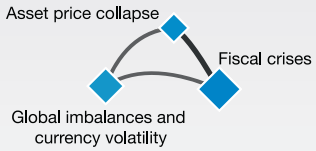
Risks in focus 1

The macroeconomic imbalances nexus



Risks in focus 1: The macroeconomic imbalances nexus



Risk description and impacts

This cluster of three economic risks – **global imbalances and currency volatility, fiscal crises** and **asset price collapse** – is characterized by both internal imbalances (within countries) and external imbalances (between countries).

Internal imbalances are produced by many factors, including government policies and private sector behavior and are influenced by the stage of economic development. Fiscal imbalances in advanced economies have widened because of government profligacy. They were exacerbated by the impact of the financial crisis. First, many governments were forced to set aside large packages to bailout failing banks and stabilize the financial system. Second, and more importantly, many governments provided large fiscal stimuli to mitigate the recessionary impact of the crisis.

The combination of bailout and stimulus packages resulted in burgeoning deficits and expanding debt-to-GDP ratios, particularly in advanced economies. Achieving fiscal consolidation while avoiding hampering the fragile recovery is a short-term challenge. However in the long-term, a key fiscal challenge will be financing the unfunded liabilities of current and future generations (see discussion below and Risk to Watch *Demographic Challenges*).

Related to this point, external imbalances between countries are also of concern. At the heart of global imbalances is a mismatch between saving and investment. Deficit countries do not save enough relative to their investments, and surplus countries do not invest enough given their high savings. In principle, external imbalances are not bad. Capital will tend to flow to the most profitable use; in a globalized system, that includes cross-border capital flows. As long as the recipients of such flows put them to productive use (i.e. as long as the resulting investments generate revenue that is high enough to serve and amortize the debt incurred) no major problem arises.[6] External imbalances become a problem if they contribute to an unsustainable accumulation of debt or, for countries that actively control their exchange rates, if they lead to an unsustainable accumulation of foreign reserves.

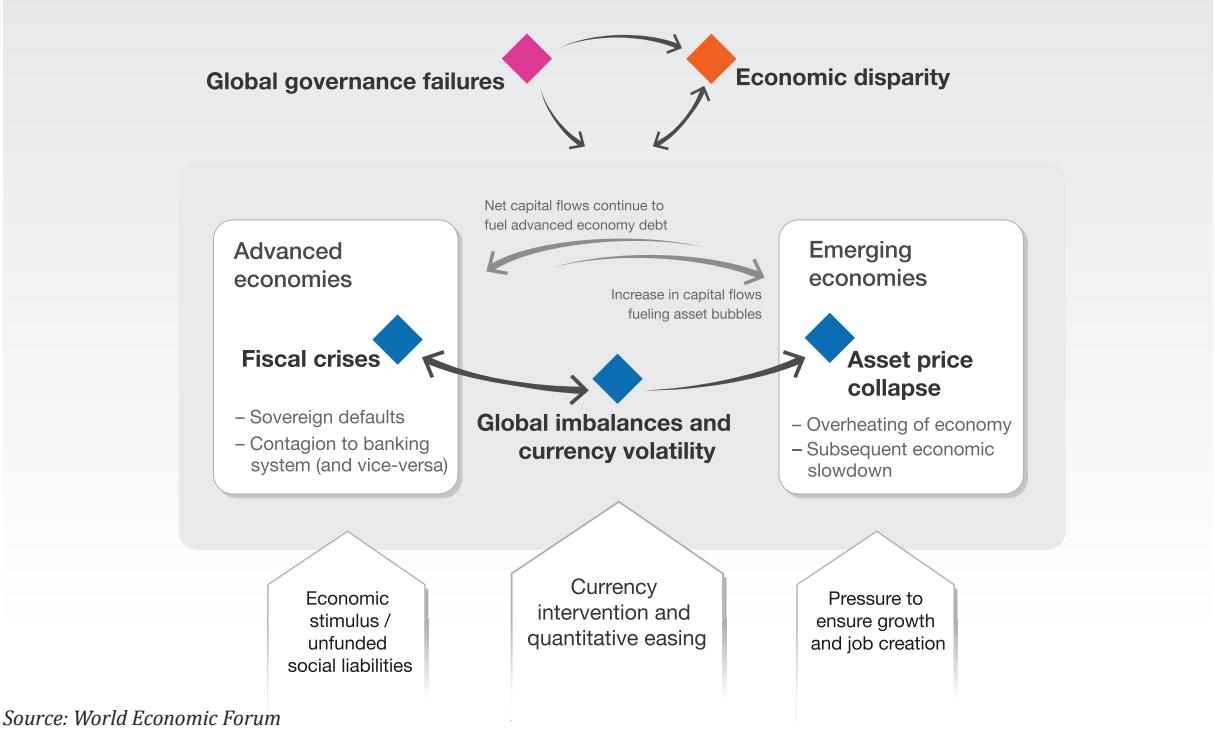
These imbalances lead to two primary risks. First, they lead to slow growth, increasing accumulation of debt and fiscal pressures create risks of sovereign defaults in certain advanced economies which could also affect banking systems worldwide (and vice-versa). Second, such weakness creates the risk of excessive capital flows to emerging markets, increasing the bubble risk and potentially leading to asset price collapse. While global imbalances will continue to imply a net flow of capital from surplus to deficit countries, these risks arise when increases in gross flows of capital from advanced to emerging economies are not matched by the commensurate ability of economies to absorb such flows productively.

Figure 3 shows how these risks are linked graphically, and Table 1 provides a non-exhaustive list of the direct and indirect impacts of these risks to stakeholders.

These risks link strongly to other global risks. For example, fiscal pressures in advanced economies will accelerate the ongoing power shift towards Asia, increasing the risk of geopolitical tensions. All three risks could also exacerbate global governance failures as countries resort to zero-sum calculations and short-term, populist solutions.

[6]Some prominent economists, including US Federal Reserve Chairman Ben Bernanke, have argued that global imbalances contributed materially to the recent global financial crisis by lowering the cost of debt and encouraging investors to search for higher yields in riskier assets such as the US housing market.

Figure 3 System diagram for risks associated with the macroeconomic imbalances nexus

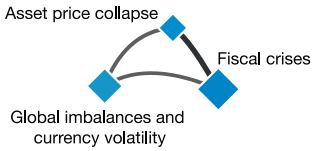


Source: World Economic Forum

Table 1 Impact of risks related to macroeconomic imbalances (non-exhaustive)

Impacts	Direct Impacts	Indirect Impacts
Impact on governments	• Advanced economies: Tough budget decisions in balancing stimulus and austerity; debt defaults, rescheduling or rescue • Emerging economies: Increased need to explore currency adjustment	• Lack of political will to address other global challenges such as climate change
Impact on society / populations	• Advanced economies: Low growth in face of severe austerity; inability to meet entitlement commitments • Emerging economies: Social adjustments through shift towards domestic demand rather than exports (need for redistribution and social security schemes to boost consumption and lower savings)	• Welfare increases in China in the longer term as a result of greater reliance on domestic consumption once rebalancing takes place
Impact on business	• Protectionist (trade and financial) pressures • Threat of collapse of banking system along with government finance; uncertainty	• Realignment of business models as global adjustments and retrenchment from globalization shift demand patterns

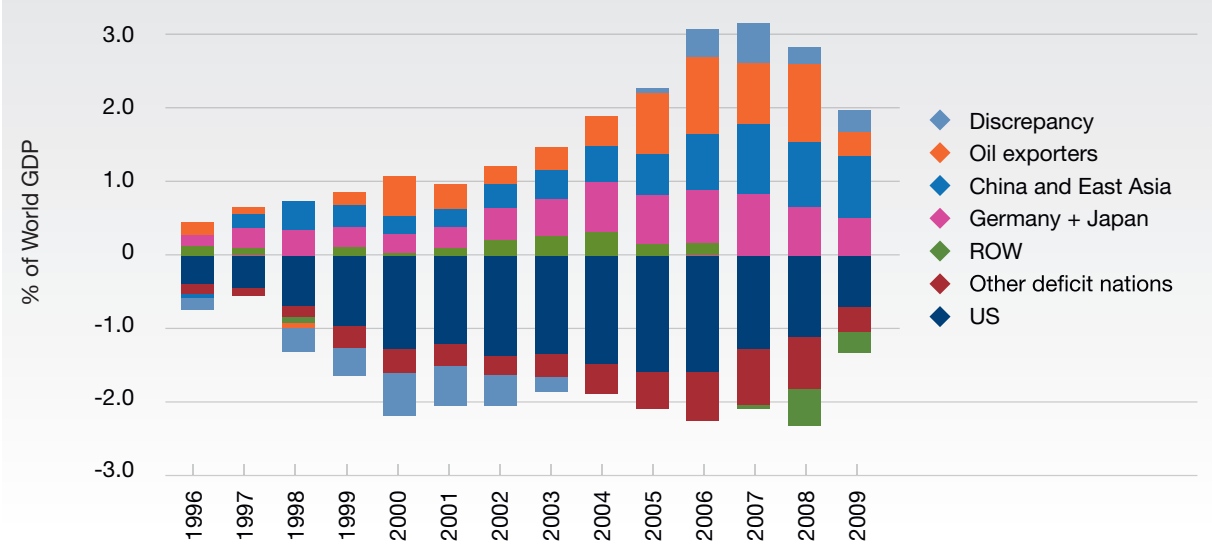
Source: World Economic Forum



Major trends and uncertainties

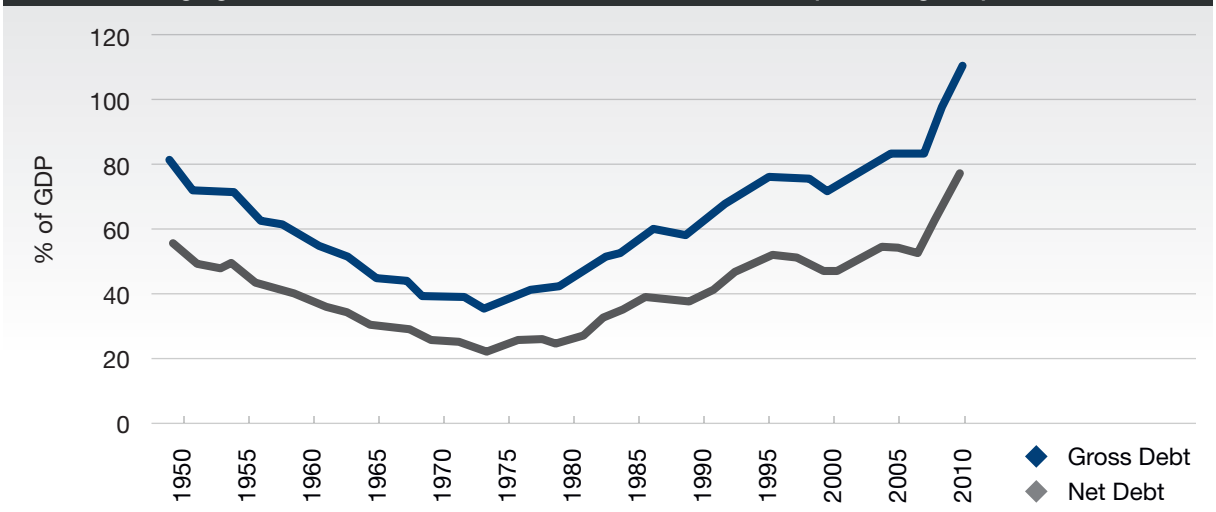
As Figure 4 shows, global imbalances increased significantly between 1996 and 2009. While the financial crisis acted to reduce these somewhat from recent highs, the IMF and others expect them to increase again in the future. Running sustained and large current account deficits requires capital inflows on the part of deficit countries. This implies an increase in public debt when accompanied by fiscal deficits. Figure 5 shows the long-run trends for government debt for G7 economies, including recent increases.

Figure 4 Global current account imbalances 1996-2009



Source: IMF World Economic Forum Outlook, April 2010

Figure 5 Average government debt ratios in G7 Economies,1950-2010 (PPP-weighted)

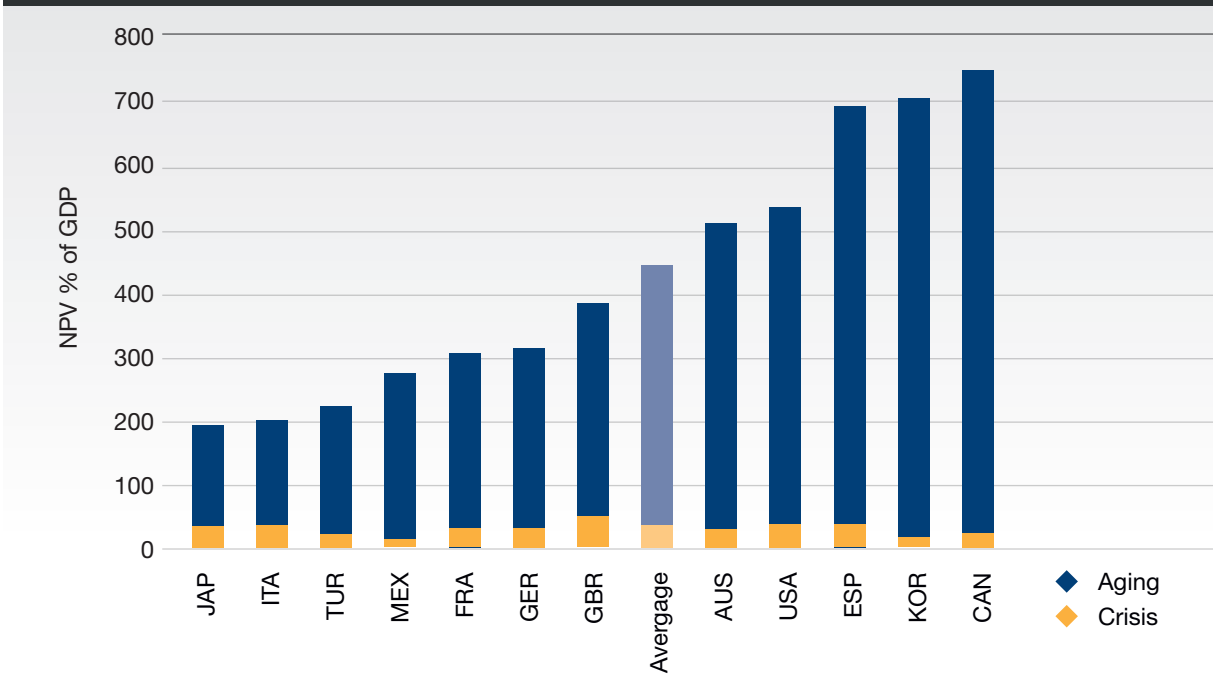


Source: Long-Term Trends in Public Finances in the G-7 Economies, IMF Staff Position Note SPN/10/13, 1 September 2010

There is a high degree of risk and uncertainty regarding how much debt can be borne by the public sector, particularly in advanced economies, before the debt burden seriously impacts economic growth through increasing borrowing costs, politically unacceptable amortization payments, and the subsequent need for fiscal austerity. Based on a sample of 44 countries over a period of 200 years Kenneth Rogoff and Carmen Reinhart have found that there are distinct debt-to-GDP thresholds where debt growth becomes non-linear. Specifically, for public debt held by advanced and emerging economies they found this threshold to be approximately 90%.[7] After this threshold, the burden of debt reduces median GDP growth by roughly one percentage point and average GDP growth by considerably more. Depending on which measures of debt are used, US public debt is either fast approaching or even just past this threshold, while many European countries are well beyond it. Further, if current spending and income trends continue, IMF analysis indicates that net government debt for G7 economies could rapidly increase to unprecedented levels.

However, some economists argue that the standard debt-to-GDP ratios reported widely by official agencies fail to measure a country's true long-term fiscal prospects. A more accurate measure of fiscal outlook is to factor in future liabilities not counted as current debt by calculating the net present value (NPV) of all future obligations relative to the NPV of all future income streams. Figure 6 summarizes such an IMF calculation for selected countries, with the average of the sample representing an NPV of 444% of GDP. While there are large uncertainties in these calculations, such analysis suggests that the impact of uncounted future liabilities is very large, and that the impact of age-related liabilities will dwarf short-term issues such as the cost of fiscal stimulus.

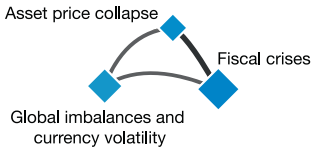
Figure 6 Net present value of the impact on fiscal imbalance deficits of the financial crisis and ageing-related spending for selected countries



Source: Fiscal Implications of the Global Economic and Financial Crisis, IMF Staff Position Note, SPN/09/13, 9 June 2009

[7] *Reinhart, Carmen M. and Kenneth S. Rogoff (2010), "Growth in a Time of Debt", NBER Working Paper No. 15639, January 2010*

Risks in focus 1:
The macroeconomic imbalances nexus



Given the magnitude of uncovered future liabilities, the IMF and Bank of International Settlements analysis implies that without significant adjustments in the medium-term, almost all advanced economies face serious threats to fiscal solvency in the long-run.[8] This suggests that countries will have to embark on major fiscal consolidation exercises, increasing taxes or reducing spending, in order to cover the gap between expected future liabilities and expected future income. Experts argued that there is a distinct risk that politicians will not be able to muster the necessary will to prevent severe financial market turbulences and, ultimately, protect their countries against default.

In light of the pressures of such fiscal and macroeconomic imbalances, discussions with experts highlighted three non-exclusive and negative scenarios whereby this cluster of risks produces severe challenges to the global financial and economic systems and beyond.

In the first scenario, a combination of recessionary pressures and lack of market confidence in the short-term and unfunded social obligations in the long-term could drive both fiscal and banking crises in selected advanced economies. In some countries, crises in public finances will mean a fall in value of government bonds, taking with them the value of assets invested by financial institutions. For countries with a higher proportion of private lending, as the threat of sovereign default rises, capital will flee banks that are seen to ultimately be reliant on public rescues. In either event, the direct impacts of fiscal crises are likely to be compounded by credit and banking crises with adverse systemic implications for the global financial system.

In the second scenario, emerging markets experience an asset price collapse. Loose monetary policy and slow growth in advanced economies, together with high growth in emerging markets, is already attracting increasing gross capital flows to emerging economies and decoupling their stock markets from those of advanced economies. This could result in asset bubbles as rising equity markets leak into real estate prices. Although some emerging markets are trying to restrain these capital inflows, it would be difficult for all emerging markets simultaneously to resist the upward pressure on their currencies. Such asset bubbles, driven as they are by excess liquidity rather than increases in underlying value, could result in severe crashes, damaging both emerging markets and the world economy as a whole.

The final scenario, although regarded by many as unlikely, is a repeat of the "stagflation" of the 1970s in advanced economies. This scenario sees loose monetary policy proving unable to stimulate economic activity, while supply-side restrictions for commodities and energy arise because of geopolitical conflict in the Middle East, or merely an outpacing of global supply by robust growth in the emerging world, leading to a loss of confidence in the ability of central banks in advanced economies and emerging countries to control inflation.

[8]See also IMF Country Report No. 10/248, 12 July 2010, Gokhale J, (2009) "Measuring the Unfunded Obligations of European Countries", National Centre for Policy Analysis and Kotlikoff, L (2010), "A Hidden Fiscal Crisis?", Finance and Development, September 2010

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Levers and trade-offs

Recognizing trade-offs in managing global imbalances

Lack of agreement on how to reduce global imbalances makes it difficult to create joint responsibility at the international level. Diverging interests in the short-term are driven by both political and economic factors. While advanced economies see continuing imbalances as economically unsustainable, emerging economies running trade surpluses fear that adjustments involving currency appreciation would hurt employment in export sectors and potentially threaten social stability.

Political leaders in advanced economies are under increasing pressure to seek short-term solutions – but uncoordinated actions, such as simultaneous currency depreciation by multiple countries, could create new risks. For all countries to attempt to devalue their currencies at the same time would only have negative impacts.

There are three primary levers through which the risks described above could be addressed.

Strengthening global coordination

Although unlikely, experts consider that the G20 and IMF could play a key role in developing a stronger policy framework to discourage the build-up of unsustainable imbalances. Renewed leadership on promoting international exchange rate coordination is particularly important to avoid currency wars.

However, even more powerful would be cooperation on meaningful growth policies that change the incentives for the use of income in both deficit and surplus countries. Both price and income adjustments are required to reduce imbalances, and successful adjustment must include debtor and creditor (or deficit and surplus) countries.

Strengthening financial systems

Weak financial systems are a likely source of risk in both advanced and emerging economies; strengthening regulation and institutions in general is a key point of intervention. Many proposals have been made in this regard, including the Basel III provisions, and implementation is now seen as of most importance. Possibilities for strengthening the global financial system through regulation include:

- Better surveillance of the financial sector, including all systemically relevant players
- Tighter capital and liquidity ratios for all banking institutions (including non-banks), with higher ratios for systemically relevant institutions
- Risk retention for securitization (so-called “skin in the game”)
- Improved transparency and counterparty risk management in “over-the-counter” derivative markets

As outlined in the Forum’s *Financial Development Report 2010*, strengthening financial systems in emerging economies by developing capital markets and improving access to retail financial services could increase both domestic confidence and investment opportunities, both of which could stimulate consumption and help to offset global imbalances as well as reduce the risk of asset bubbles.

Facilitating domestic transitions towards balanced economies

While deficit countries will necessarily be required to take on far-reaching price and cost adjustments to enhance the competitiveness of their exports, surplus countries need to address weaknesses in private domestic consumption. This would not only increase the welfare of surplus societies, but also facilitate the necessary adjustments in deficit countries by raising their exports.

Most importantly, advanced economies urgently need to recognize the rising challenge of fiscal stress caused by unfunded liabilities linked to ageing societies. To shift dependence from government-provided social insurance to private savings for pensions and healthcare services, states will require a combination of careful reform, financial innovation, and private sector solutions to gradually but significantly reduce the burden on public finances and offset the risk of future fiscal crises.

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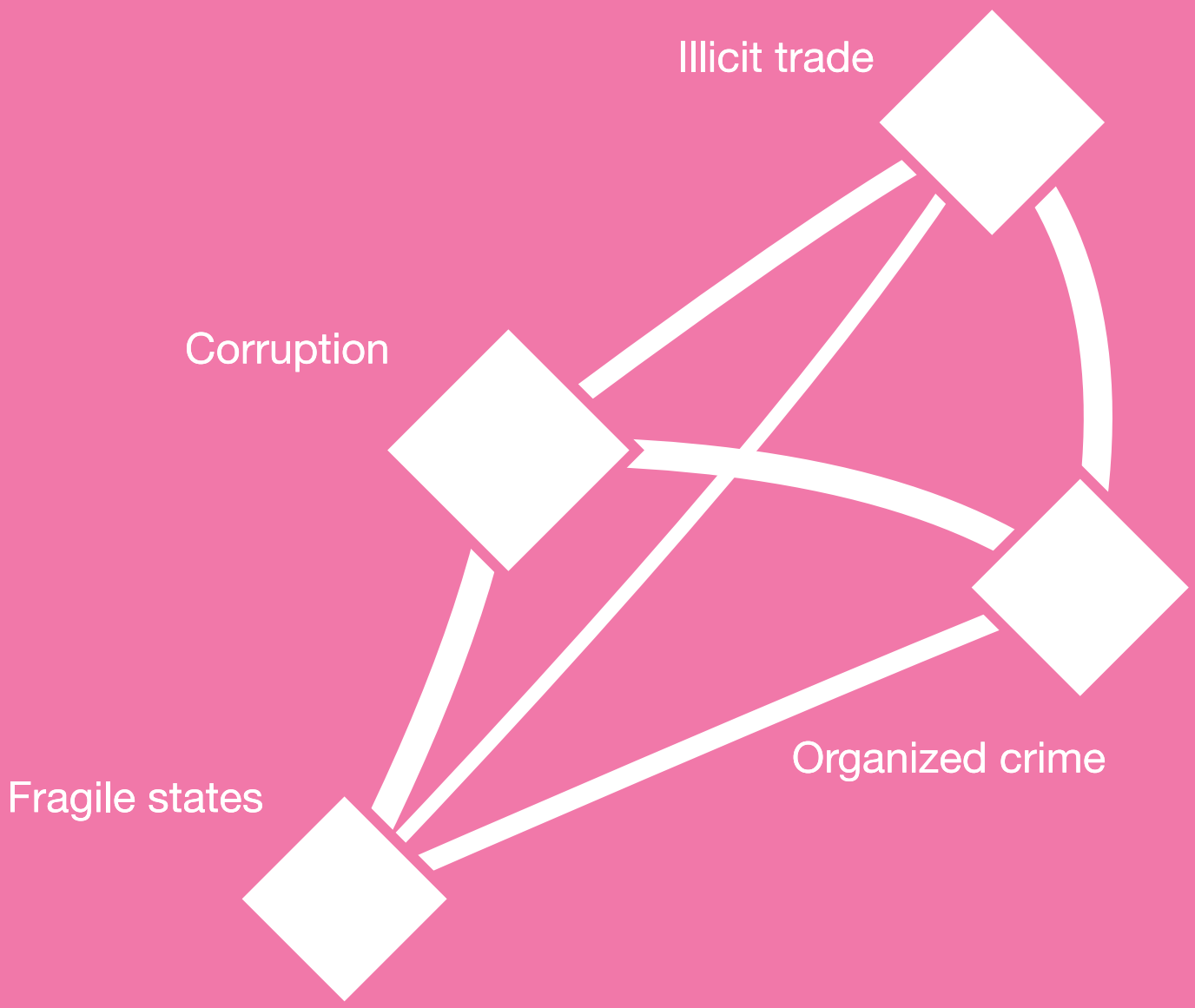
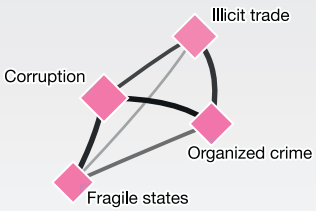
Risks in focus 2

The illegal economy nexus



Risks in focus 2: The illegal economy nexus



Risk description and impacts

Illicit trade, organized crime and **corruption** are chronic risks that are perceived as highly likely to occur and of medium impact. As a highly interconnected nexus representing the illegal economy, however, experts see these risks as of central importance to the global risk landscape. As Figure 7 illustrates, both survey data and experts suggest that this nexus heavily influences three other important global risks – **fragile states, terrorism** and **geopolitical conflict**– which, in turn, have a significant and negative impact on global stability.

There is a feedback loop between this nexus and economic disparity. Economic disparity provides an enabling environment for illicit trade, corruption and organized crime to grow in advanced and emerging economies. In turn, the proceeds reinforce the power of the privileged, while undermining economic development by raising the costs of doing legitimate business, thereby increasing inequalities both within and between countries.

Similarly, while global governance failures have created a growing space for illegal activities, these activities have, in turn, tended to undermine efficient global governance.

Although this nexus of risks is often seen as more pervasive in emerging economies, a significant proportion of the demand for illicit goods is generated in advanced economies. Illegal networks also use the international banking and real estate systems to facilitate their financial management, laundering money and hiding profits from tax authorities.

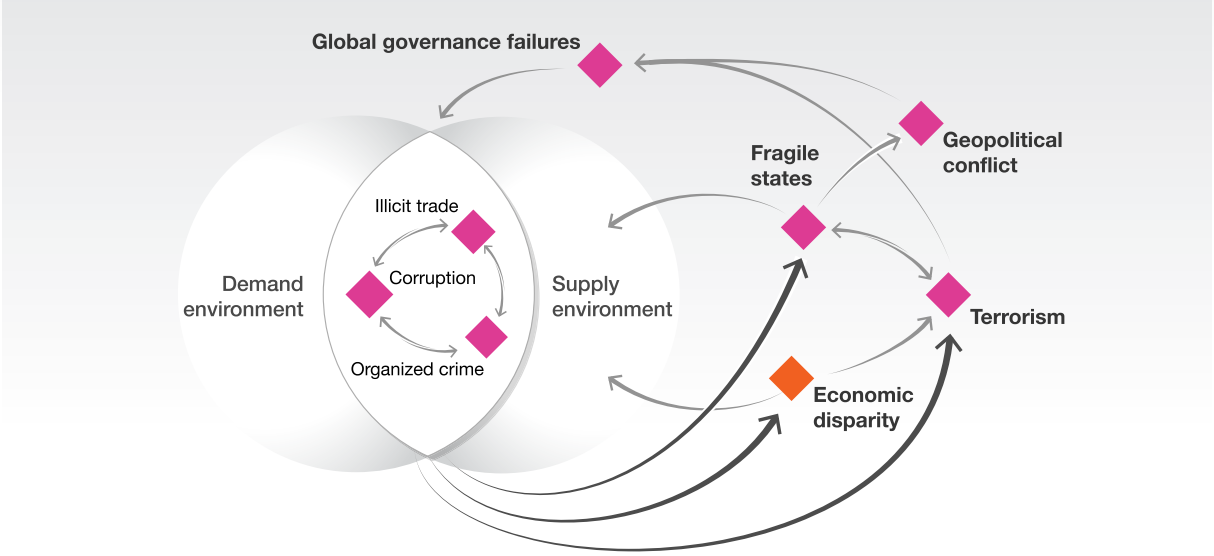
The impacts of this nexus of risks can also spread far beyond emerging economies. For example, illicit trade of intellectual property-protected goods reduces incentives for innovation and investment. Trade in counterfeit medicines risks human health globally. Security risks arising from fragile states – terrorism and geopolitical conflict – may have broad consequences. And as Table 2 below shows, corruption in both emerging and advanced economies is a low-intensity transaction cost that stifles growth, distorts markets and undermines the rule of law.

Table 2 Impact of risks related to the illegal economy nexus (non-exhaustive)

Impacts	Direct Impacts	Indirect Impacts
Impact on governments	• Weakened institutions/undermining and corruption of the rule of law • Erosion of civil service function/capture of state institutions by corruption • Lack of continuity in policies affecting business • Small tax base/loss of revenue • Exodus of capital • Threats to political stability	• Decreased regional investments • Shift of power to disruptive groups
Impact on society / populations	• Erosion of trust in public institutions • Potential for draconian responses that limit economic opportunity (stricter migration policies) • Brain drain / skill depletion from emigration	• Reduction in tourism • Destruction of biosphere through unregulated activities • Criminalization/marginalization of segments of the population
Impact on business	• Increased transaction costs • Lost legitimate sales • Deterred/appropriated investments • Exposure to threats, bribes and reduced security of personnel	• Higher costs of capital • Pressure to participate in corrupt practices through perceived competitive disadvantage

Source: World Economic Forum

Figure 7 System diagram for risks associated with the illegal economy nexus



Source: World Economic Forum

Major trends and uncertainties

The negative effects of corruption, illicit trade, organized crime and fragility are easy to characterize but extremely difficult to quantify. The opaqueness of this nexus of risks has resulted in too little attention and too few resources devoted to mitigating it, and the significance of this nexus of risks has increased considerably in recent years – in part because of global governance failures, as informal networks engage in legal and regulatory arbitrage.

Illicit trade is now thought to represent between 7 and 10% of the global economy – in some countries, illicit trade is the major source of income. Table 3 below is one example of attempts to judge the market size of illicit trade of different goods based on public sources. It must be stressed that these numbers are extremely rough estimates and are the subject of significant debate; the Forum's Global Agenda Council on Illicit Trade is currently developing a methodology to track effectively the global impact of these activities.

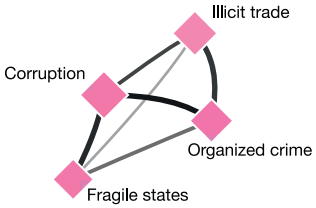
It should be noted that even when flows of illicit goods and criminal activity are small relative to global markets, they can have an outsized effect on fragile states as the real value of such activity can dwarf national salaries and government budgets.

The potential for this nexus of risks to cause contagion has arguably been demonstrated recently in Kyrgyzstan. Members of the Forum's Global Agenda Councils argue that the undermining of state leadership and economic growth by corrupt officials and organized crime contributed significantly to social tensions which erupted in violent conflict in June 2010, causing widespread destruction, hundreds of civilian deaths and the displacement of 400,000 ethnic Uzbeks.

Table 3 Rough estimated market size of illicit goods based on public sources (in USD billion)

Counterfeit pharmaceutical drugs: 200
Prostitution: 190
Marijuana: 140
Counterfeit electronics: 100
Cocaine: 80
Opium and heroin: 60
Web video piracy: 60
Software piracy: 50
Cigarette smuggling: 50
Human trafficking: 30
Environmental crimes and natural resources trade: 20
Logging: 5
Art and cultural artefacts: 5
Small arms: 1

Source: Havocscope and experts



Levers and trade-offs

Recognizing trade-offs in responding to the illegal econnomy nexus

Why has so little progress been made in mitigating this nexus of risks? One reason is that structures which enable illicit activities also benefit many people who would not consider themselves as engaging in criminal behaviour; for example, secrecy jurisdictions allow individuals and corporations to avoid tax. Increasing transparency and reducing illicit trade would undoubtedly involve increased costs and lower profits for many businesses. Similarly, there are large costs in shifting populations who currently rely on producing goods for illicit markets (such as poppy-farmers in Afghanistan) to other, legal activities.

However, if global leaders appreciate the importance of this issue as a collective challenge, a number of measures could be employed.

Improve global coordination with stronger multilateral frameworks

Stronger links between international civil society and legal institutions in advanced economies would assist activists and law enforcement in emerging economies in tracking and halting flows of illicit capital out of fragile states. This was exemplified in the recent ruling by France's Supreme Court allowing a judicial inquiry into complaints of alleged corruption and the removal of government assets filed against three African heads of state.

Reducing variation in regulation and enforcement capacity would inhibit the capacity of illicit activities to shift to the least-vigilant jurisdictions. National laws containing extraterritorial provisions to hold companies liable for corruption, such as the US Foreign Corrupt Practices Act and the United Kingdom Anti-Bribery Bill, offer a potential illustration example of how regulations could be extended and harmonized across jurisdictions.

Increase the transparency of international financial and trade flows

The global financial system allows the profits of illicit trade, organized crime and corruption to be transferred and hidden. This protects participants, deprives governments of tax revenue and shifts tax burdens from capital onto wages and consumption. Ensuring transparency of financial flows would reduce opportunities for money to be laundered or transferred out of emerging economies, as well as enabling more effective law enforcement.

The Task Force on Financial Integrity & Economic Development recommends five steps to achieving greater transparency to ensure that financial flows can be tracked, verified and taxed:

- Requiring beneficial ownership to be a matter of public record, to reveal the true owners of capital
- Requiring multinational companies to undertake country-by-country reporting of all sales, profits and taxes
- Requiring all trade pricing to be conducted under the OECD arms-length principle and with pricing declarations and online data available to customs authorities, to curtail trade mispricing that avoids taxes and duties
- Implementing global automatic tax information exchange for all non-resident individuals, corporations and trusts
- Harmonizing anti-money laundering laws globally to standardize the predicate offences for money laundering, reduce legal arbitrage and ensure enforcement can proceed across different jurisdictions

Transparency in physical movement of goods similarly needs to be increased, to track the movement of products that may constitute illicit trade or be associated with organized crime and corruption. More responsible monitoring of supply chains could have a large impact.

Increased demand side intervention

Experts argue that a greater understanding of the human and economic impact of engaging in illicit trade would reduce demand for illicit goods in advanced economies. This implies a focus on education, ethics training and the construction of new norms.

Similarly, rather than viewing it as an end in itself to reduce illicit trade, organized crime and corruption, this goal could be reframed as a means to support economic growth and human security. Such a reframing could shift priorities and behaviour while driving greater cooperation among institutions.

For certain elements of illicit trade, there may be a case for reducing the profits on offer to organized crime by bringing trade within the framework of the law, as proposed recently in California with the legalization of marijuana.

For the corporate sector, reframing corruption from an issue of compliance to an issue of risk could increase vigilance in monitoring legal or reputational exposure. This requires a more precise assessment of the costs of this nexus to businesses and government tax bases.[9] The Forum is convening private sector actors through its *Partnering Against Corruption Initiative* to clarify the business impacts of corruption and develop collective solutions with government and civil society.

Reducing economic disparity

Economic disparity is an enabling environment for this nexus, as it provides the incentive for individuals to supply and consume the outputs of illicit trade, organized crime and corruption.

Reducing economic disparities is a major challenge; it must be faced at a structural level. An empirically reliable long-term strategy is to invest in universal education, equipping populations with the knowledge and skills to contribute fully to economic activity. Similarly, investments that attempt to correct for structural unemployment should be investigated.

[9] *See for example Transparency International, the International Chamber of Commerce, the UN Global Compact and the World Economic Forum (2008) Clean Business is Good Business: The Business Case against Corruption* http://www3.weforum.org/docs/WEF_PACI_BusinessCaseAgainstCorruption_2008.pdf

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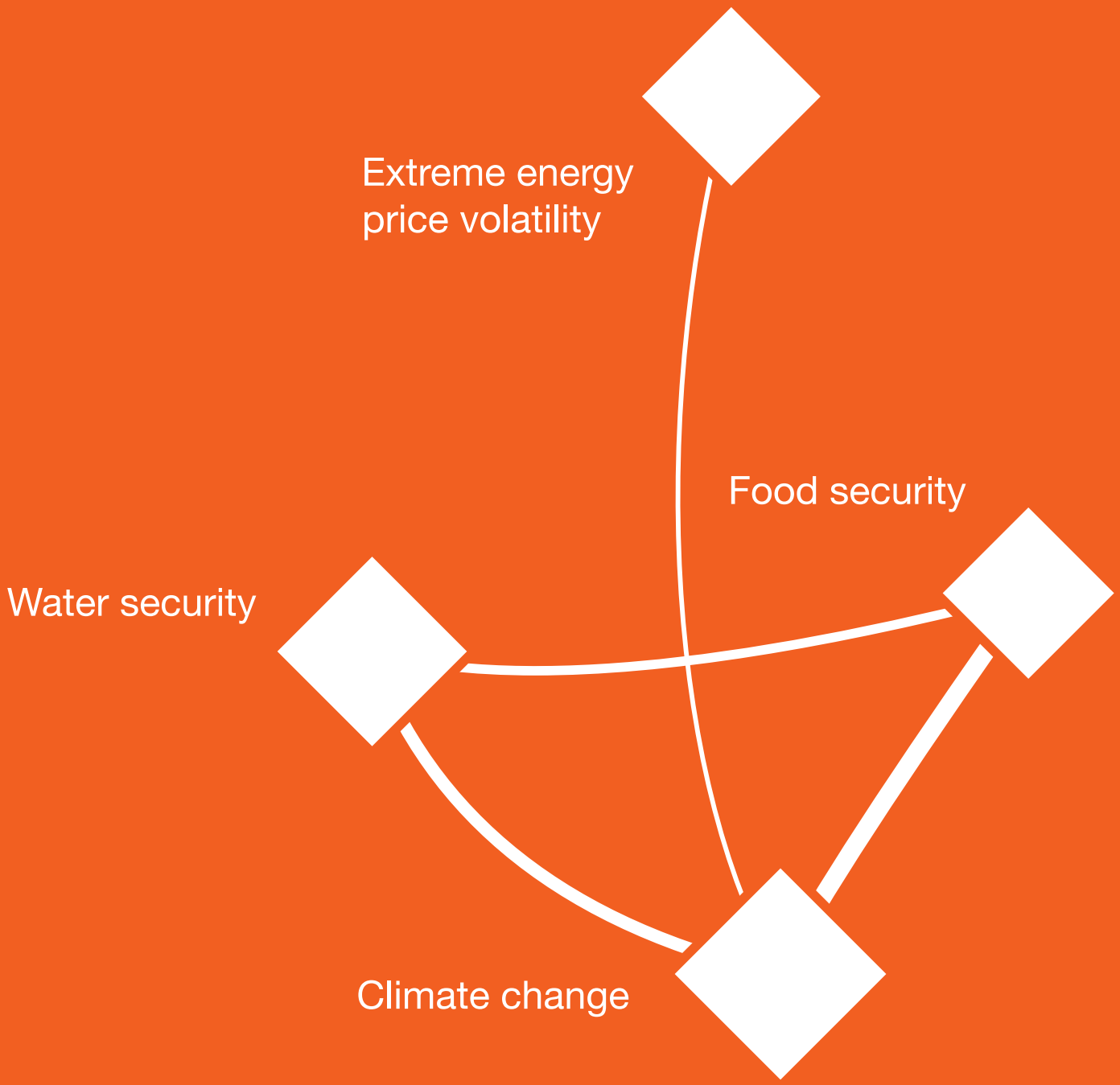
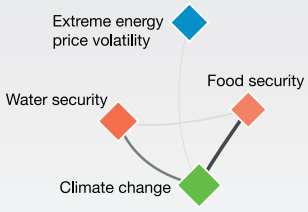
Risks in focus 3

The water-food-energy nexus



Risks in focus 3: The water-food-energy nexus



Risk description and impacts

Water security, food security and energy security are chronic impediments to economic growth and social stability. Figure 8 shows their interrelatedness: food production requires water and energy; water extraction and distribution requires energy; and energy production requires water. Food prices are also highly sensitive to the cost of energy inputs through fertilizers, irrigation, transport and processing.

Economic growth and population growth are common drivers for all three risks, especially as improving living conditions in emerging economies results in more resource-intensive consumption patterns. Environmental pressures also drive resource insecurity – from climate shifts to extreme weather events that alter rainfall and affect crop production.

Governance failures in terms of managing shared resources – such as trans-boundary water and energy sources and food trade agreements – create tensions that can lead to conflict, as seen recently in Yemen. Economic disparity also often exacerbates this nexus of risks as governments and consumers seek short-term, unsustainable solutions to economic hardship such as growing high-value, water-intensive export crops in water-deprived regions.

It is at the local level that most opportunities can be found for improving resource efficiency and managing trade-offs between energy, water and food production. However, at the global and regional levels there are few initiatives to raise awareness, share leading practices and motivate consumers in an integrated approach.

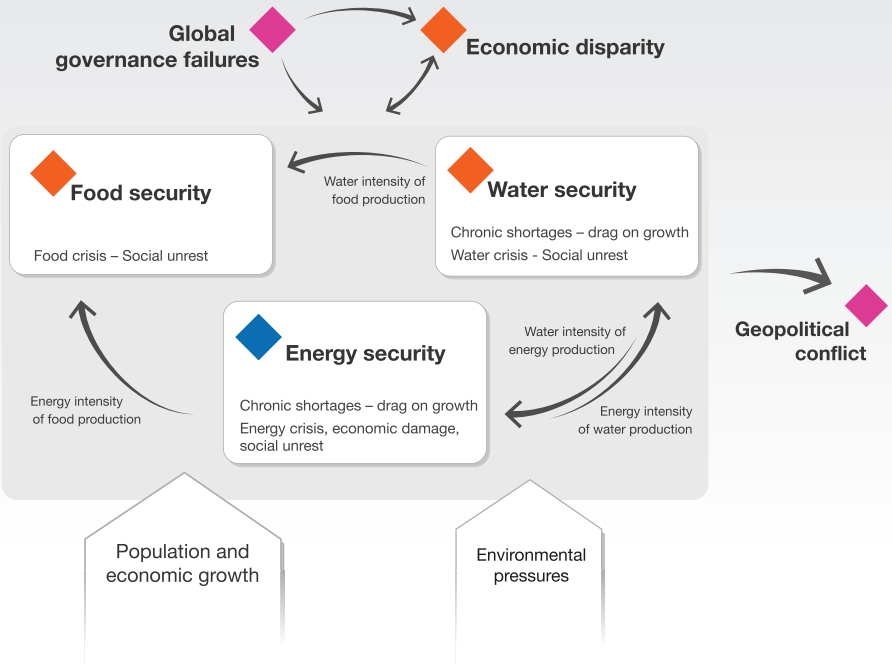
Table 4 shows a non-exhaustive list of some of the direct and indirect impacts stemming from this nexus.

Table 4 Impacts of risks related to the water-food-energy nexus (non-exhaustive)

Impacts	Direct Impacts	Indirect Impacts
Impact on governments	• Stagnation in economic development • Political unrest • Cost of emergency food relief • Significantly reduced agricultural yields • Threats to energy security	• Increased social costs linked to employment and income loss as agriculture is negatively effected • National security risks/conflict over natural resources
Impact on society / populations	• Increased levels of hunger and poverty • Increased environmental degradation • Severe food and water shortages • Social unrest • Food price spikes	• Migration pressures • Irreparably damaged water sources • Loss of livelihoods
Impact on business	• Export constraints • Increased resource prices • Commodity price volatility as shortages ripple through global markets • Energy and water restrictions	• Lost investment opportunities

Source: World Economic Forum

Figure 8 System diagram for risks associated with the water-food-energy nexus



Source: World Economic Forum

Major trends and uncertainties

Agriculture is the dominant water user, consuming more than 70% of total global water demand. Industrially produced meat is especially water-intensive, requiring up to 20,000 litres of water to produce a kilogram, compared to approximately 1,200 litres to produce a kilogram of grain. Both population growth and increasing meat consumption in emerging economies will therefore have a tremendous impact on resource needs.

As Figure 9 shows, over the next 10 years, the world population is expected to rise from the current 6.83 billion to approximately 7.7 billion, with most of the growth in emerging economies. The United Nations Food and Agriculture Organization (FAO) projects a 50% increase in demand for food by 2030, and the International Food Policy Research Institute (IFRI) expects a 30% increase in demand for water, with other estimates rising to over 40%. The International Energy Agency (IEA) forecasts that the world economy will demand at least 40% more energy by 2030; producing this energy will draw heavily on freshwater resources. For such increased demand for water, food and energy to be realized, significant and perhaps radical changes in water use will be required as well as new sources for food and energy production exploited.

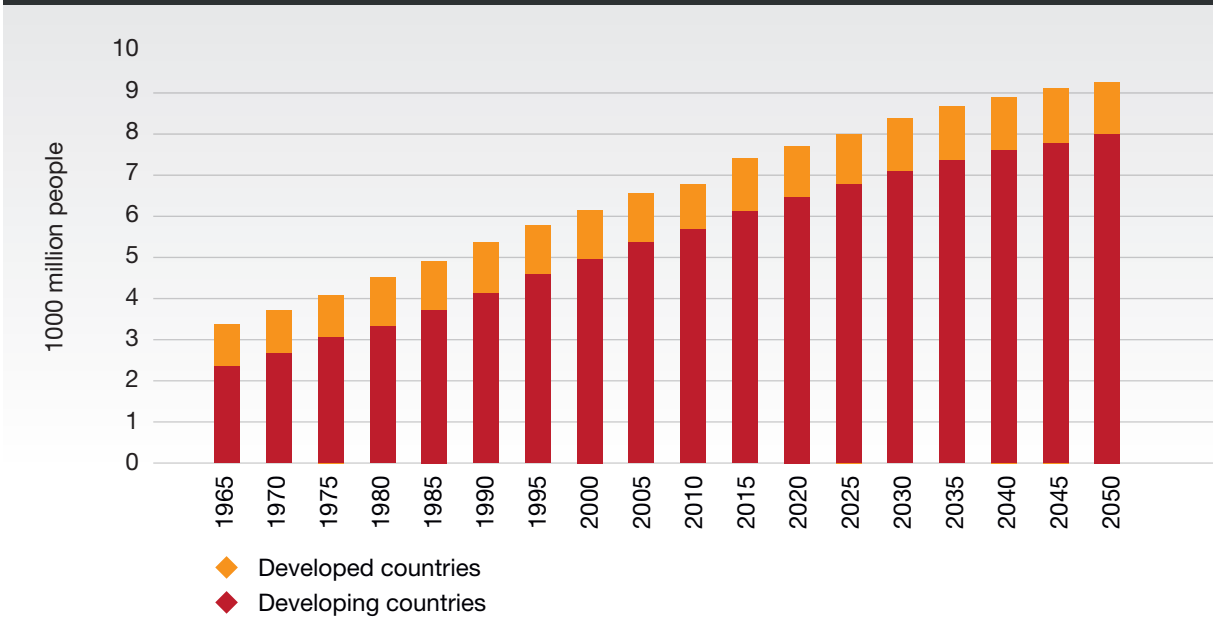
For food production, supply-related challenges may limit the ability of farmers to meet growth in demand. Already, major grain-producing areas – in China, India and the United States, for example – depend on unsustainable mining of groundwater. In some regions, such as North Africa and Australia, climate-related changes of precipitation have already critically reduced the levels of freshwater supply. In northeast China, one of the country's main grain-producing regions, climate change could increase drought losses by over 50% by 2030.[10]

Climate change is likely to be exacerbated by meeting the growing demand for energy. Over 75% of the global increase in energy use from 2007-2030 is expected to be met through fossil fuels, especially coal, and an estimated 77% of the power stations required to meet demand are yet to be built.

[10] *The Economics of Climate Adaptation (ECA) Working Group (2009) Shaping Climate Resilient Development: A Framework for Decision-Making*

Risks in focus 3:
The water-food-energy nexus

Figure 9 **World Population 1960-2050**



Source: World Economic Forum Water Initiative, edited by D. Waughray (2010). Water Security: The Water-Food-Energy-Climate Nexus, based on United Nations Population Division, UN-DESA, UN Revision 2008

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Levers and trade-offs

Recognizing trade-offs in the water-food-energy nexus

Tough trade-offs will increasingly be needed between energy, food and water in terms of resource allocation and planning. The key challenge is to incorporate the complex interconnections of this nexus of risks into response strategies that are integrated and take into account the many relevant stakeholders. The Forum is working on such an approach with its innovative initiative WRG Phase 2, run in partnership with the Water Resources Group (*See page 33: The Forum's Water Initiative: Focusing on the Water-Food-Energy Nexus)*.

Unintended consequences abound. For example, because of policy incentives designed to reduce vehicle emissions, by 2030 the IEA predicts that at least 5% of global road transport will be powered by biofuel – over 3.2 million barrels per day. However, producing those fuels could consume between 20-100% of the total quantity of water now used worldwide for agriculture. This is clearly an unsustainable trade-off. Another example is shale gas extraction, which promises access to new reserves of fossil fuels, but is highly water-intensive and may pose a risk to water quality.

Few governments are developing energy policy with a goal of not only enabling economic growth and reducing carbon emissions, but also ensuring water efficiency; the nature of this nexus, however, means pursuing multiple goals will become a necessity. Trade-offs between the three resources, as well as trade-offs between users in the form of resource rationing, will become an increasingly important issue, as will managing these trade-offs through a combination of market mechanisms and regulation.

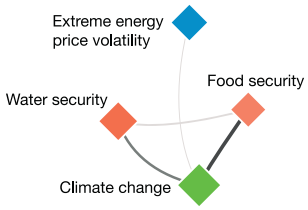
However, beware of false dichotomies. It is not necessary to trade biodiversity for economic growth, for example. Such trade-offs exist primarily when policy-makers and resource-users act in a short-term, reactive and hurried fashion. To avoid these unnecessary trade-offs and tackle the necessary ones, the Forum has identified a number of response strategies for further exploration.

Integrated and multistakeholder resource planning

The challenges associated with managing trade-offs of food, energy and water resources rest with governments. Experts argue that meeting those challenges is undermined by the existence of separate administrative structures and policies for agriculture, water, energy and urban planning. The development of high-level commissions that cut across government departments, stakeholders and country representatives could improve public-sector-led governance, planning and information flows.

A recent example of a regionally-focused, integrated approach is the Mekong River Commission's *Strategic Environmental Assessment*. This document examines the cumulative risks and opportunities of hydropower projects in five separate countries. It explicitly considers the links between energy generation, water availability and food production, including second-and third-order impacts to ecosystems, social systems and economic development over a 15 year perspective.

The Forum's New Vision for Agriculture initiative, which is now being piloted through national-level partnerships in Tanzania and Vietnam, has developed a framework for multi-stakeholder collaboration to accelerate sustainable agricultural growth. In this model, the government's national agriculture strategy provides the framework for focusing expertise and investments from diverse stakeholders to accelerate sustainable agricultural growth, thus multiplying efforts and reducing risk for all involved.



Regionally-focused infrastructure development

Multistakeholder coordination on regional infrastructure investment could significantly enhance resilience with regard to food, water and energy security. For example, by investing in regional electricity grids, Gulf Cooperation Council countries increased the reliability of their power supply. Experience shows that countries with adequate levels of infrastructure, coupled with institutions which ensure that the scarcity value of water is reflected, can be extraordinarily adaptive.[11]

Market-led resource pricing

Resource pricing has a large role to play in managing demand for food, water and energy. Prices are kept artificially low by government subsidies or other regulation in many countries, thereby increasing demand. However, even if they were allowed to rise through market mechanisms, prices would not account for many of the negative externalities created by water, food and energy consumption. Both the cost of local impacts (such as the long-run social and environmental costs of resource exploitation) and global impacts (such as contribution to climate change through carbon emissions) should ideally be included in resource pricing. Without accurate pricing to reflect the full cost of resource use, it is likely that unsustainable decisions regarding resource use will continue.

However raising the price of water has significant and negative social impacts in many regions. To account for these, market mechanisms must be managed progressively so as not to endanger social stability by disadvantaging poor consumers; the human cost of higher resource prices should be recognized by stakeholders and solved with careful planning. Further, increased resource prices will inevitably impact economic growth, as higher prices are passed on to consumers. Experts suggest that despite such challenges, efforts to create properly-costed systems are critical to the future sustainability of global prosperity, as the cost of severe shortages because of irreparable damage to water and food sources would far exceed the costs incurred through proactive resource management. In regions such as the Middle East and North Africa, market prices may also attract private investment in infrastructure that can better preserve the scarce resources currently being depleted.

Community-level empowerment and implementation

Experts argued that policies which aim to manage food, energy or water resources are in many cases well-designed; many of the barriers to sustainable resource use relate to implementation. As an example, lack of sanitary facilities impacts water security through the contamination of local water sources. However it may not be enough simply to build sanitation facilities without also addressing social norms on open defecation; to ensure that such facilities are used requires implementing cultural shifts as well infrastructure investment. Overcoming such barriers means engaging, empowering and incentivizing local actors at the community level to ensure that those actually using core resources are also the guardians of their sustainable consumption.

Technological and financial innovation for managing the nexus

Further research and investment in transformative technologies and risk management tools that address the nexus as a whole are needed. Ensuring that such tools are locally appropriate and broadly adopted is key to their success. Many efficiency improvements require new operational management models and access to information. Innovations such as synthetic protein manufacturing, drip irrigation, and hybridization of crops to make them salt resistant could potentially maintain food security while simultaneously achieving water and energy efficiency, but require investment for both development and implementation.

Innovative financial risk management initiatives also look promising, such as the development of “safety net” payments for Vietnamese rice farmers if yields fall below expected levels due to pests, diseases or weather events such as droughts, floods and typhoons. In the past, damages to agriculture due to weather or pests have resulted in losses of up to 5% of Vietnamese GDP; thanks to multi-stakeholder collaboration between agricultural banks, insurers and the national government, this scheme addresses multiple risks to help ensure food security on a national level, protecting the livelihoods of farmers and thus increasing the overall resilience of food production in the country. However, most of these instruments remain focused on a particular target such as yield or weather risk, and as such do not address regional risk management across sectors, or the ultimate risk of food supply. The interconnected nature of the challenge suggests that further work in integrating technical and financial solutions is needed.

[11] In southeast Australia, for example, a 70% reduction in water availability has had big effects on the composition of agriculture, but little impact on the overall economic value of agriculture.

The Forum's Water Initiative:

Focusing on the Water-Food-Energy Nexus

The World Economic Forum has partnered with the Water Resources Group ("WRG") on an innovative initiative under the guidance of the Global Agenda Council on Water Security. This initiative, known as WRG Phase 2, will engage governments who wish to work progressively on a water sector reform strategy; and then provide a supporting public-private approach. The initiative will follow the ACT process – undertaking **Analysis** to help **Convene and build Coalitions** to develop **Transformational** policies, programmes, projects and partnerships – aimed to create "proof points" that such a coordinated platform approach can work. There are two main steps to this process:

- **Step 1: Initial diagnostic**. The initiative will create a comprehensive fact base on the national water supply and demand balance to 2030 and the economic implications of the options available to address any gaps;
- **Step 2: Country-level work**. When invited by the government, the initiative will offer multidisciplinary support through a public-private advisory platform. This will help the government shape and test concepts and governance processes that seek to close identified future water volume gaps; to improve water resource management in a river basin, country or region; and to build this inform national into regional water adaptation planning.

The outcome of the WRG Phase 2 will be a **validated and unique public-private model and a financed global platform** that can support governments who wish to catalyze change in their water sectors.

An example of this initiative in action is the **Forum's ongoing work in Jordan**, supported by the Jordanian Ministry of Planning and International Cooperation, and the Ministry of Water and Irrigation. Step one is underway, involving deep analysis and building cost-curves to understand the gaps between water supply and demand, and developing prioritized recommendations and sector strategies. Step two will build on recent work with the **Jordan Business Alliance on Water**, a collaboration catalysed at the 2009 World Economic Forum on the Middle East and involving the Jordanian government, Jordan Chamber of Industry, American Chamber of Commerce, USAID and GTZ.

A special focus of the initiative is to build awareness and better understanding of the **water-food-energy-climate nexus**. This nexus represents the most important global dimension of the water crisis in terms of managing economic growth and other impacts connected to water scarcity. The **Global Agenda Council on Water Security** is a key supporter of the initiative, and will help the Forum develop deeper and more focused analysis of issues related to the water-food-energy nexus and the associated risks to growth.

The WRG Phase 2 initiative aims to contribute a range of expert briefing documents into the Forum's **Risk Response Network** as well as to relevant Government officials and other stakeholders facing the challenges of the water-food-energy nexus.

For more information on this initiative, please see http://www.weforum.org/water

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Risks to watch

Risks to watch

Some risks in the global risk landscape saw low levels of confidence or strongly varying expert views as to likelihood and impact. For these very reasons, such risks may surprise or overwhelm us, and they have been designated as "risks to watch".

Cyber security

Awareness is growing that the real world is vulnerable to security threats from the virtual world, but the complexity of "cyber security" issues is still not well understood and its risks could be underestimated. Cyber security encompasses **online data and information security** and **critical information infrastructure breakdown**, and ranges from petty online theft by disenfranchised youths to government-led provocations with potentially catastrophic consequences.

Four distinct global risk-related activities stand out:

- **Cyber theft** has become a growing industry with a long tail, particularly in countries where economic disparity has recently been combined with access to global communication technologies. Actors in this field range from entrepreneurial individuals to shell corporations built with the hope of economic gains offset by acceptable risks. Interestingly, some assessments indicate that cyber thieves experience a substantially lower feeling of guilt than is apparent in other criminal activities.
- **Cyber espionage**, whether by the private or public sector, has brought the age-old practice of intelligence-gathering into a new era. Particularly insidious, as has repeatedly been shown in the past two decades, is the use of such techniques not only by countries generally understood as enemies but also by friendly allies.
- **Cyber war** is little understood by the general public and has stirred controversy among civilian and military leaders. While an open war in cyber space is possible, experts indicate that the interplay between cyber war and physical war poses a more likely risk for society, with aggression online not only serving but also potentially provoking conventional attacks.
- **Cyber terrorism** is perhaps even less understood and is fuelling concerns over the openness of the Internet, security and privacy. Many have inferred a high risk of cyber terrorist attacks from terrorist organizations' extensive use of the Internet in recent years for doctrinal, recruitment, and operational communication purposes as well as some occurrences of cyber theft. However, these practices do not in themselves indicate any capacity for large-scale cyber terrorist attacks, and it should be noted that terrorist use of the Internet equally allows law enforcement agencies to gather valuable intelligence.

In addition to these intentional or malevolent risks, a range of risks relate to design flaws in "smart" systems connected to the Internet. Data gathered for one benign purpose may be spread to other networks with unintended consequences, potentially leading to new machine-to-machine threats.

Further contributing to confusion about cyber security's landscape is the constant innovation in each of the above fields and potential new connections among them. Nevertheless, understanding the range of negative consequences is central to managing effective risk response. The pervasiveness of the Internet and importance of related technologies to everyday life and business means that should a major disruption occur, it is likely to have high impact globally.

Demographic challenges and opportunities: population "cluster bombs", global graying and demographic dividends

Demographic change has major implications throughout the world, ranging from political instability in fragile states to enjoyment of a "demographic dividend" in emerging economies to fiscal crises in advanced economies. The most significant changes – which vary considerably by country – involve the rate of population growth, evolution of the age structure and the pace of urbanization. In addition to their effects on national income, shifts in these demographic indicators can have powerful implications for global income, economic inequality, environmental quality, social stability and migration.

Ageing populations in many advanced economies add to fiscal stress as the ratio of the working age population to the elderly falls. Many emerging economies are also experiencing rapidly ageing populations as longevity increases, creating a new set of development challenges in the absence of adequate financing solutions.

For certain developing countries, the population size and growth rate are creating intense and rising pressure on resources, public institutions and social stability. In countries where rapid population growth is combined with weak institutions, lack of economic opportunties, fragile ecosystems, gender inequality and severe urban crowding, the potential for large numbers of disaffected youth engaging in resource-based conflict is a real risk. The Forum's Global Agenda Council on Population Growth has identified 14 countries encompassing 450 million people where high population growth is combined with water and other resource stresses. Such "population cluster bombs" could send myriad shock waves to neighbouring countries and regions.

One example is Niger. With every woman having, on average, upwards of seven children, Niger's population has gone from 3 million in 1960 to 16 million today and is projected to almost quadruple to 58 million in 2050. However, population growth has already outstipped the country's ability to produce food. In the last decade, Niger has experienced several episodes of severe food insecurity and famine,including a famine that affected almost half the population in 2010. In addition, decreasing soil productivity and a high vulnerability to the effects of climate change mean that Niger's ability to further increase food production will become even more strained. Already there are signs of increased inter-ethnic conflict over scarce resources. Implications could be felt more widely, especially since Niger has one of the most important uranium mines in Africa.

Emerging economies that have reduced fertility rates are experiencing a "demographic dividend" as smaller family size means fewer dependents for each working adult and greater investment in each child. Realizing this potenial requires the development of so-called "21st century skills"[12] among young people, and a supporting institutional environment with an emphasis on sectors and policies that improve employment prospects and the operation of financial markets.

As well as national ownership, a strong global voice is needed to help address population issues. To this end, the World Economic Forum's Global Agenda Council on Population Growth has called on the United Nations Population Fund (UNFPA) to reaffirm the world's interest in global and national demographic dynamics, including rates of population growth, to reassert its leadership in the population and development arena, to rebalance its portfolio of activities and to subject its activities to periodic external review.

[12] 21st century skills as viewed by experts include: good living and career skills related to global citizenship, civic responsibility, ethics, environmental awareness, health literacy, cross-cultural sensitivity and leadership. It also includes workforce readiness skills pertaining to creativity, innovation, entrepreneurship, critical thinking, communication, collaboration, ICT and media literacy. In addition, it includes basic skills in math, science, reading, geography and history.

Resource security

Beyond the food-energy-water nexus addressed above, this cluster of risks involves **extreme commodity price volatility** and **extreme energy price volatility**. It is a relatively uncontroversial assertion that demand for natural resources will increase in the medium term because of a combination of population growth and projected increases in per-capita consumption. But there is uncertainty as to whether supply can keep pace. This leads some experts to argue that, in the long-term, the world should expect at best, sustained increases in commodity prices, and at worst, shortages of key resources.

Empirically, entrepreneurs have responded to increased prices in the short-term with technological and process innovations that have lowered prices in the long-term. When adjusted for inflation, the price of most commodities actually declined from 1950 to 2000 despite rapidly rising overall demand. Some experts, such as the late Julian Simon, have argued that such declines are likely to continue.[13]

However there are two types of supply-side scarcity: as well as the "soft" temporary limits driven by inadequate past investment in production, there are the "hard", natural limits of a resource's availability. Such hard resource limits lead a number of experts to doubt whether technology and innovation can continue to increase the supply of core commodities at the required rate implied by population and economic growth in the long-term. They argue that the contribution of technological advancement to increased supply is slowing; that certain resources – such as water – have no easy substitutes; and that the unprecedented growth experienced in emerging economies in recent years might outpace the investment required to meet demand.

Externalities also play a role in price increases: as the most accessible sources of commodities are exhausted, the technical and environmental challenges to their extraction are likely to rise, increasing costs either directly or through regulatory responses.

Sustained increases in commodity prices and shortages of key resources would have a negative impact on global economic growth. Further, should resulting price rises in finished goods be transferred to consumers, the poorest will likely be worst hit, increasing economic disparity and the interconnected risks that this implies.

Increases in resource efficiency can help mitigate this situation. Behavioural changes on the part of both consumers and businesses can reduce demand. Removing perverse incentives for the inefficient use of some resources – hydrocarbon subsidies and underpriced water – can support these changes. Stronger rules on the stewardship of common, trans-border resources – such as water or fisheries – may help prevent a generalization of the "tragedy of the commons". And continued investment in technologies and infrastructure that increase the efficiency of resource extraction, distribution and use is also necessary.

In the long-term, a model of truly sustainable consumption where private sector business models adopt resource limits as a driver of business innovation – as advocated by the Forum's *Driving Sustainable Consumption Initiative* –, could shift this current set of risks to an opportunity for renewed growth and competitive advantage.

[13] *Julian Simon, The Ultimate Resource, 1981.*

Retrenchment from globalization

As the power and capacity of the United States to lead diminishes, emerging economies are amassing increasing political, economic and military power. A key question in determining the scale and scope of **retrenchment from globalization** will be the extent to which emerging economies will be ready to embrace leadership for defending the open international system that facilitated their rise in the first place.

In many advanced economies strengthening political forces either directly or indirectly advocate retrenchment from globalization. Economic difficulties mean policy-makers are increasingly tempted to resort to protectionist measures and anti-globalization rhetoric. Some of the stimulus packages adopted during the financial crisis already entailed elements of protectionism. Countries with growing current account deficits will almost certainly continue to seek short-term adjustments through protectionist or other trade-restricting measures.

Unemployment and unequal wealth distribution within both advanced and emerging countries also disenfranchises large parts of societies from the benefits of globalization. This may result in socio-political unrest and general socio-economic backlash against globalization. There are early signs of this risk in the rise of extremist parties in Europe (at both extremes of the political spectrum) and in the US (tea party) coupling arguments of economic nationalism with anti-immigration rhetoric. Similar sentiments are being heard in some emerging economies, such as in North Africa.

While experts regard full retrenchment from globalization as a low-probability scenario, even marginal restrictions to global movements of goods, people and ideas could lead to economic loss as gains of trade and the benefits of global division of labour decrease. Such restrictions could simultaneously exacerbate other risks by limiting opportunities for countries to spread risks and share resources across borders.

Weapons of mass destruction

There is no argument about the high potential impact of **weapons of mass destruction** (WMD) but a broad range of assessments do surround the likelihood of WMD materializing as a global risk. The chemical, biological, radiological, and nuclear (CBRN) risk could occur in two ways. One is through terrorist attacks. The other is through geopolitical conflict. Both are affected by global governance failures. While WMD covers a range of weapons of varying concern, the key WMD risk is felt by most experts to be that of nuclear proliferation, both among states and non-state actors, closely followed by the potential use of biological weapons.

Regimes to restrict the spread of WMD have proven surprisingly effective, particularly in conjunction with the high capital and political costs associated with nuclear weapons in particular. The norm of non-use of nuclear weapons, in addition, has become well established. Contrary to widespread fears in the 1960s, only a handful of states currently carry nuclear arsenals. Some states such as South Africa and Libya have even gone so far as to renounce their nuclear ambitions altogether. More recently, the May 2010 Nuclear Non-Proliferation Treaty (NPT) Review Conference was broadly viewed as a marginal success, despite its shortcomings.

Nonetheless, the dynamics of the nuclear status quo are unstable. While the expansion of nuclear-powered electricity generation does not pose a weapons proliferation risk per se, it is still likely to raise concerns regarding dual-use technologies, thereby highlighting imperfections in global energy governance. In parallel, delay in the ratification of the New START Treaty risks undermining the “reset” in relations between the Russian Federation and the United States and weakening the impetus of non-proliferation and arms reduction – as do recurring worries regarding North Korea’s nuclear status and the uncertainties surrounding Iran’s intentions on the matter. Meanwhile, technological barriers to manufacturing and delivering WMD have been falling, and illegal transfers of technology have occurred repeatedly, including in the nuclear realm.

According to some experts, the risk of acquisition of WMD materials by non-state actors – and their willingness to use such tools – is considerable and could increase. While a fully-fledged nuclear programme is far beyond the capacity of any non-state actor, much nuclear material remains insecure. Perhaps even more significantly, the Forum’s community of experts argues that the use by terrorists of improvised radiological devices, the sabotage of commercial chemical plants and/or supply chains, and the possible occurrence of small-scale biological attacks rank high among risks to watch in the CBRN field.

Conclusion

As the different chapters of this report have shown, addressing global risks requires new capacities in terms of risk analysis as well as formal and informal risk response mechanisms at the global level. Three key features stand out to define the requirements of these capacities:

- First, interconnections between risks require us to better understand the systems behind risks as well as the risk context. It is no longer sufficient to simply assess operational risks in the corporate context or national security challenges in the government context. Identifying the central nodes in risk interconnections is a crucial element of risk response. Analyses such as the one provided in this report that focus on risk interconnections therefore play an important role at focusing the debate on risk response.
- Second, with global risks playing out both at the global and national levels and different stakeholders being affected in different ways, the world faces a significant challenge in coordinating national and global responses. By definition, none of the risks discussed in this report can be addressed by a single actor alone; we therefore need to continue efforts to create a common framework for assessing risks in a multistakeholder, collaborative environment.
- Third, while in an increasingly turbulent global environment there is the temptation to always focus on the most recent risk event, it is important to take a long-term perspective to risk assessment and response. Many global risks could emerge over decades rather than months or years; this is one reason why this report maintains a ten-year outlook. Long-term commitment is required to ensure that the effectiveness of the response matches the magnitude of global risks.

As such, addressing the two central risks in this report – **economic disparity** and **global governance failures** – could go a long way towards improving both the effectiveness of risk response and overall resilience at the global level. Both risks have strong impact on the three important clusters highlighted by this year's risk perception survey. While many of the longer-term developments and effects of global risks are difficult to anticipate with a reasonable degree of certainty, investments in these central risks are certain to have positive effects on overall risk resilience.

However even with the best analysis, we can never anticipate or prepare for all risks. In an increasingly connected world, there is a plethora of risks that are beyond the planning and assessment capacities of decision-makers and risk experts alike. To be prepared for these future challenges and to continue to seize opportunities in rapidly changing strategic environments, organizations and decision-makers must continue to invest in our ability to adapt and learn, thereby building more resilient systems. We hope that the Forum's Risk Response Network will make a tangible and valuable contribution towards achieving this goal.

Appendix 1: Definitions and methodology

Defining global risks

For a threat to be considered a **"global risk**" it must have global geographic scope, cross-industry relevance, uncertainty as to how and when it will occur, high levels of economic and/or social impact, and it must require a multistakeholder approach to risk response.

- Global Scope: Risks that affect no less than three world regions on at least two different continents. While these risks may have regional or even local origin, their impact potentially can be felt globally.
- Cross-Industry Relevance: Risks that affect three or more industries.
- Uncertainty: Uncertainty about how the risk manifests itself within 10 years combined with uncertainty about the magnitude of its impact (assessed in terms of likelihood and severity).
- Economic Impact: The risk has the potential to cause economic damage of US$ 10 billion or more.
- Multistakeholder Approach: The complexity of the risk requires a multistakeholder approach for its mitigation. The risks are classified in five domains: economic, geopolitical, environmental, societal and technological risks.

Further, risks are not all equal. The 2010 report deals with two main types of risks:

- "Creeping" or "**chronic global risks**" that manifest as long-term drains on economic or social activity but do not occur as major, time-bound events (in health, chronic disease is in this category);
- "Acute" or "**event-driven global risks**" that have an identifiable onset when they occur (pandemics fall in this category).

We define "**resilience**" as the ability of a system to reorganize under change and deliver its core function continually, despite the impact of external or internally generated risks.

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Global risk report methodology and sources

The insights portrayed in *Global Risks 2011, Sixth Edition* are based on:

World Economic Forum Global Risks Survey 2010:

The Global Risks Survey seeks the opinion of experts, business leaders and policy-makers on a selection of global risks tracked by the World Economic Forum. This is a perception survey which received approximately 580 valid responses across the 37 global risks in five risk categories. Respondents were asked to assess risk likelihood and impact over a ten year time horizon (2010-2020) and also provided their level of confidence in their answers. Respondents also assessed risk interconnections by choosing up to six other risks they judged were related in some way to the risk being assessed. Respondents also had the option to add data on the dominant type of interconnection between risks. Data were analysed using a range of statistical techniques, both descriptive and analytical. For more information on the full risk set, please see our interactive website at: http://www.weforum.org/globalrisks2011.

Note: the starting point for this report is a risk perception survey. An important point to note is how risks are perceived is not equivalent to the actual exposure faced by stakeholders. While drawing on perception data for insights into global risks, the Forum's Global Risks reports explicitly look to combat perception biases, by taking a 10 year perspective, encouraging experts to engage in debate and challenge their own assumptions, and by specifically focusing on risk interconnectedness and the trade-offs involved in risk response. Finally, by highlighting how experts perceive risks, the Forum aims to improve multistakeholder awareness regarding both well-known and less-understood risks in the hope that risk response will be served.

Workshops and discussions with leading experts:

Eighteen workshops and numerous individual discussions with the Forum's community of risk experts provided valuable context and insight into the survey data and form the basis for much of the analysis in this report. Please see acknowledgements for details of the experts involved.

Collaboration with the Forum's Risk Partners:

The Forum benefited greatly from data, expertise and guidance from our four risk partners: Marsh & McLennan Companies, Swiss Reinsurance Company, Wharton Center for Risk Management, University of Pennsylvania and Zurich Financial Services.

Outcomes of the Network of Global Agenda Councils:

Comprising over 1,000 of the world's leading experts across 72 key topics in the global arena, the Forum's Network of Global Agenda Councils serves as an advisory board to the Forum and other interested parties, such as governments and international organizations. Input into this report from the councils included survey data from the Global Agenda Council Survey 2010 (600 respondents), data and insight drawn from council reports and proposals, the use of transcripts from council calls, output from the Summits on the Global Agenda and individual contributions by council members.

Desk research and internal expert review:

The World Economic Forum's internal resources conducted an extensive research process. In addition, internal expert reviews were provided by 30 World Economic Forum topic experts.

Appendix 2: Survey data overview 2011

The Global Risks Landscape 2011

Global Risks 2011, Sixth Edition draws on the insights of 580 expert respondents to the Forum's Global Risks Survey across stakeholder groups and regions. The survey measured the perception of risk likelihood, risk impact and risk interconnections from 2010 to 2020 for 37 global risks. A visualization of the results of this survey can be seen at the beginning of the report. The risks set is based on previous Global Risks reports as well as input from the Network of Global Agenda Councils and the Forum's risk partners to reflect the evolving risk context.

The Global Risks Landscape 2011 (Figure 1) reveals that respondents in general perceive event-driven risks as having higher impact than risks that are more chronic in nature and more distributed over time. This is a well-known bias in risk perception: there is a tendency to discount the impact of risks which are long-term and familiar, and the tendency to inflate the impact of risks which involve extreme "shocks", such as fiscal crises and geopolitical conflict.

There are three interesting exceptions to this observation. First, the risk of **climate change**; though defined explicitly as chronic in nature, ranked highest when likelihood and impact are combined. Two other "chronic" risks are seen as particularly likely **and** of high impact: **economic disparity** and **global governance failures**.

The global risks perceived as having the highest combined impact and likelihood among those assessed appear in Table 5 below.

For more information on the Global Risks Landscape 2011, please go to:
http://www.weforum.org/globalrisks2011

Table 5 Top 10 risks by likelihood and impact combined

Ranking	Likelihood x Impact
1	Climate change
2	Fiscal crises
3	Economic disparity
4	Global governance failures
5	Storms and cyclones
6	Extreme energy price volatility
7	Geopolitical conflict
8	Corruption
9	Flooding
10	Water security

Source: World Economic Forum

Risks Interconnection Map 2011

A key feature of the Forum's Global Risks Survey is its assessment of risk interconnections. Table 6 shows the top 10 risks in terms of average strength of these interconnections. The Risks Interconnection Map (RIM) 2011 (Figure 2), which provides a visualization of perceived interconnections and their strengths, can be found on the inside cover of this report and is further explored on http://www.weforum.org/globalrisks2011.

Table 6 Top 10 risks in terms of average strength of interconnections

Ranking	Interconnection
1	Economic disparity
2	Global governance failures
3	Geopolitical conflict
4	Fragile states
5	Corruption
6	Food security
7	Regulatory failures
8	Climate change
9	Fiscal crises
10	Asset price collapse

Source: World Economic Forum

The data indicate that the most interconnected risks are **economic disparity** and **global governance failures**. This makes them central to the visualization of risk interconnections. It also makes them central to our understanding of global risk as it implies that they are particularly important in shaping the contemporary risk context, creating or exacerbating other global risks and inhibiting effective response. As such they are discussed separately.

Interestingly, the distribution of their interconnections differs substantially. Global governance failures directly impact a large number of other risks, and are perceived predominantly as an influencer of other risks. Economic disparity, on the other hand, has stronger interconnections with a smaller set of risks and there is more evidence of perceived feedback loop dynamics.

Further analysis of interconnections revealed three distinct clusters, which are analysed in the Risks in Focus section below. One cluster consists of **global imbalances and currency volatility, asset-price collapse** and **fiscal crises**. The second cluster links **illicit trade, organized crime, corruption**, and **fragile states**. A third cluster links **climate change** with **water security, food security** and **extreme energy price volatility**.

Risks were defined by category, and it is interesting to observe that societal risks were the most influential on risks in other categories. While much media attention is paid to geopolitical and economic risk, social risks may in fact be of greater systemic concern.

Differences in risk perception among respondents

The Forum's survey data show that perceptions on the 37 global risks assessed in the survey vary significantly by stakeholder group and geography. Respondents tend to worry more about risks which are traditionally viewed as being in "their" domain: businesses indicate the highest level of concern about economic risks while governments and international organizations tend to perceive societal risks as the most concerning. Table 7 shows the major differences in perception across stakeholders and geographic groupings.

Respondents from the BRIC countries tended in general to rate risks as lower in both likelihood and impact than those from OECD countries. This is surprising in that BRIC countries are at least as exposed to the downside of global risks as OECD countries, and for some risks, such as climate change, exposures may be far greater. The explanation may lie in a greater comfort with risk-taking in fast-growing economies.

Economic disparities were viewed as similarly important by all types of stakeholders and across all geographies. Both North Americans and Asians considered environmental risks to be of the greatest aggregate concern while in Europe, societal risks rated the highest.

Table 7 Stakeholder and geographic differences in risk perception from the Global Risks Survey

Respondent:	Governments	Business	Academia	International Organizations	North America	Europe	Asia
Most concerned about:	Societal risks	Economic risks	Environmental risks	Societal risks	Environmental risks	Societal risks	Environmental risks
Perception relative to other groups:	Climate change (likelihood > others) Fragile states (impact > others) Geopolitical conflict (> academia, business) Illicit trade, organized crime, fragile states (> others)	Fiscal crises (impact > Int. Org) Slowing Chinese economy (impact > Int. Org) Consumer price volatility (> academia) Terrorism (likelihood > gov'ts) Food security (impact < others)	Climate change (impact > business) Fragile states (likelihood > others) Biodiversity loss (> others)	Climate change (likelihood > others) Climate change (impact > business) Fragile states (likelihood > others) Illicit trade, organized crime and fragile states (> others) Food security (likelihood > others)	Global imbalances (> Europe) Regulatory failures (> Asia) Consumer price volatility (impact > Asia) Retrenchment from globalization (> Europe) Terrorism (> Asia) Critical information infrastructure breakdown (> others) Regulatory failures (> Asia) Consumer price volatility (impact > Asia) Retrenchment from globalization (> Europe) Terrorism (> Asia) Critical information infrastructure breakdown (> others)	Global governance failures (> Asia) Demographic challenges (> North America)	Global imbalances (> Europe) Retrenchment from globalization (> Europe) Consumer price volatility (likelihood > NorthAmerica

Source: World Economic Forum

Appendix 2: Survey data overview 2011

Outliers in the risk landscape for further reflection

Four risks are broadly perceived to be "outliers" in the Global Risks' 2011 landscape, either because of high levels of uncertainty about their assessment or because the attributes of these risks are only now becoming visible. These risks are considered here because under certain circumstances they could move rapidly to the centre of the risk landscape.

First, **space security** – the risk of economic damage and geopolitical tension from insufficient regulation of commercial and military activity beyond the earth's atmosphere. This was the least familiar risk of the set, with respondents displaying very low levels of confidence in their responses because of a lack of technical knowledge or readily plausible scenarios. This led a number of experts to suggest this risk was being systematically underestimated. The Forum's Global Agenda Council on Space Security is undertaking work in this area.

The robustness of the Chinese economy since the global financial crisis means a **slowing Chinese economy** was this year perceived to be one of the least likely of the 37 global risks, a significant change from previous years. However, the potential impact is high, with Chinese growth currently fuelling a significant proportion of the world's economic activity. A Chinese slowdown might also precipitate social instability domestically, leading to political instability that could threaten the entire region.

Ocean governance is another outlier, ranking low in both likelihood and impact despite expert opinion that places the decline of fish stocks and disputes over marine territories as highly likely and of very high impact.

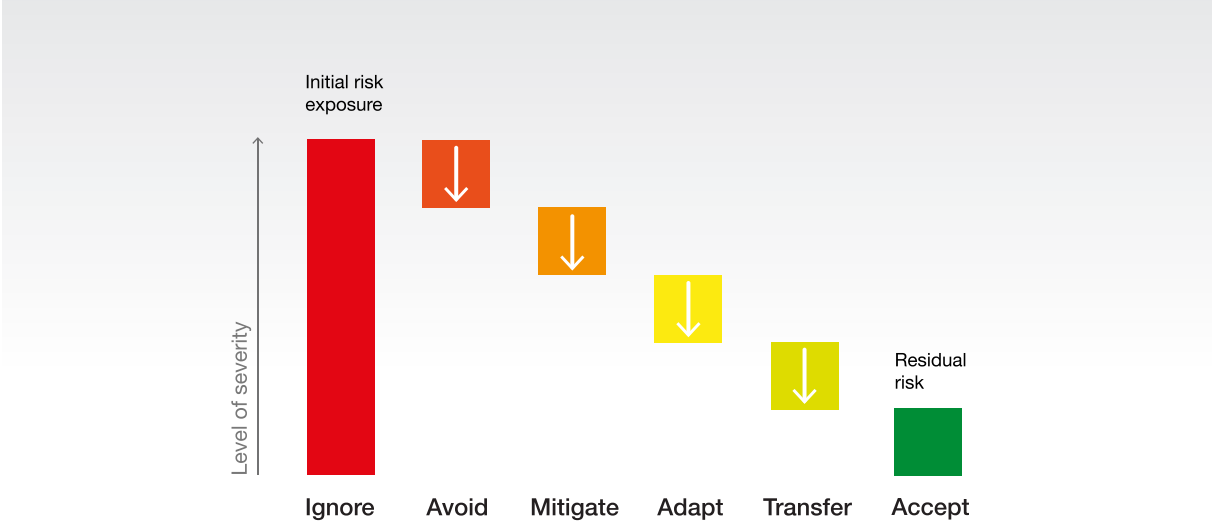
A final outlier is **threats from new technologies** – unintended consequences for human, animal or plant life from the release of agents into the biosphere created by genetic engineering, synthetic biology or nanotechnology. Stakeholders rated this threat as of low impact and likelihood. However while experts interviewed concurred that numerous regulatory authorities in this area lower the risk's likelihood, it was being underestimated in terms of impact.

Appendix 3:
Common global risk response strategies

The focus of this report is on improving understanding of global risks, rather than analysing optimal risk response strategies– that is left to the ongoing discussions in the Forum's Risk Response Network and beyond.

Nevertheless, a generic framework for risk response is helpful when contemplating risk. Figure 10 depicts five broad, non-exclusive strategies that might be employed by a government, corporation or individual to reduce overall risk exposure.

Figure 10 Generic risk response strategies



Source: Adapted from Cleary & Malleret's "Resilience to Risk" and, Vernon L Grose's "Managing Risk"

The first and most obvious option is to seek to avoid the risk wherever possible. The second option is to mitigate the risk directly – to attempt to reduce the impact or likelihood of the risk at source. For example, a corporation facing climate change-related risks could lobby internationally to reduce carbon emissions.

The third option is to adapt to the risk by preparing for its occurrence. Here, a corporation may strengthen buildings or prepare emergency response plans. Homeowners residing in flood-prone areas could elevate their structures or collaborate to put drainage systems in place.

The fourth option involves transferring risk. For individuals and companies, risk could be transferred to a third party such as an insurer, or through more sophisticated hedging strategies (see below). The equivalent from a systemic perspective is to diffuse the risk, such that the second and third-order impacts are reduced. For example, ensure that the collapse of a single bank does not cause the collapse of interbank lending.

These options can all reduce the resulting impact of the risk on an organization or system. But the final step is also critically important – it involves accepting the residual risk, such that the organization or individual is well aware of the potential impact and can hold reserves or make other provisions to deal with the possible consequences.

Appendix 3:
Common global risk response strategies

Catastrophe financing: the use of alternative risk transfer instruments

The most common form of risk transfer, insurance, shifts exposure to insurers in a exchange for a premium. However this depends on insurers being able to profitably pool and absorb a range of risks through diversification over time and geography. This is becoming more difficult as disasters are increasingly regionally and temporally concentrated, thanks in part to development in hazard-prone areas. Of the 25 most costly insured catastrophes in the past 40 years, two-thirds have occurred since 2001.

The World Economic Forum's Global Agenda Council on the Mitigation of Natural Disasters produced an analysis* of new forms of risk transfer which involve shifting parts of catastrophe risk exposure directly to financial markets. Alternative risk transfer (ART) instruments offer innovative financial solutions to meet the growing needs of financial coverage of catastrophic risks and permit investors to play a more direct role in that sphere.

One example of such instruments is a **catastrophe bond** which enables a company, international organization or a government to issue bonds to protect them against predefined risks. Over 160 "cat bonds" have been issued to date around the world to protect against pandemics, terrorism and natural disasters. Another promising financial innovation is weather-index based **micro-insurance** for subsistence farmers in countries where traditional insurance is unavailable or unaffordable.

With proper regulation and transparency, such alternative risk transfer instruments can provide additional capital and offer new ways to hedge catastrophe risks, protect individuals and reduce the systemic impact of future disasters.

* Michel-Kerjan, Erwann "Hedging Against Tomorrow's Catastrophes", in *Learning from Catastrophes*, Kunreuther and Useem (Eds), Wharton School Publishing, 2010

Appendix 4: Guide to online global risks 2011 resources

Interactive website

The Forum has prepared a series of interactive resources related to *Global Risks 2011, Sixth Edition*. This includes an online version of this report, a data explorer showing the results of the Global Risks Survey, videos, interviews, quotes, data narratives and an interactive version of the global risks barometer. Please go to http://www.weforum.org/globalrisks2011 to explore this material.

The global risks barometer

The global risks barometer assesses the influencing factors, global impact and risk perceptions of the 37 risks in the five risk categories: economic, geopolitical, societal, environmental and technological at a global level. In *Global Risks 2011, Sixth Edition*, the influencing factors and global impact have been generated and refined though the 18 workshops with experts in each risk category. The risk perception characteristics, which include key interconnections, likelihood, severity, and variation in perception and confidence level are data extracted from the Global Risks Survey 2010.

The barometer is designed to trigger discussions on global risks at multiple levels: at an **individual risk level** to understand the factors that influence the risk and its consequences described as global impact, in relationship with the **highly interconnected risks** to understand the directionality and the feedback loop with other risks, and at a **systemic level** as it has been illustrated in the Global Risk Landscape.

The barometer is 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 level in a similar manner hence there is a need for further discussion. Second, the risk characteristics evolve as the world moves on. Lastly, there are many interpretations on how the risks may be influenced and impacted; hence there is a broader need to continually improve the work.

The full list of barometers, as illustrated in a dashboard format below (figure 11), is available at the World Economic Forum's interactive website: http://www.weforum.org/globalrisks2011. Readers are encouraged to provide constructive contribution to further elaborate this living document that will feed into future Global Risks reports.

Figure 11 Example of barometer "Asset Price Collapse"

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.

References and further reading

Cleary, S. and Thierry Malleret (2006). *Resilience to Risk*

Cottarelli C. and Andrea Schaechter (2010). *"Long-Term Trends in Public Finances in the G-7 Economies", IMF Staff Position Note SPN/10/13*

Economics of Climate Adaptation (ECA) Working Group (2009). *Shaping Climate Resilient Development: A Framework for Decision-Making*

Gokhale, J. (2009). *"Measuring the Unfunded Obligations of European Countries", National Centre for Policy Analysis (NCPA) Policy Report No. 319*

Grose, V. (1987). Managing Risk

International Monetary Fund (2009). *"Fiscal Implications of the Global Economic and Financial Crisis", IMF Staff Position Note SPN/09/13*

International Monetary Fund (2010). *"United States: Selected Issues Paper", IMF Country Report No. 10/248*

Kotlikoff, L. (2010). *"A Hidden Fiscal Crisis?", Finance and Development, September 2010*

Kunreuther and Useem (2010). *Learning from Catastrophes*

Mekong River Commission (2010). *Strategic Environmental Assessment*

OECD (2008). *Growing Unequal? Income Distribution and Poverty in OECD Countries*

Reinhart, C. M. and Kenneth S. Rogoff (2010). *"Growth in a Time of Debt", NBER Working Paper No. 15639*

Simon, J. (1981). *The Ultimate Resource*

Transparency International, International Chamber of Commerce, UN Global Compact and World Economic Forum (2008). *Clean Business is Good Business: The Case against Corruption*

World Economic Forum (2010). *Financial Development Report 2010*

World Economic Forum (2010). *Global Redesign Initiative*

World Economic Forum (2009). *The Future of the Global Financial System: A Near-Term Outlook and Long-Term Scenarios.*

World Economic Forum (2010). *The Middle East and North Africa at Risk 2010*

World Economic Forum Water Initiative, edited by D. Waughray (2010). *Water Security: The Water-Food-Energy-Climate Nexus*

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