WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

Global Risks 2009

A Global Risk Network Report

A World Economic Forum Report
in collaboration with
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Marsh & McLennan Companies (MMC)
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Zurich Financial Services

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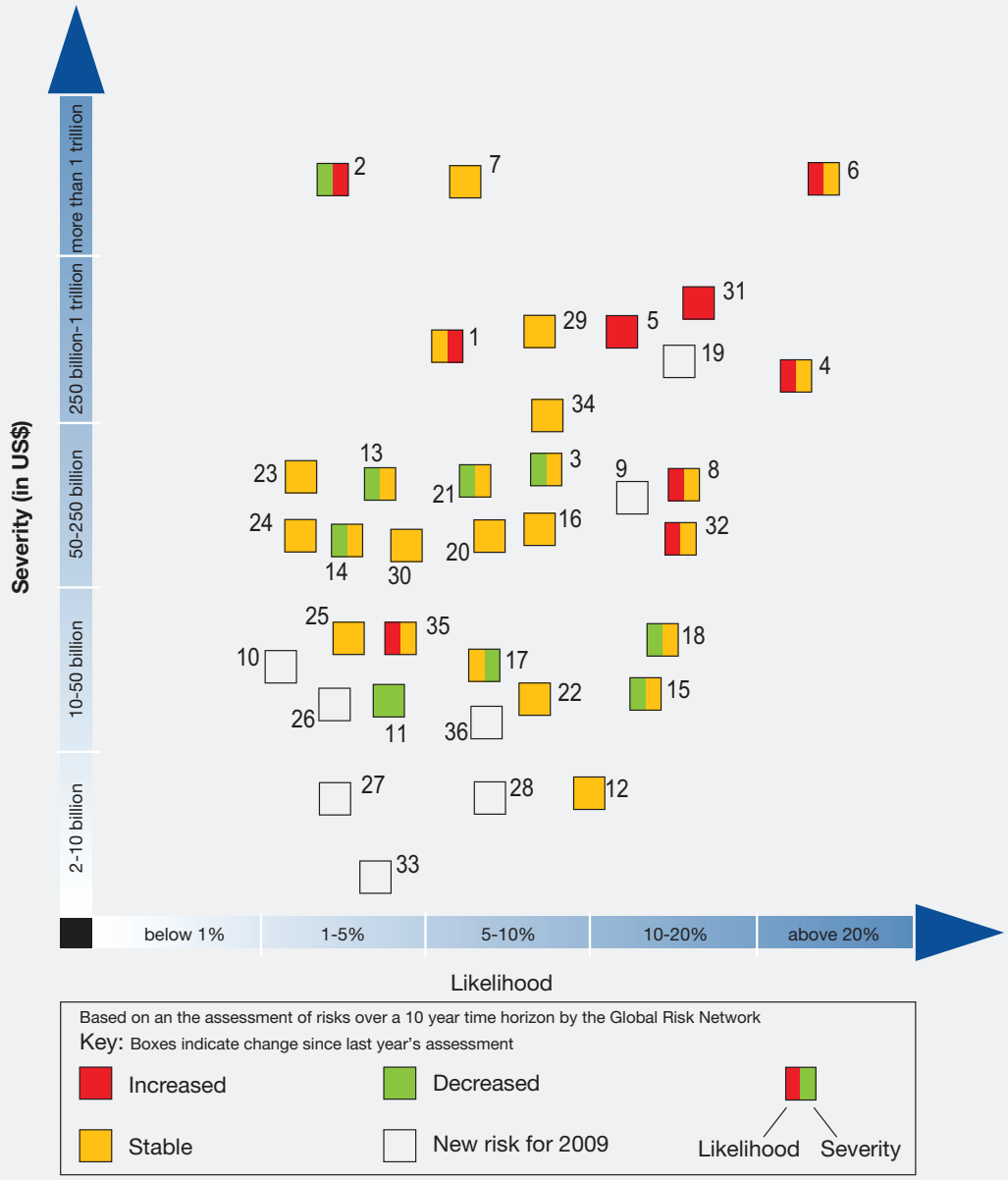
Figure 1: Global Risks Landscape 2009: Likelihood with Severity by Economic Loss



Source: World Economic Forum 2009

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Preface

2009 will be a year of learning the lessons of the financial crisis; a year where its reach in terms of time and scope becomes more evident; a year that calls for a new financial architecture to be shaped. At the same time, it will be a year that will test the resolve and willingness of world leaders to collaborate and take action to move beyond this crisis. The global risks landscape is a crowded one and the window of opportunity we have to address some of the largest challenges of our time is narrow.

Global Risks 2009 looks at the risks, economic and other, that could emerge as the financial crisis continues to unfold. The report considers the implications of a sudden drop in China's growth to 6% or below; deteriorating fiscal positions; and further asset price falls. Given the vulnerable state of the global economy, and as deleveraging continues across the financial system, further shocks could have severe and far-reaching consequences. The degree to which the world has lost confidence in its institutions and systems is serious. Without confidence we could face a protracted and potentially calamitous, downward spiral. Governments, central banks and regulators must avert this but must also avoid inadvertently sowing the seeds of future crises. They need to restore confidence at all levels; to consumers and house-owners, to investors, and in and among financial institutions. This crisis exposed the weaknesses of governance systems. Good governance and leadership will help rebuild confidence, enable alignment across regions and industries, and encourage collaboration.

With world attention focused on the immediate economic challenges, this report also warns against losing sight of longer term risks. Now is the time for leaders to look ahead. Risks related to climate change, unresolved resource issues and potentially more defensive and protectionist stances by states could lead to a conflation of these global risks with significant societal and economic costs. Again, better governance at corporate, country and global level is necessary to provide the frameworks for stable international relations, and for states and corporations to create greater certainty and trust. Successful mitigation of global risks will only be possible once confidence in global governance institutions is restored, starting by ensuring that they are adapted to today's challenges and revising their mandate and powers accordingly. They must be able to function in a proactive and coordinated fashion, fostering cooperation across all regions, industries and stakeholder groups.

Global Risks 2009 builds on the insight and experience of the Forum's unparalleled network of political and business leaders, experts and academics. We are grateful for the continued commitment of our partners on this report: Citigroup, Marsh & McLennan Companies (MMC), Swiss Re, The Wharton School Risk Center and Zurich Financial Services. This report takes a long-term approach to risk, looking ten years ahead, while not forgetting that decision-makers must respond to the crisis today with the consequences that carries for their countries and enterprises. Above all, *Global Risks 2009* provides a framework for leaders to think about risk and how the risks that they face in the short term in their region and business link to the longer term risks, with global implications. While the mitigation of the risks considered here will demand leadership, commitment and resources across all stakeholder groups, they may also yield opportunities and strengthen the ties between different parts of the world. 2008 has proven the extent to which the world is subject to global risks; let 2009 be the year where the world finds a common agenda to begin mitigating their impact.

Klaus Schwab
Founder and Executive Chairman
World Economic Forum

Executive Summary

2008 was an historic year. Financial disruptions triggered by declining house prices in the US grew into a global credit crisis of systemic proportions. By the second half of the year, most advanced economies had entered a recession. The downturn spilled over into emerging markets, increasing the likelihood of a global contraction in 2009. Although the world has seen several financial crises, this one differs in two respects. First, it has demonstrated just how tightly interconnected globalization has made the world and its systems. Second, this crisis was driven by developed economies using unprecedented levels of debt and leverage throughout the financial system. Thus, risks that had been identified in the past two editions of this report – the risk of a global meltdown in asset prices (2007) and the widespread mispricing of risk and the potential implications of systemic financial risk (2008) – have materialized with huge consequences.

The focus of the report

This year's report focuses on the effects of the global financial crisis and its implications for those risks that came to the fore of the Global Risk Network assessment for 2009. They include: a sudden further drop in China's growth to 6% or below; deteriorating fiscal positions; further asset price falls; increasing resource-related risks due to climate change; and the failure of global governance to mitigate global risks. The highly interconnected nature of these risks means that their impact is truly global. The economic outlook for 2009 is a grim one for most economies; markets remain volatile, liquidity has not returned, unemployment is rising, and consumer and business confidence has fallen to record lows. In this climate, risks become even more potent in their impact and, as discussed in previous reports, the tendency towards panic and short-term responses are more pronounced. This report explores the dangers of managing out of this crisis, without considering the broader, long-term consequences of today's decisions. It also stresses the need for a determined, global focus on balancing the response to the immediate challenges with a concerted effort to mitigate longer term risks, not least those relating to climate change and resources.

The report also considers the impact of the financial crisis and economic environment on a few risks introduced for the first time in 2008 and others that the Global Risk Network has tracked for several years. Many of these are particularly pertinent to the current environment. Linking to the discussion on the response to the financial crisis, the risk of over-regulation and lack of a coordinated approach to regulation at a global level makes its first appearance in the assessment. The same is true of underinvestment in infrastructure, a risk that is highly interconnected with a number of economic, environmental and societal risks. In terms of both economic impact and loss of life, health risks, including chronic and infectious diseases, as well as the ongoing risk of a major pandemic, continue to dominate. Conflicts, in particular intra-state conflict, and terrorism continue to mar the lives of millions worldwide and their effects reach far beyond the costs to the populations they directly touch.

Global Risks 2009 offers an assessment of how the focus risks interconnect with others and how they may evolve over time. It also raises many questions about the risk of ignoring other potential crises when dealing with a current one. The events of 2008 underscored the importance of two major ideas behind the work of the Global Risk Network: global risks can only be understood when explored in the context of their interlinkages with other risks and no one group acting alone can mitigate them effectively. These aspects of global risks are also why they pose such a challenge for policy-makers and business leaders alike. However, as they try to resolve this situation as quickly as possible, leaders must be mindful of the long-term implications of today's decisions.

1. The Global Risks Landscape 2009

These pages should be read with the front inside flap open for an overview of all charts

How the global risks landscape has evolved since last year

The following risks came to the fore in the assessment for 2009, both in terms of likelihood and severity and the degree to which they are "pivotal" risks, i.e. that they are at the nexus of many risks.

Deteriorating fiscal positions

The deterioration of fiscal balances in several major G8 countries and other economies was judged as increasing in both likelihood and severity. From the interconnections map it can be seen that this risk is linked to a number of other central economic, societal and economic risks: retrenchment from globalization, a fall in the US dollar, further asset price declines, the rise of chronic diseases and underinvestment in public infrastructure.

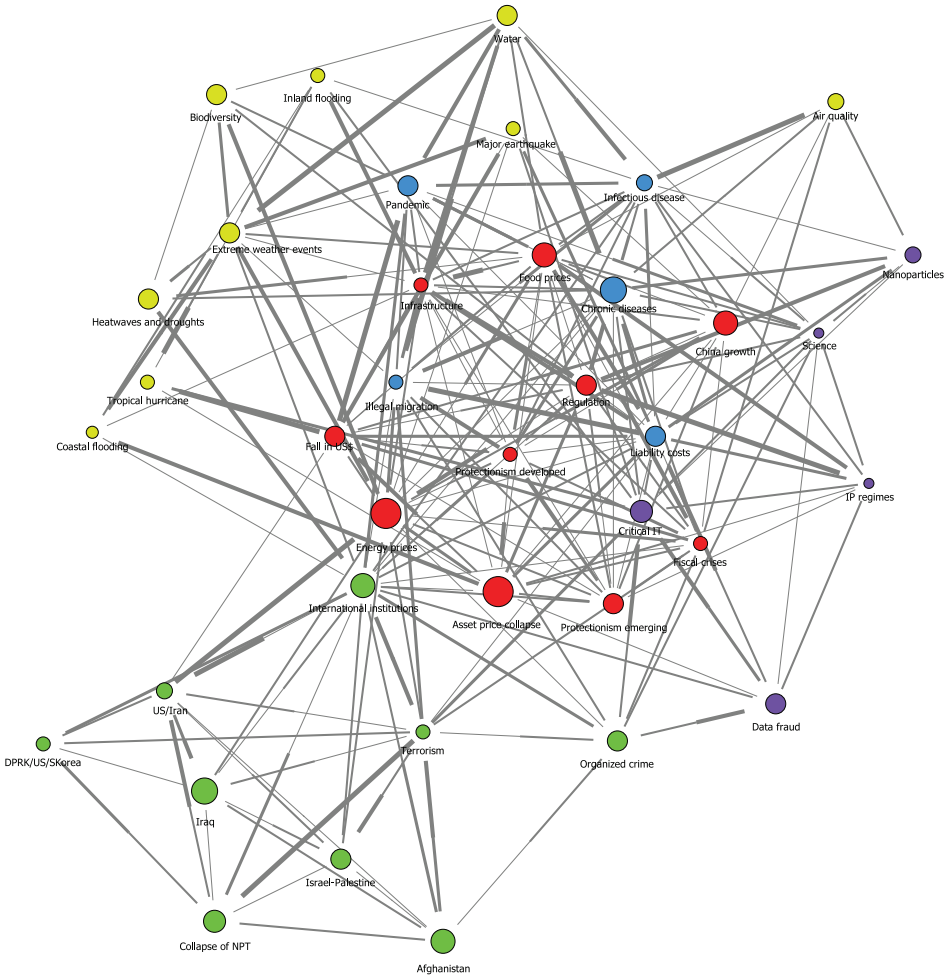
China hard landing

Though the most recent World Bank forecast (November 2008) suggests China will still achieve growth of 7.5% in 2009, given the importance of China in terms of its potential to be a source of global growth and given its massive net-creditor position mainly with respect to the US, a slowdown to 6% or below in China's growth rate would have significant impact on the already weak global economy. This risk is highly connected to a fall in the US dollar, to energy and food price risks, and to health risks.

Asset price collapse

Though the effects of sharply declining asset prices are already playing out, the assessment continues to place this risk as very high on both the likelihood and severity scale across different asset classes and regions. Many

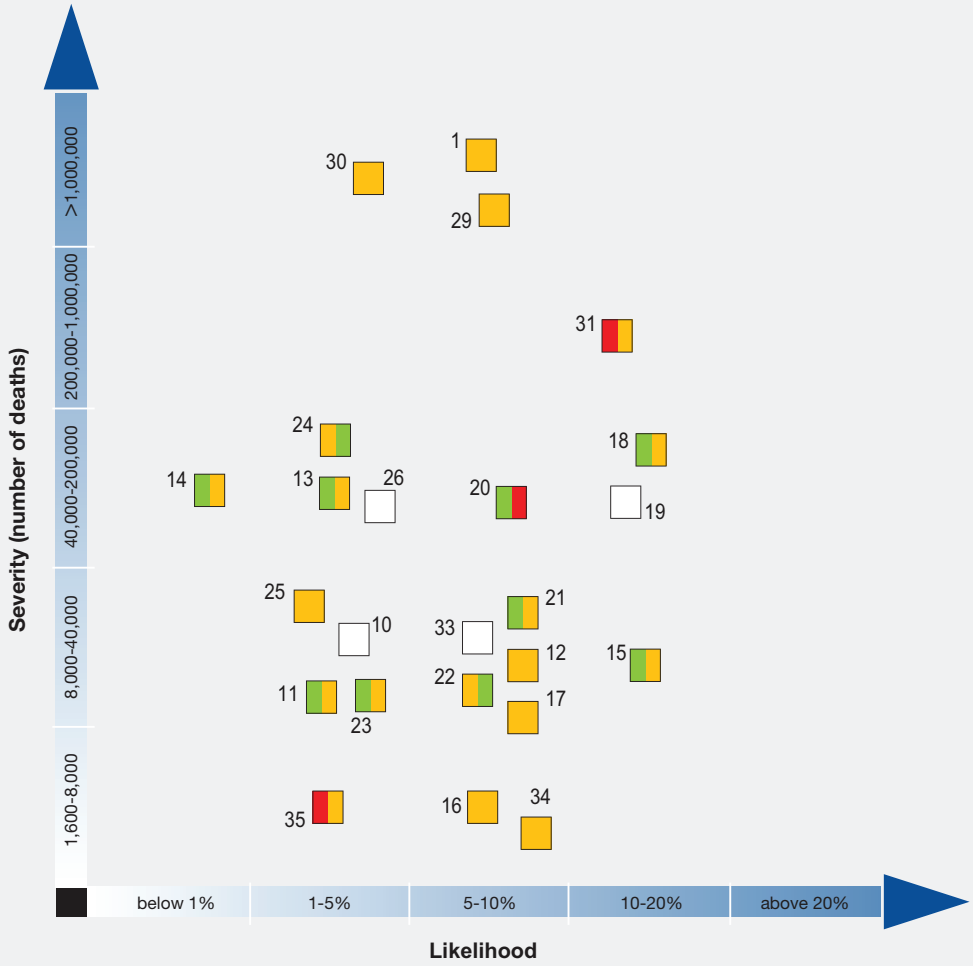
Figure 2: Risks Interconnection Map (RIM) 2009



Source: World Economic Forum 2009

Node size: *denotes severity,* ***Node colours:*** *red – economics; dark green – geopolitics; light green – environmental; purple – technology; blue – society*
Lines: *line thickness denotes the strength of the interlinkage. The direction of a thicker line segment indicates when one risk is the stronger in the relationship.*
Proximity: *the map shows risks that are tightly interlinked to many other risks as closer to one another.*

Figure 3: Global Risks Landscape 2009: Likelihood with Severity by Number of Deaths



Source: World Economic Forum 2009

Please see inside flap for key

experts expect the decline in asset prices to continue over the coming months as the financial crisis unwinds further and the recession leads to bankruptcies and credit defaults.

Resource challenges

Linking several of the risks on the assessment, including climate change-related weather events and declining water quality and availability as well as energy, these longer term risks have remained almost constant since the last assessment. Nearly half of the world's population already live in high water stressed areas and the links to food security, geopolitical and health risks are strong. In this report, the linkage between energy, water and land is discussed more fully.

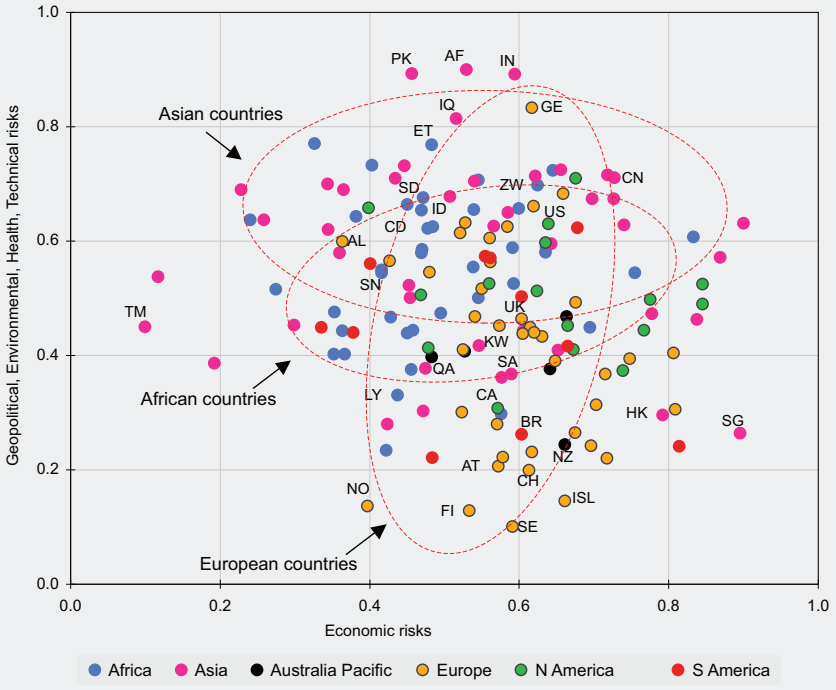
Global governance gaps

Introduced for the first time in the 2009 assessment, experts and Global Risk Network members deemed the absence or lack of effective and inclusive governance on global issues such as financial stability, trade, climate change, water and security as a source of risk in and of itself. The assessment places this gap as highly likely and severe in its impact. As the interconnections map shows, weak global governance sits at a central position between geopolitical, economic and environmental risks.

A note on health-related risks

Though not discussed extensively in this report, chronic disease, infectious disease and pandemics all remain high on the assessment, particularly in terms of potential severity in economic and loss of life indices. Chronic disease, in particular, is not only prominent in the assessment but is also central on the interconnections map, linking strongly to food prices and infectious disease but also to China's growth and fiscal crises. According to the World Health Organization (WHO), chronic diseases (including heart disease, stroke, cancer, chronic respiratory disease and diabetes) are currently the cause of 60% of deaths annually worldwide, of which 80% occur in low- and middle-income countries. Health spending already represents a significant burden on public spending, which will increase as fiscal positions deteriorate and budgets come under pressure.

Figure 4: Exposure of 160 Countries to 24 Global Risks



Source: Zurich Financial Services, 2008

Country exposure to global risks

As the Risk Interconnections Map (RIM) offers an overview of linkages, a complementary approach is to consider the ramifications of these interactions at regional and country level. The chart below is derived from a model looking at the global risk exposure of 160 countries*. The model uses 24 of the global risks that are assessed in this report. Below, country exposures to economic risks (on an increasing scale, from low to high), which can change rapidly, are depicted on the horizontal axis. Exposures to more slow-moving environmental, geopolitical, health and technological risks are displayed vertically (also on an increasing scale, low to high).

Looking at different clusters, the chart underscores regional clusters and outliers. It reveals a fairly high level of cohesion with respect to economic risks among European countries. In contrast, the variation in risk exposures is far larger along the domain that includes geopolitical, environmental, health and technological risks. A closer analysis of the individual risks (not shown here) suggests that drivers for dispersion in Europe are mainly geopolitical and, to a lesser degree, environmental risks, with particularly high exposures to geopolitical risks in countries of the former Soviet Union.

The picture for Asia is reversed. Asian countries are much more diverse with respect to their exposures to economic risks, but comparatively tightly clustered – however at a higher median risk level – when it comes to the geopolitical and environmental risk dimensions.

African countries form, in general, a comparatively tight cluster with respect to environmental, geopolitical, health and technological risks dimensions. Note that their median exposure is lower than that for Asian countries, and also that Africa is not quite as strongly exposed to economic risks as is Asia. Though this chart should only be taken as a tool to explore possible risk exposure, it does suggest that certain regions and countries have the potential to reduce their overall risk exposure along one or the other axis.

* For a note on the tool behind this chart please see Appendix 2

2. The Financial Crisis and Global Risks

A crisis in an interconnected world

Over the past 18 months, a crisis that began in a small segment of the US housing market evolved into a global credit crisis of systemic proportions. After the demise of Lehman Brothers and the near-collapse of AIG in September 2008, credit markets became dysfunctional and capital flows that had already slowed ground to a halt. As global banks continued to reduce leverage, the impact of the crisis began to engulf households and businesses around the world. By the end of 2008, most advanced economies were simultaneously in recession for the first time since World War II, reducing growth prospects in emerging markets due to lower demand for export goods. As a consequence, global growth is expected to remain below potential in 2009 and 2010.

The speed at which these events unfolded was unprecedented. In *Global Risks 2008*, "panic" was identified as an element of the anatomy of a systemic financial crisis that in this case exacerbated pressure on asset prices and induced contagion effects to the rest of the financial system and around the globe. In this sense, 2008 served as a reminder of how the world and its risks are highly interconnected. Contagion not only arises through linkages in trade and finance, but also through the often complex interaction of risks that increases uncertainty and renders decisions more difficult (see Figure 2, page 8).

Increased short-term economic risks and focus on the long term

As discussed in the last two global risks reports, the collapse of asset prices marked only the beginning of a complex chain of events that exposed numerous systemic vulnerabilities and triggered other risks and potentially adverse developments. The salient risks likely to affect the global economy through 2009 include:

- **Deteriorating fiscal positions.** The US, United Kingdom, France, Italy, Spain and Australia are all already running high deficits. Massive government spending in support of financial institutions and growth are threatening to worsen fiscal positions that are already precarious in many countries. The convergence of this decline with rising health and pension costs in industrialized economies due to demographic trends will place further fiscal pressure on governments[1].

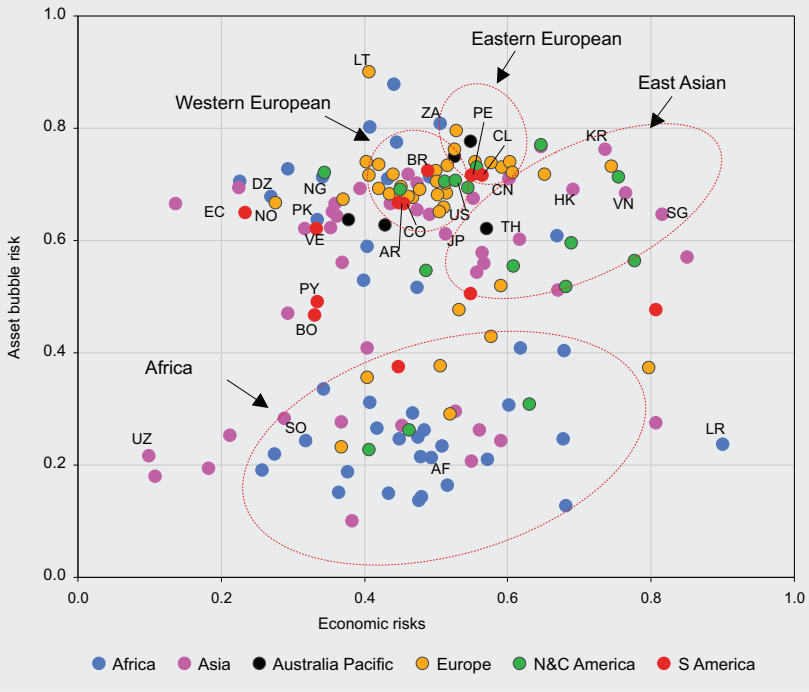
- **A further significant reduction in China's growth.** The decline in export demand has led to a substantial reduction in China's overall economic growth, increasing considerably the risk of a hard landing that would stress the financial system and could generate social tensions within China and beyond as other economies face similar declines. Over recent years, China built up nearly US$ 2,000 billion in foreign reserves to prevent the renminbi appreciating. Although starting mid-2007 China began to allow a moderate appreciation, the trend reversed towards the end of 2008 with the rapid rise of the US dollar relative to most other currencies.

- **Continued depreciation of asset prices.** Although global equity markets have declined on average by more than 50% in a very short time, the vicious circle between falling asset values, write-downs and attendant pressure on the capital position of financial institutions and continued deleveraging appears to be unbroken. This vicious circle is now affecting manufacturing, services and households around the world and the credit crunch has generated a substantial weakening of economic activity and growing credit losses.

- **Deflation replaces inflation as a key concern.** In *Global Risks 2008*, the impact of high energy and food prices in combination with rapid credit growth were strongly linked to concerns about inflation. A year later, uncertainty in the financial sector, falling asset prices, poor credit conditions, weak demand and rising unemployment could create a deflationary spiral. However, the short-term risk of deflation must be seen in the context of a long-term inflation risk caused by the large monetary stimulus in pursuit of financial and economic stability and the risk posed by the growing public debt. Economic history is littered with periods during which governments reduced their debt burden through inflation.

[1] Pension and healthcare reform is examined in a recent World Economic Forum study entitled *Financing Demographic Shifts: The Future of Pensions and Healthcare in a Rapidly Ageing World: Scenarios to 2030*, World Economic Forum, 2008.

Figure 5: Country Exposure to Asset Bubbles and Economic Risks



Source: Zurich Financial Services, 2008

Country Exposure to Asset Bubbles and Economic Risks

Before the current global downturn, it was often claimed that emerging markets had decoupled from advanced economies. It is clear, however, that with respect to cyclical changes, emerging and advanced economies continue to be closely correlated; a fact that may have been masked by years without sharp recessions.

Developing and emerging market countries are tightly clustered with respect to economic and asset bubble risks but to different degrees. African countries, for example, have relatively fewer financial and real assets, and thus lower exposure to asset bubbles. Even their overall exposure to economic risks is small, reflecting in part their lagging integration into global markets.

In contrast, East Asia shows high exposures to economic and asset bubble risks; in fact, their overall exposure is very similar to Japan and the US. Most Asian economies are heavily exposed to a hard landing in China. Asia is also subject to risks related to the price of oil, dollar fluctuations and a retrenchment from globalization, with the latter being especially acute for the small and open economies of Hong Kong SAR and Singapore.

** For a note on the tool behind this chart please see Appendix 2*

Beware of unintended consequences

The risks associated with a decline in China's growth, deteriorating fiscal positions and deflation illustrate the need for forward-looking policies. While it is essential for leaders to respond forcefully to the current financial market instability and the risk of a global recession, they must also be mindful of the implications that today's decisions have in the long term. Risks related to underinvestment in infrastructure, for example, or the degradation of natural resources and climate change, may be low in the short term, but these risks and associated losses increase in a longer time horizon.

Policy-makers must also consider the unintended consequences arising from regulation and government interventions. Market participants always react to incentives and one can argue that the growth of unregulated and highly leveraged investment vehicles was in some part due to market participants' activities designed to avoid regulation that they perceived as onerous. Indeed, this regulatory arbitrage added to the opacity that made it difficult to spot the extent of the weaknesses in the system. Hence, future financial market regulation must strike a fine balance between fostering an environment conducive to innovation and reducing the risk of systemic failure. This calls inter alia for regulatory measures that reduce pro-cyclicality and assign accountability to reduce incentives for excessive risk taking that can have disastrous results.

Government interventions in support of the financial and manufacturing sectors carry the risk of rewarding failure or propping up inefficient corporations and industries. There is also an inherent risk of creating uneven playing fields for companies excluded from access to government funds. This tends to impede competition among locally and globally active corporations, which will ultimately hurt consumers. If interventions are necessary, then governments should develop exit strategies by setting firm milestones for their duration and clear conditions for the industries concerned.

Improving risk management

The credit crisis has revealed glaring gaps in risk management. Banks, for example, learned at their peril that the underestimation of liquidity had created severe systemic risk. Moreover, there was a significant lack of clarity about the extent of risk exposure in each part of the system and financial organizations were not proactive enough in seeking out that information.

However, identifying and understanding individual risks is not enough. Risk management must also account for interlinkages and remote possibilities. Low-probability, high-severity events, such as the terrorist attacks of 9/11, the Asia tsunami of 2004 and the current global credit crisis do happen. All of these events were considered outside the normal distribution of experience and all imposed high human and economic costs, which affect people, regions and industries that are often quite far removed from the epicentre of the catastrophe.

But this should be no reason for paralysis. Risk management that considers extreme events, employs stress testing and calibrates quantitative approaches with informed qualitative judgments can make a difference. Today's arsenal of tools is impressive. But models have their limits and decision-makers need to be mindful of the assumptions, sensitivities and limitations of the models used in the analysis and anticipation of risk, and of their own inherent biases.

The Implications of Risk Myopia and Misperception

Human risk perception and behaviour have been scrutinized by economists, psychologists and neuroscientists in recent years. As a more recent interdisciplinary subject, behavioural economics is still developing and its policy implications are only beginning to be understood. However, basic elements are coming more clearly into focus. Risk perception is one such element. When faced with risks, humans often respond in ways that are deeply rooted in their physiological and neurological make-up. Fear, doubt, fight or flight are all emotions and responses that limit our capacity for rational decision-making. Fear of loss is an example of one type of risk behaviour. In many different experiments, research has found that people exhibit loss aversion by avoiding short-term expenditures, even though they could actually result in significant long-term gains. More specifically, people often miss an opportunity to mitigate risks by not acting with a long-term perspective and by not taking interdependencies into account.

An example from disaster mitigation

Disaster preparedness and response planning is a good example of how people fail to take sufficient action even though they know they are exposed to a serious risk. Property owners, lenders, investors and government agencies often ignore worst-case scenarios and do not invest adequately in infrastructure or enforce regulations designed to reduce the risk of catastrophes and accidents.

How can one explain this behaviour? Part of the response is that people rarely look at probability estimates in choosing between alternatives and tend to ignore risks with perceived likelihoods falling below some threshold of concern. For instance, despite the first terrorist attack against the World Trade Center in 1993 which cost insurers several hundred million dollars, terrorism risk continued to be included as an unnamed peril in most US commercial insurance policies. When the 9/11 attacks occurred, insurers and reinsurers from all over the world had to pay US$ 35 billion of insured losses.

There is another reason why many people do not act until after a crisis has occurred. Individuals and corporations have short time horizons when planning for the future so they may not fully weigh the long-term benefits of investing today in loss reduction measures that could benefit them in the future. The upfront costs of mitigation loom disproportionately large relative to the delayed expected benefits over time. Applied to businesses, short-term horizons can translate into a NIMTOF perspective (Not in My Term of Office). In other words, if a major crisis occurs everyone hopes it is not on their watch.

Overcoming myopia: thinking ahead

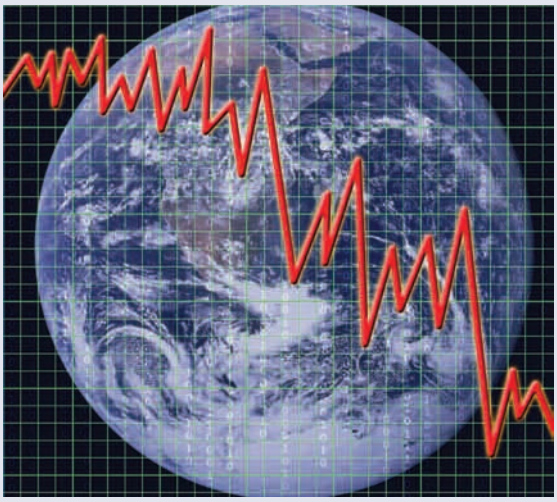
One way to overcome the behavioural biases caused by myopia and misperception of risk is to change the decision time frame in which risk information is presented. For example, recent research[2] shows the importance of reframing the probability dimension so that people pay attention to the consequences of an event. Rather than specifying that the chance of a disaster occurring next year is greater than 1 in 100, experts could indicate that the chances of a disaster occurring in the next 25 years exceeds 1 in 5. These two probabilities are identical except that the time horizon has been stretched to obtain the latter figure. Empirical studies have shown that people are much more likely to overcome their risk misperception and to consider undertaking protective measures when they focus on a probability of greater than 1 in 5 over 25 years rather than 1 in 100 next year because the loger time horizon is above their threshold level of concern.

So how might this concept be applied to encourage long-term thinking? One proposal in the context of catastrophe risk financing is to move from the usual one-year contracts towards the development of longer term contracts. Similar strategies may also be appropriate to encourage longer term thinking in other areas. For example, the standard annual bonus system implemented by many organizations could be modified so that a more significant portion of managers' remuneration packages are contingent on multi-year performance rather than on just the past 12 months. This might induce managers to consider more systematically the potential consequences of their immediate actions in the long run and to pay more attention to worst-case scenarios rather than hoping that they will not occur by the end of the current year.

Furthermore, given the interconnectedness of the world today, actions taken in one part of the world can have ripple effects thousands of miles away and months and years after these decisions have been made. Innovative strategies will be crucial to help businesses and individuals focus on the long term and to move beyond "it cannot happen to us" to "what if it occurs" – a mentality better suited to the current climate of interdependent global risks.

[2] *Wharton on Making Decisions, Protective Decisions: Fear or Prudence* (Stephen J. Hoch and Howard C. Kunreuther ed), Wiley 2001, http://opim.wharton.upenn.edu/risk/downloads/01-41-HK.pdf

Hedging Commodities Risk: Lessons Learned



2008 saw commodity prices fall sharply from historic highs. The price of crude oil (WTI) declined from a peak of US$ 147 a barrel in mid-July 2008 to below US$ 50 in December 2008. Other commodities experienced similar declines. Between March 2008 and August 2008, steel fell by 68%, wheat by 67% and ethylene by 50%. This boom and bust further highlighted just how exposed many economies and industries are to the impact of commodity prices. Producing nations have seen their growth prospects deteriorate, increasing their vulnerability to other risks. From a corporate perspective, it underlined the need for new approaches to managing both price levels and volatility patterns.

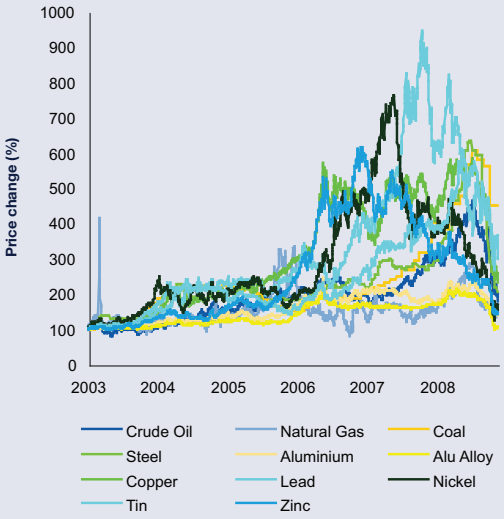
Heavy commodity users are now facing a new paradigm where reduced prices but higher volatility is not necessarily giving the expected economic benefit. A new phenomenon has emerged whereby reduced price levels should support increased industrial activity; however, the higher price volatility adds more uncertainty and, therefore, potentially reduces economic activity. While, until recently, commodity/raw material users had to manage margin compression as a consequence of increasing commodity prices, the pressure has now shifted to the supply side. Producers are now suffering from both a drop in commodity prices and reduced demand. Both market situations impose particular management challenges beyond pure financial hedging for both the demand and supply side. Throughout the high price period, businesses found it difficult to secure supply, achieve price certainty and, ultimately, pass the increased costs on to customers. The prospect for 2009 means that heavy commodity users are seeking to adapt to a new context and to reflect the lower price/higher volatility situation in their commodity risk management approach.

Corporate commodity risk management clearly needs to be more responsive to changing price levels and higher than expected volatility. For most commodity users this means a fundamental reassessment of their hedging objectives over a longer period of time; the incorporation of uncertainty in price and volatility forecasts; a better understanding of exposures; and finding a more sophisticated way of assessing the range of hedging tools and approaches available to manage the cashflow/earnings volatility. In other sectors, such as energy and metals, these tools are already an integral part of industry best practice but previously less-exposed sectors, such as chemicals and fast-moving consumers goods, are now looking at these tools.

The aim is to have a clear understanding of net exposure, which is often a combination of a number of transactions including foreign exchange components. Commodity price risk management tools involve a range of financial instruments, physical contracts and the pricing mechanism for the sales contract. For a number of commodities, proxy hedges (using a hedging with a different commodity than the underlying exposure) are deployed due to the lack of liquid hedging markets. In these circumstances, the basis risk needs to be quantified and monitored.

In making these hedging decisions, companies are using a number of metrics and sophisticated optimization tools that allow companies to determine their risk appetite and evaluate hedging strategies accordingly. However, to implement these approaches companies need to improve the transparency of their exposures and include a cross section of functions such as procurement, sales, treasury and controlling to ensure alignment and coordination of actions.

Figure 6: Commodity Price Volatility



Source: Datastream, graph courtesy of Oliver Wyman (MMC)

Addressing governance gaps and avoiding regulatory overreaction

The financial crisis has underscored the need for policy responses that account for the global nature of crises. It has revealed the limits of the current financial architecture, shown the inadequacy of early warning systems, and exposed deficiencies in the coordination among policy-makers, regulators and supervisors. At national level, the financial crisis also exposed the limits of supervision that is geared only to local entities and neglects the systemic implications of financial institutions with global reach. There can be little doubt that global governance and the institutions charged to develop the frameworks and carry out such governance should be strengthened.

However, this is easier said than done. The historic development of different legal systems, to point to just one difficulty, virtually ensures that regulatory authority will continue to reside primarily with national bodies. Hence, the financial architecture of the near future should focus on setting broad standards for coordination and cooperation among regulators that improve the surveillance of economic and financial activities and support the implementation of corrective measures. Regulation can help create a climate of confidence, stability and certainty that promotes innovation, growth and competitiveness. However, poorly designed or implemented regulation can also drive up the cost of doing business, operate as a barrier to trade and capital flows or simply shift risk into less regulated parts of the system. One extreme, but plausible, scenario that should be considered is a regulatory overreaction to the recent crisis which increases transaction and compliance costs while ultimately proving ineffective in the face of the "next" crisis[3]. Policy-makers and regulators must be careful to weigh the costs and consequences of regulatory shifts to ensure that they produce a net benefit in terms of both system efficiency and stability. From the corporate perspective, the current uncertainty about the extent of the changes that may happen over 2009 is difficult to manage. The changes need to be measured but to reduce uncertainty they must be communicated swiftly to allow business to track them across their markets and take the necessary actions.

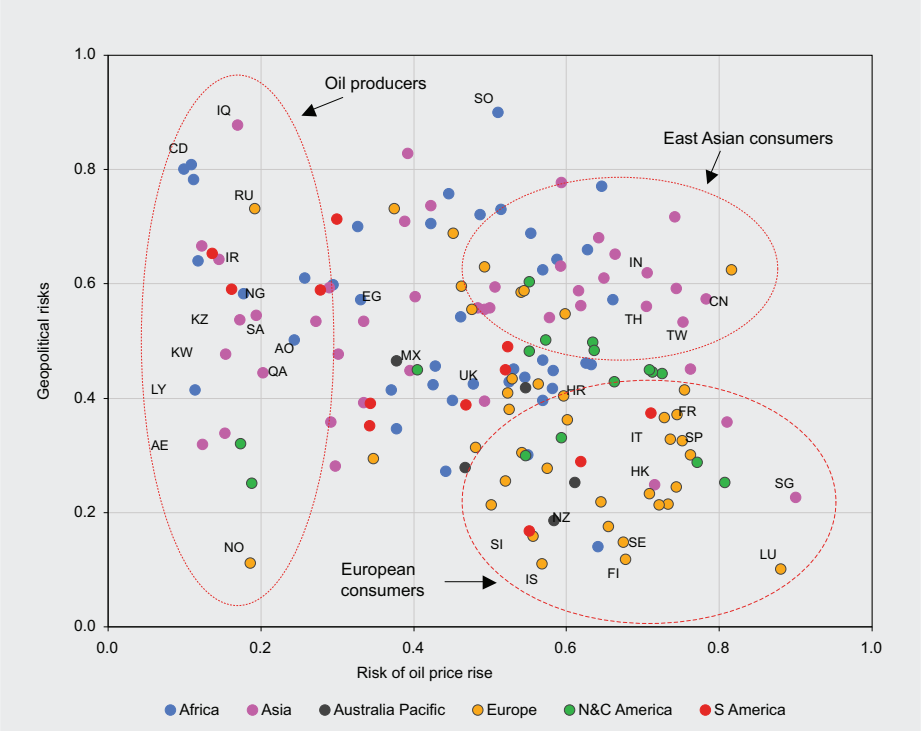
The Global Risks 5i Framework Applied to the Credit Crisis

The "5i" framework based on **i**nsight, **i**nformation, **i**ncentives, **i**nvestment and **i**nstitutions discussed in *Global Risks 2007* can also be applied to analyse the global credit crisis. It can help us to identify the risks, assess their interaction and design mitigation activities.

- **Insight**: Financial innovation appeared to increase the financial system's efficiency by spreading risks to a wide spectrum of market participants. However, the failure to cut through the opaqueness of many structured products and assess the multilayered leverage pyramid created systemic risk. Hence, forward-looking risk management must identify interlinkages and account for low probability/high severity events.
- **Information**: Financial markets must always cope with imperfect information and moral hazard. Transparency is the antidote to remedy deficiencies arising from the asymmetric distribution of information. The growth of the credit bubble can be partly traced back to the fact that investors were in the dark about the magnitude of liabilities accumulated in structured investment vehicles due to their complexity and that they were not covered by the consolidated reporting of banks and broker-dealer institutions.
- **Incentives**: Market participants respond to economic incentives. The separation of risk origination and risk ownership within the originate-to-distribute (OTD) business model introduced by banks over the last 30 years led to a lack in due diligence and accountability.
- **Investment**: Financial markets depend on structures that support the flow of information and the timely settlement of trades. Credit default swaps, for example, were and continue to be traded over the counter only and the settlement of contracts used to take weeks (now days). Hence, creating a central clearing facility for credit derivatives and enabling them to be traded on regulated exchanges would help improve the market structure and reduce both settlement and systemic risk.
- **Institutions**: The global credit crisis demonstrated a major governance gap and the need to improve prudential oversight and regulation. Financial market stability is a public good, and globalized financial markets require a globally coordinated effort to create and maintain this public good. The financial architecture of the future must have an element that transcends national borders. To ensure success its institutions should include broad representation in rule-making bodies, macro prudential surveillance and have agreed procedures for systematic enforcement.

[3]This topic is discussed in greater depth in the World Economic Foum World Scenarios Series report *The New Financial Architecture: Scenarios to 2020*, World Economic Forum 2009

Figure 7: Geopolitical Risks and Oil Dependency



Source: Zurich Financial Services, 2008

Geopolitical risks and oil dependency

By focusing on the geopolitical dimension (comprising risks of terrorism, interstate wars, state failure and transnational crime) and oil price risk, the following graph illustrates the interaction between two classes of risks that are usually considered to be Siamese twins. Three points emerge.

- First, oil-producing and oil-consuming countries form two very distinct and separate clusters.
- Second, oil producers are exposed to geopolitical risks in varying degrees, with Norway on the low end and Iraq on the high end of that particular risk spectrum. Mexico and Great Britain, although oil producers too, are set apart and much closer to the oil-consuming countries of Europe.
- Third, it is worthwhile noting that Hong Kong SAR and Singapore are both clustered with the European countries instead of with their geographic neighbours in East Asia. They demonstrate a lower exposure to geopolitical risk, while maintaining a relatively high exposure to a rising oil price.

The analysis points to broad scope for collective action. High oil dependency exposes consumer countries indirectly to geopolitical risk. Advanced economies in particular are shown to have a powerful incentive to reduce their oil consumption not only for environmental reasons (to cut carbon emissions), but also for reduction of their indirect exposure to geopolitical risk.

3. Resource Challenges, Sustainability and Competition

Demographics, resources and climate change

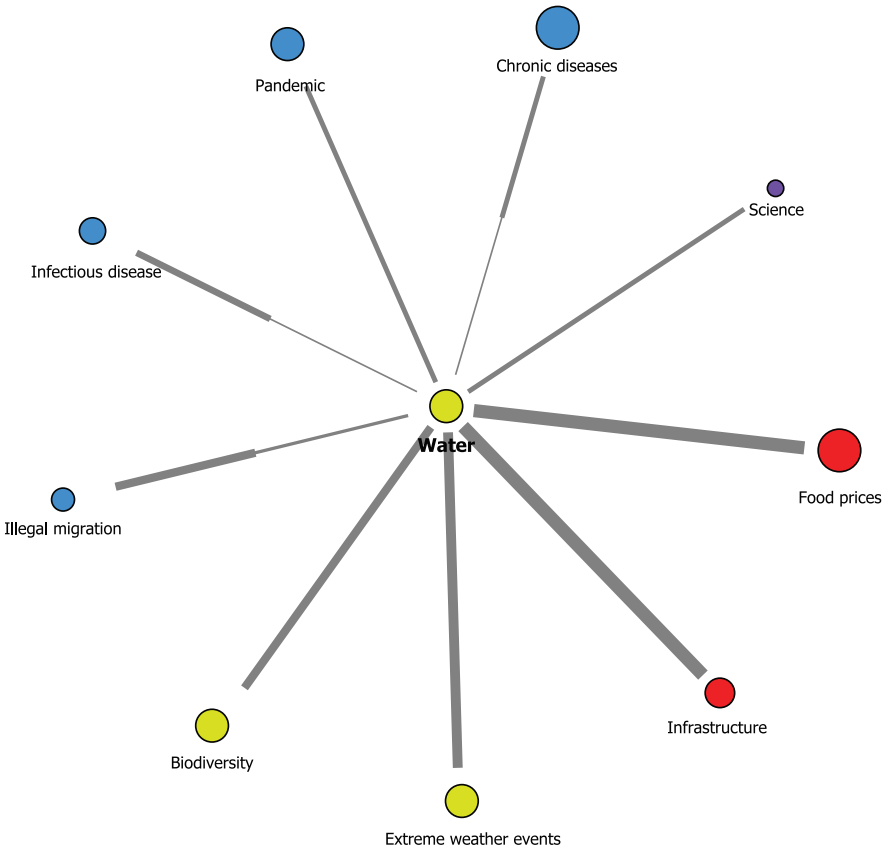
Despite a slowdown in the rate of global population growth, the world's population is still growing and expected to peak at 9 billion people in 2050, up from 6.6 billion in 2006. The past decades have seen urbanization accelerate to the point where over half the world's population now live in cities, a trend that is expected to continue. These shifts are placing greater pressure on resources and are contributing directly and indirectly to the rising emissions linked to climate change and the resulting consequences for the environment.

More intensive agricultural methods, greater industrialization and growing energy needs, urbanization and rising incomes in emerging economies are already sources of pressure on water resources. Globally, agriculture accounts for 69% of all renewable water consumption, industry for 23% and domestic use for 8%. The push to improve agricultural productivity in a number of countries will drive water consumption higher. The flipside is that the focus on increasing agricultural production, through what is often referred to as a "second green revolution", could also be used as an opportunity to introduce more water-efficient irrigation techniques and drought-resistant crops that require less water. Nonetheless, as the global population grows, and water demand increases, the interest in fertile, water-rich land will rise. This will be compounded by shifting rainfall and drought patterns due to climate change. Farmers from Europe to South-East Asia and Australia are already having to manage their crops and water differently as droughts are prolonged, or monsoons are heavier but shorter in duration.

Competition for land and water

This demand on, and for, fertile land for food production and associated water resources is prompting some countries to take action to secure access to water both within and beyond their borders. Countries such as Saudi Arabia and China have already made significant investments in infrastructure and agricultural productivity to access land for food supplies in Kazakhstan and

Figure 8: Water: At the Nexus of Many Risks



Source: World Economic Forum 2009

Mozambique respectively. These agreements may be the first of many, where countries and corporations lock in their access to arable land and water supply to fulfil a strategic need or for which they see a future market. China's arable land availability is decreasing due to soil erosion, pollution and urbanization. Given its very limited fresh water resources, Saudi Arabia has strategically chosen to use its water resources for household rather than agricultural use. In November 2008, South Korea announced that it had taken a 99-year lease on half the arable land in Madagascar in return for employing local labour and building road and storage infrastructure.

Private companies have also entered this arena, in particular for water. Water has become an alternative asset class. Private companies in the US and Turkey have already begun to operate or explore the possibility of pipelines transporting water over long distances to service demand in water-poor areas. Hedge funds have purchased rights to glaciers in Scandinavia.

Resource risks and instability

What do these new arrangements mean for international relations? The past few years have seen a number of agreements between resource-rich, cash-poor countries with cash-rich, high-growth nations. Often tied to infrastructure and capacity building, these agreements provide benefits in the short term but may prove unsustainable over the long term in terms of environmental and societal considerations. Land rights are already a frequent source of tension between people and state, and among political factions. Over time, as the effects of climate change on both water and land availability become apparent, the rising demand for food and the pressures on land use for industrial and residential purposes could trigger intra-state or even interstate tensions as sovereignty or contractual issues arise.

The linked demand for energy and water

While the focus on water for biofuels captured public attention, water is in fact crucial to a range of conventional and alternative energy and power generation solutions. The combination of a need to meet longer term increases in energy demand and to find "cleaner" alternatives to oil and coal may in fact drive us towards more water-intensive energy paths. Water is used in the extraction of oil and coal mining, in refining, for biofuels, in power plants for cooling, for thermal-electric forms of electricity generation and in nuclear power plants. The water used in these processes is not necessarily wasted, many are closed loop systems but it is required in large quantities and in some cases it is returned to natural water areas at a higher temperature which can cause pollution from algae and damage to marine life.

Demand for energy and water are tightly interrelated, with water critical to energy generation and supply and water supply dependent upon energy for pumping, treatment, distribution, heating and waste treatment. On average, 50% of the costs associated with water supply are related to energy. According to a 2008 OECD report, just 2.8 billion people (44% of the world's population) currently live in high water stress areas but this will rise to 3.9 billion by 2030 (50% the global population) if better water policies are not implemented. Energy demand is also set to rise according to the International Energy Agency's latest *World Energy Outlook* estimates, and global demand will increase by 45%, with 30% of this rise coming from coal-fired plants.

Investing to mitigate climate change risks

The current financial crisis underlines how important it is to see risks in the context of a wider system and to understand where vulnerabilities lie. Now is an opportune time for industries and governments to consider the risks related to resources and climate change, and what they could imply for them in the future. At the national level, governments should be considering policies that encourage efficient resource management, especially for energy and water and that promote investment in this direction. Governments must be long term in their thinking about how their regulatory regimes need to develop and how they should invest in infrastructure, which will be one of the key areas when it comes to long-term sustainable resource management.

Sustainable resource management and infrastructure investment

As this report examines in the section on the financial crisis and global risks, governments in both developed and developing economies are facing tighter fiscal conditions due to the economic downturn. Likewise, the financial crisis has dramatically reduced confidence and made access to capital difficult. The US alone requires

Figure 9: Infrastructure: An Investment in Risk Mitigation

Source: World Economic Forum 2009

an estimated US$ 1.3 trillion in investment to address ageing infrastructure: the Environmental Protection Agency says there is a gap of between US$ 300 billion and US$ 500 billion alone for waste water infrastructure. In November 2008, China announced a US$ 586 billion package, most of which will go into infrastructure over the next two years. Over recent years, China's infrastructure spending has averaged 9% of its GDP. India's public spending on infrastructure has historically represented 3.5% of GDP; it plans to increase this amount to 8% in 2012. Worldwide it is estimated that the global economy needs about US$ 5 trillion for infrastructure over the next five years alone – ranging from transport networks to sanitation and power – just to maintain the quality of the existing infrastructure network and meet rising demand.

Today's infrastructure investment choices are key, as they represent a huge opportunity to spend on projects that will result in better, long-term resource management – from technology and plant choices to reduce emissions and waste, to transport and building development that will be more energy and land efficient. A lack of investment now or investment in unsustainable areas will result in further costs through climate change, poor living conditions in crowded cities and, ultimately, will be a drag on future growth. Governments will need to spend effectively but they will also need to implement policies that encourage investors to understand the risks and take a long-term view.

The Road to Copenhagen: An Update

2009 is a critical year for international climate change issues. By year-end the countries at the Copenhagen conference, which is a follow-up to the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol, must agree to a new protocol to ensure that international efforts to reduce global greenhouse gas emissions continue beyond 2012. Recent studies indicate climate change is occurring faster than expected. Without resolute action we could face irreversible changes to the climate. There is pressure on the discussions in Copenhagen to produce a concrete result – a framework far more comprehensive, long term and ambitious than the Kyoto Protocol, ironically at a time when the world economy is entering a major economic slowdown.

The four cornerstone issues that the 2009 climate negotiations need to address are discussed below:

1. A long-term global goal for emission reduction

There is a need for an agreed global goal for emission reductions by 2050 in the range of 50-80%, compared to 1990 levels. Greenhouse gas emissions are an expression of the market's economic failure to adequately value a public good – the climate. To solve this market failure a combination of state-defined conditions, caps, incentives and standards will be necessary to give emissions a price and to reward emission reduction measures.

2. Enhanced national/international action on mitigation

Leaders from developed countries will be under pressure to provide clear targets, milestones and a strategy as to how the world economy can progress to a low carbon future. All countries signing the UNFCCC will need to commit to a level of carbon emissions by a specific date. Developing nations must be a part of the solution, co-operating with meeting the targets, but also allowed to achieve their economic development goals.

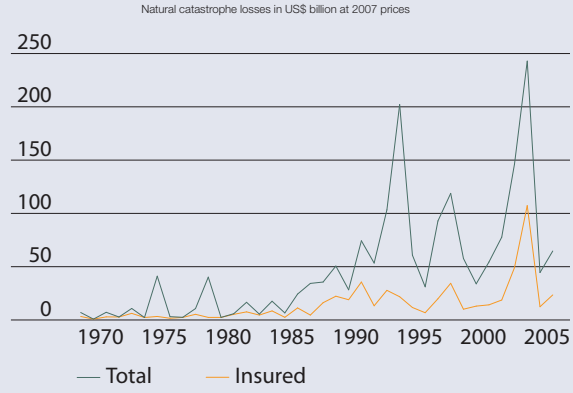
3. Enhanced action on adaptation

If emissions continue to rise at the rate of the past 30 years, atmospheric concentrations will increase to 700ppm or more, corresponding to global average temperatures of +6°C or more by 2050 (Intergovernmental Panel on Climate Change (IPCC) 2007 4th report; World Energy Outlook, International Energy Agency 2008). Even if we stopped emitting greenhouse gases altogether, the effects of global warming are now unavoidable. For these reasons, societies will need to adapt to the unavoidable consequences of climate change.

Importantly, it is developing nations who face the worst consequences because they are more vulnerable to the physical effects of climate change than developed nations, due to their limited institutional frameworks and financial adaptive capacities:

- In Africa alone, 75-250 million people will be exposed to water stress by 2020 (IPCC 4th report). The area suitable for agriculture will decrease and reductions in yields could amount to 50% by 2020.
- Towards the end of the 21st century, projected sea-level rise and storms will affect low-lying coastal areas with large populations potentially triggering migration of people.
- Weather-related disasters disproportionately affect the agricultural sector in least developed countries (subsistence farming) where most farmers have only limited access to financial means such as micro-credit and insurance solutions.

Figure 10: The Cost of Natural Catastrophes

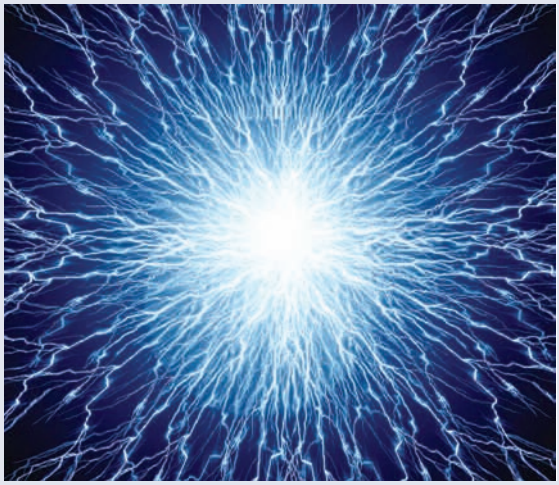


Source: Swiss Re, Economic Research & Consulting

4. Enhanced action on technology development and transfer

The UNFCCC estimates that 85% of the capital required for low carbon investments needs to come from private sources. Adjusting public policies to stimulate private investments, technology development and adaptation in developing countries will be vital. A major deal flow of projects in both today's realisable low carbon technologies and tomorrow's technologies (e.g. carbon capture and storage, next generation photo-voltaics and biofuels) will be required. Financial and project development expertise from the international private sector will need to partner with governments and multilateral development banks.

Energy Security: Reconciling Growth and Sustainability in Future Infrastructure Investment



In 2008, national energy security was challenged from many different directions. Infrastructure has been damaged by extreme weather events, for example during tropical storm Gustav in the Gulf of Mexico. Countries such as France and Slovenia have had to close nuclear plants for safety reasons. Climate policies have toughened, oil and gas prices have been highly volatile, and geopolitical tensions have led to the temporary closure of gas pipelines and heightened resource nationalism. The approval and delivery of new power plants have faced lengthy delays in many countries and large-scale mergers and acquisitions among leading industry players have increased cross-border ownership. The value of global energy-related mergers and acquisitions between May 2007 and the last quarter of 2008 amounted to approximately US$ 500 billion.

Policy-makers and industry players are struggling to assess the many investment options open to them in the light of growing energy demand, commitments to reduce carbon emissions, deteriorating infrastructure and the depletion of fossil fuel resources. The scale of investment is high (according to the IMF's *World Economic Outlook*, between 2007 and 2030 the new expenditure required to update and expand global energy infrastructure alone amounts to US$ 26.3 trillion), the time frames are long and the technological choices require significant trade-offs. Decisions can be piecemeal and often lack the coherence, vision and follow-through that give confidence to all parties.

In this context it is helpful to conceptualize energy security as having four objectives:

- **Autonomy**: energy supply that is within the control of a country and is not vulnerable to disruption by external agents
- **Reliability**: energy distribution that is safe and secure in both the short and long term and meets demand without interruption
- **Affordability**: energy prices that are commensurate with the buying power of domestic and business consumers – at the same time this objective is, however, often difficult to achieve in a manner consistent with the final objective
- **Sustainability**: energy use that is sufficient to support a high quality of life but does not damage the environment to an unacceptable degree

This framework is useful for decision-makers not only to analyse how their existing infrastructure and renewal plans match up against the different objectives but also to understand where their principal exposures lie. This is the basis for a long-term strategy that not only provides for a supply mix appropriate to national circumstances but also policies that will improve productivity through increased energy efficiency and demand reduction. Such a strategy will also need to anticipate the systematic disruption that might be caused by innovations such as the introduction of distributed generation or the rapid uptake of plug-in electric vehicles.

Effective governance arrangements as well as strategic vision are critical to underpinning decisions at both the planning and implementation stages. Policy-makers and other energy system players should therefore address the following questions:

1. Does our energy policy fully dovetail with our climate policy in terms of its goals and measures?
2. Are our regulatory and investment incentives strong enough to drive the development of optimal supply solutions, grid infrastructure renewal, energy efficiency measures adoption and new technology development?
3. Is there a need to streamline national regulations, harmonize international laws and strengthen bilateral trading agreements?
4. Does our engagement with the different stakeholder groups enable us to deploy their different strengths to turn the optimal energy solutions into reality?

4. Global Governance: a Key to Global Stability and Sustainability

The financial crisis exposed fundamental flaws in global governance. In an historic meeting of countries representing 90% of world GDP, the G20 summit held in November 2008 discussed ways to coordinate a response and the need for a global, collaborative solution to the financial crisis. Indeed, as governments and corporations face the immediate challenge of rekindling growth, there is a risk that other challenges such as climate change, food security, poverty reduction, and failing and unstable states are pushed down the agenda, perhaps increasing the severity of these risks in the long run. Persistent governance gaps in many of these issues will only serve to exacerbate the related risks.

Where are the gaps?

Whether in the economic or security arena, most of the multilateral institutions that operate today were created in the period following World War II. Their mandates and capacities were not designed for the highly interconnected, multi-polar and, in many ways, more open world of today. Economic and demographic shifts have not been reflected in either their governance or decision-making structures. Equally, the shift in the roles between the public and private sectors has not been fully taken on board. Global risks know no borders and global solutions are also beyond the realm of any one government. Indeed, they will require not only intergovernmental collaboration but also public-private collaboration. Again, existing governance structures were not built to capitalize on the combined strengths of government, business and civil society.

Addressing global risks through better governance

At the World Economic Forum's inaugural Summit on the Global Agenda in Dubai in November 2008, the Global Agenda Council (GAC) on Global Governance made some recommendations as to how to address governance gaps. They included: fostering greater commitment and new leadership on global issues; developing frameworks to draw on expertise and to generate debate and awareness; marrying public authority and regulatory capacity with incentives for the private sector to innovate; reforming existing institutions, specifically reforming the UN Security Council; exploring new mechanisms to provide necessary resources.

Looking at the global risks tracked by the Global Risk Network for the past five years with these recommendations in mind provides a gauge of how much more can be done to improve governance. On climate change and resources, the picture is mixed. On the one hand, the Intergovernmental Panel on Climate Change has advanced dialogue by encouraging debate among the scientific community resulting in improved awareness and a greater common understanding. On the other hand, the Kyoto Protocol proved ineffective not only because key governments failed to engage but also because it was unable to offer a framework encompassing incentives and adaptation.

Where better and more innovative governance has shown results is in the area of global health risks. For HIV/AIDS treatment, The Global Fund, a UN-backed public-private structure has succeeded in making antiretroviral drugs more easily available to populations at risk. The WHO has developed an effective monitoring and information network for pandemics that operates globally. The risk of infectious disease remains high but these examples illustrate that new forms of governance can be effective even for some of the most borderless and tenacious of global risks.

On water-related risks however, there is currently little oversight and shared understanding among governments and business about not only environmental and security but also economic implications. In the absence of frameworks that offer a common base for national and regional dialogue and action around water pricing, sustainability and infrastructure, water-related risks may go unaddressed. As discussed in the previous section, water scarcity and quality are highly connected to energy, food and health risks. As a global good *and* a global risk, water is perhaps an issue most in need of global governance for mitigation.

Better governance to avoid retrenchment

The spread of the financial crisis and the resulting global downturn has increased the risk of retrenchment from globalization in developed and especially in developing economies (as illustrated in Figure 11).

Over the past several decades, globalization has meant countries and businesses building economic and societal ties across the world, opening new markets, providing services, generating employment and reducing poverty. This momentum has raised hundreds of millions of people out of poverty but more progress is needed. A global downturn will undoubtedly place greater pressures on many economies, developed and developing, but retrenchment, in the form of economic protectionism or unwillingness to engage on climate change, resource or security issues, could create even greater pressures. Now seems like an appropriate time address governance gaps and thus provide frameworks offering greater certainty to

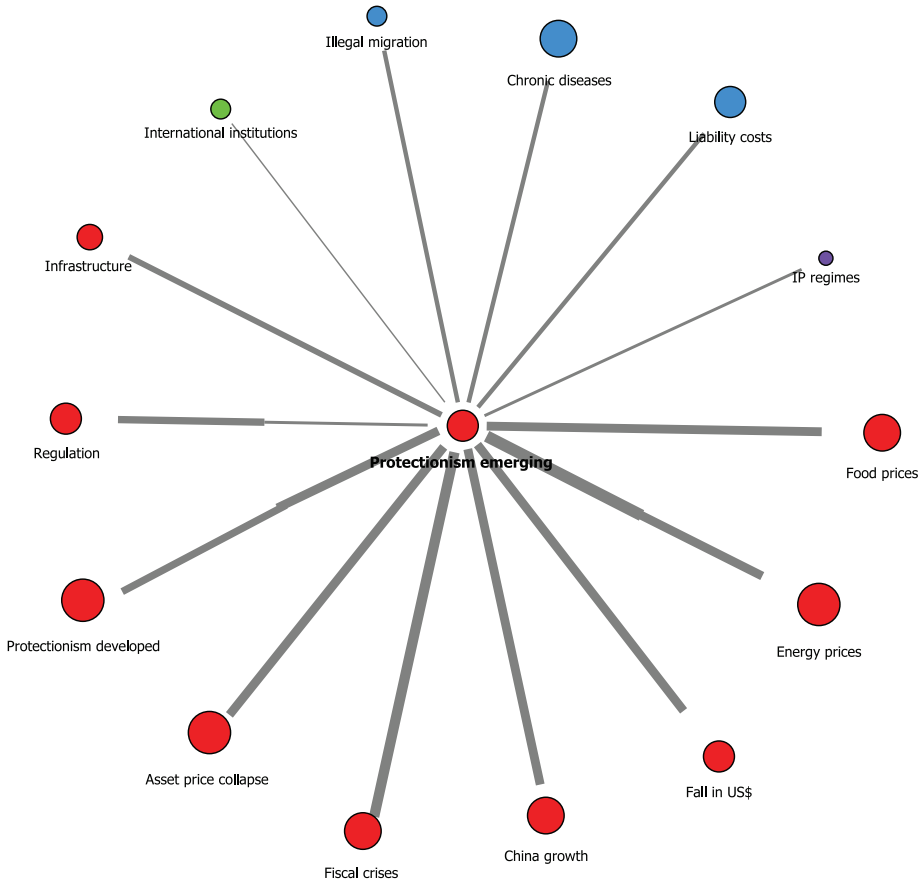
both governments and business and that will enable solutions that will benefit all.

Climate change, natural catastrophes and geopolitical risk

Ninety per cent of all natural catastrophes are related to weather and severe weather incidents have been on the rise over the past decade. Many of the catastrophes, flash floods, droughts and tropical storms affect developing countries far more than developed countries. The losses, both of life and earnings, that these populations experience due to natural catastrophes, are compounded by the fact that insurance penetration is low in emerging markets. Thus their recovery is more difficult.

However, even before the financial crisis, emerging economies were reluctant to accept the trade-off between economic growth and the costs of containing climate change effects. Now that economic growth is slowing, the risk is that this trade-off becomes even less acceptable. Developing nations in the regions that are likely to suffer the most from climate change may not only see their growth and development impaired, they may also have to manage rising tensions with neighbouring states as pollution levels and pressure on natural resources rise. Once again, only globally coordinated and nationally supported efforts will be effective to address the challenges related to climate change, the management of scarce resources and geopolitical tensions.

Figure 11: The Risk of Protectionism in Emerging Markets



Source: World Economic Forum 2009

Node size: *denotes severity*

Node colours*: red – economics; dark green – geopolitics; light green – environmental; purple – technology; blue – society*

Lines: *line thickness denotes the strength of the interlinkage. The direction of a thicker line segment indicates when one risk is the stronger in the relationship.*

Proximity: *the map shows risks that are tightly interlinked to many other risks as closer to one another.*

Mitigating the Effects of Natural Disasters

During 2008, the World Economic Forum formed 68 Global Agenda Councils (GACs) for the express purpose of bringing experts and leaders together to capture state-of-the-art knowledge and propose solutions for the most crucial issues facing the world today. The Global Agenda Council (GAC) on Mitigation of Natural Disasters focuses on strategies for reducing losses from events that can have catastrophic global impacts. This Council and a number of other GACs agreed that there is a need to develop innovative long-term strategies for coping with myopic behaviour by decision-makers and dealing with an increasingly interconnected world. They suggest the following principles for thinking about natural catastrophes that lend themselves to other areas of risk, such as a technical accident or major terrorist attack:

Principle 1. Appreciate the importance of assessing risks and characterizing uncertainties surrounding such assessments

Principle 2. Recognize the interdependencies associated with risks and the dynamic uncertainties that result from these interdependencies

Principle 3. Understand behavioural biases and heuristics used by decision-makers, such as misperceptions of probability, myopia and "the disaster won't happen to me" attitude in developing risk management strategies

Principle 4. Appreciate the long-term impact of disasters on a area's or country's economy, politics, culture and society

Principle 5. Implement risk-based pricing of economic goods exposed to natural catastrophes and create resiliency by considering measures that prevent and mitigate the risks of natural disasters and their social and economic impacts

Principle 6. Deal with trans-boundary risks by developing strategies that transcend political boundaries

Principle 7. Consider inequalities with respect to the distribution and effects of natural disasters. Where possible, cooperative agreements should be facilitated so that those with few resources are assisted by those with a greater capacity to help

Principle 8. Develop organizational leadership that is prepared to anticipate the risks of large-scale natural disasters and mobilize the organization in the immediate wake of a calamity

An Overview of the Geopolitical Landscape

The Russo-Georgian conflict during the summer of 2008 was a reminder of how geopolitical events and security considerations can suddenly expose a diverse set of risks and interrelations, and how little effect existing security institutions have. The conflict strained Russia's relations with Europe and its neighbours in Central Asia, raising the issue of energy security and dependence. These concerns have been compounded by even more recent events as Russia again cut off the gas supply to Ukraine as 2009 began.

To the fore among the geopolitical risks tracked by the Global Risk Network over the past five years are the Israel-Palestine tensions, Iraq and Afghanistan. As this report was going to press, Hamas, having called an end to a six-month cease fire, was sending rockets into Israel and Israeli troops had entered Gaza following a week-long campaign of airstrikes. While the situation on the ground in Iraq may have improved slightly, civilians and military personnel continue to be the target of terrorist and insurgents attacks. Because of this, reconstruction, which is so necessary to restoring social order and economic opportunity for the population, is advancing painfully slowly. In Afghanistan, despite NATO's ongoing presence, the level of violence remains high and the situation along the Afghan-Pakistan border is a source of instability throughout the region and beyond. India suffered a major terrorist event in Mumbai. Though, previous attacks have been equally severe in the terms of fatalities, the nature of this attack and the targets may signal the new direction for terrorism on the subcontinent. Given this and the potential for instability in Pakistan, with its troubled borders with Afghanistan and India, the world must remain on the alert about events in this region, dominated by two nuclear powers and, if necessary, ready to act in an aligned manner.

In Latin America, problems of violence, corruption and political instability continue to plague parts of the continent and uncertainty abounds on the consequences of the political directions that have been taken by several countries. On the African continent, Somalia, Sudan and Zimbabwe have the unenviable distinction of being the states "most at risk of failure" as they fill the top three positions of *Foreign Policy's* Failed States Index. And recent events in the Democratic Republic of Congo have resurrected the complications between tribal and national boundaries.

Though periodic incidents bring these situations to the fore from time to time, the world does have to bear the human and economic losses from enduring conflicts. Though they can be considered as "local" in nature they appear on the risk landscape with a relatively high degree of potential severity. Their persistent non-resolution means that there is a permanent risk that they spill over, causing greater loss of life and even destabilizing other countries. These conflicts can affect regions far beyond their borders through terrorism, sudden movements of refugees, ongoing illegal migration and direct military conflict.

Better Risk Management through Better Governance: What Can We Learn from Best Practices in Country Risk Management?

In *Global Risks 2008*, principles of country risk management and the concept of a Country Risk Officer, first introduced in 2007, were explored. Many of the challenges facing international governance are similar: broad range of risks, divergent incentives, multiple stakeholders and limited resources. However, at a country and international level, clear, transparent information and an integrated, comprehensive risk assessment are essential.

Countries are subject to a myriad of risks including natural catastrophes, food safety, pandemics and terrorism. Their governments are charged with the responsibility of maintaining critical infrastructure consisting of water, energy, transportation and communication while preserving lives and economic livelihoods under increasing budgetary pressure. Despite differences in organizational structures and risk priorities, there are two principles highlighted in *Global Risks 2008* that governments have applied in practice: integrated, comprehensive, long-term risk assessment and transparent, clear communication to all stakeholders. Whether through a committee of an existing body or a newly formed international institution, a comprehensive framework of risk assessment, carefully evaluating interconnectivity and interdependency, and clear communication with all stakeholders should be core principles for risk management on a global scale. Country Risk Officers could serve as the focal point of communication between countries and with international bodies for risks of a global nature.

Integrated, comprehensive framework: As an example, the government of Singapore has instituted a "Whole of Government – Integrated Risk Management" (WOG-IRM) framework to evaluate and prioritize risks in a holistic manner and to help identify cross agency risks that may have fallen through gaps in the system. As part of the Risk Assessment and Horizon programme, Singapore has even constructed scenarios for energy, food security and climate change illustrating the long-term, comprehensive nature of their risk management framework.

Transparent data and clear communication of risks to all stakeholders: Japan's relatively small territory (378,000 square km) suffered 20% of the world's earthquakes between 1996 and 2005. Seventy-five per cent of Japan's assets are concentrated in flood prone areas. The Central Disaster Management Council (CDMC) of Japan is an inter-ministerial body established to formulate and promote a comprehensive national strategy for these and other risks. Data from the Japan Metereological Society and local governments, funnelled through the CDMC, is used to clearly communicate risks and response to its constituents. In addition, Japan provides various risk maps to stakeholders as a risk mitigation measure.

Conclusion

The areas of risk detailed in this report are inextricably linked. While they will influence decisions and growth over 2009, they also have longer term effects whose exact shape and reach may not be clear for several years. For this reason, it is crucial for decision-makers to take a step back and consider a bigger, broader picture of the entire landscape of risks that extends both in time and in space, even when they are under pressure to resolve more immediate problems. The risk landscape explored here offers a framework for further discussion that can be used by business leaders, risk experts and policy-makers in their thinking about risk and mitigation. As this report points out, global risks can only be effectively addressed if there is a common understanding and a willingness to engage in dialogue and action with multiple stakeholders internationally across countries, industries and business sectors.

Previous editions of the Global Risk report proposed the creation of international coalitions of the willing or the institution of a Country Risk Officer as possible approaches to building effective cross-border mitigation strategies for global risks. At the local, corporate and even national level, a great deal of work is being done on mitigation, but building awareness around this work and scaling it up with the appropriate exchange of information, expertise, governance and management structures – either within existing institutions or in new ones – requires a coordinated and concerted approach. Without this effort, ownership of risks will remain fragmented and the challenges posed by increasing levels of interconnectedness will dampen prospects of successful collaboration.

Throughout 2009, the Global Risk Network will continue to work with its partners to leverage its unique platform and networks, explore existing and new mitigation possibilities and extend awareness of global risks using the framework defined in the Global Risks report as a basis for discussion. To this end, it will draw upon the World Economic Forum's expertise in public-private partnerships on global issues such as the environment and health, as well as in competitiveness and scenario building. The Global Risk Network will also explore synergies with the Forum's Global Agenda Councils and use the Forum's regional platforms to improve its understanding of the geographic distribution of global risks, and explore how different countries tackle risk at the corporate and institutional level. With the question of global governance very much to the fore of world affairs, it will be important to highlight that risk management is as important for governments as it is for businesses, and that both of these stakeholders have much to learn from each other in this area.

Appendix 1: The Risk Assessment and Risk Barometer

The 36 risks were assessed in terms of their likelihood and their severity. In addressing likelihood, actuarial principles were applied where sufficient data existed, though for certain risks only qualitative assessments based on expert opinion are possible. In assessing severity, two indices were considered: destruction of assets/economic damage and human lives lost. Both of these latter indices were used, resulting in separate analysis of risks by the two types of severity, though for some risks the lives lost criteria was deemed inapplicable. It should also be noted that although some risks by definition evolve over a longer term (e.g. climate change) and others could happen in the near term (e.g. oil price shock), the likelihood of all risks was evaluated with a 10-year time horizon.

The Global Risks "barometer" below shows how the qualitative 2009 assessment (completed in October 2008) of the likelihood and severity of each risk compares with the 2008 assessment.

Key:

same assessment as last year

increase

decrease

new risk

not applicable for this risk

#	Economic Risks	Likelihood	Severity US$	Severity No. of Deaths
1	Food price volatility Food prices peaked in mid-2008. Expectations are that food prices may be more volatile over the coming years.	=	↑	=
2	Oil and gas price spike In the short term, slowing global demand and fears of a further drop in global growth means the outlook for price spikes over the next 12 months is unlikely despite the OPEC in production in December 2008. The long-term trend is for rising demand and a potential return to tighter conditions.	↓	↑	n/a
3	Major fall in US$ Experts consider that the dollar could come under pressure as investors reflect on the long-term impact of current monetary expansion, high fiscal deficits and the continuing fragility of the US financial system.	↓	=	n/a
4	Slowing Chinese economy (6%) Though China's domestic market could help compensate for its loss of exports due to recession in the US and other markets, the government will need to encourage private spending to boost domestic consumption.	↑	=	n/a
5	Fiscal crises Demographic factors (ageing societies) are responsible for large uncovered liabilities in social security and public healthcare systems. The pressure on fiscal systems will be exacerbated by current bailout packages and fiscal programmes to jump-start growth.	↑	↑	n/a

#	Economic Risks	Likelihood	Severity US$	Severity No. of Deaths
6	Asset price collapse Although prices for many assets (housing, equities, and corporate bonds) have declined dramatically, there is continued scope for further losses over a broad class of assets in the short term.	↑	=	n/a
7	Retrenchment from globalization (developed) The outlook is stable but some retrenchment is likely if governments revert to protectionist strategies in an effort to protect jobs as unemployment rises. Cross-border private investment may also decrease until investor confidence returns.	=	=	n/a
8	Retrenchment from globalization (emerging) Experts considered that the risk of more inward-looking economic policies in emerging economies could also increase in reaction to the current financial turmoil.	↑	=	n/a
9	Regulation cost This risk was included in the assessment for the first time for 2009.	*	*	n/a
10	Underinvestment in infrastructure This risk was included in the assessment for the first time for 2009	*	*	*
#	Geopolitical Risks	Likelihood	Severity US$	Severity No. of Deaths
11	International terrorism The perceived risk has decreased overall internationally but the risk remains relatively high in several countries such as Iraq, Afghanistan, Pakistan and Somalia.	↓	↓	=
12	Collapse of NPT Though the controversial US-India nuclear deal was signed in 2008 and no progress was made on the Iranian programme, the outlook is for neither improvement nor deterioration compared to 2008.	=	=	=
13	US/Iran conflict With a new US administration entering office, the risk is perceived as less likely	↓	=	=
14	US/DPRK conflict With a new US administration entering office, the risk is perceived as less likely.	↓	=	=

#	Geopolitical Risks	Likelihood	Severity US$	Severity No. of Deaths
15	Afghanistan instability Experts judged that a degree of progress had been made but that the severity remains constant in cost and loss of life terms.	↓	=	=
16	Transnational crime and corruption Corruption continues to cost over US$ 1 trillion annually. Transnational crime remains endemic and related to a number of other global risks.	=	=	=
17	Israel-Palestine conflict The likelihood of increased tensions is neither greater or less than in 2008. Note that this assessment was completed in October 2008.	=	↓	=
18	Violence in Iraq The likelihood of more violence has decreased slightly relative to 2008 but the costs and loss of life remain constant.	↓	=	=
19	Global governance gaps This risk was included in the assessment for the first time for 2009.	*	*	*

#	Environmental Risks	Likelihood	Severity US$	Severity No. of Deaths
20	Extreme climate change-related weather As the effects of climate change have begun to manifest themselves in weather events, this risk remains constant year on year but given that many of these incidents affect developing regions the number of deaths is likely to rise.	=	=	↑
21	Droughts and desertification reduces agricultural yields As the incidence of drought has risen, production has shifted where possible to less drought-prone areas or to more drought-resistant crops. Nonetheless, desertification remains a risk to incomes and health in vulnerable regions.	↓	=	=
22	Loss of freshwater Greater awareness and education and improved sanitation is slightly reducing the number of deaths but overall this risk is constant in terms of likelihood and severity.	=	=	↓
23	Natural catastrophe: cyclone Improved building standards and better warning information have to contributed to reducing loss of life from cyclones but the risk remains constant for relevant areas.	↓	=	↓

#	Environmental Risks	Likelihood	Severity US$	Severity No. of Deaths
24	Natural catastrophe: earthquake The threat of earthquakes remains the same as they are driven by geophysics. Improved building standards and response mechanisms are slightly reducing their impact.	=	=	↓
25	Natural catastrophe: inland flooding This risk rose over previous years, primarily due to flood plain development and an expected increase in climate change-related weather events but remains constant from 2008 to 2009.	=	=	=
26	Natural catastrophe: coastal flooding This risk was included in the assessment for the first time for 2009.	*	*	*
27	Air pollution This risk was included in the assessment for the first time for 2009.	*	*	n/a
28	Biodiversity loss This risk was included in the assessment for the first time for 2009.	*	*	n/a

#	Societal Risks	Likelihood	Severity US$	Severity No. of Deaths
29	Pandemic Work continues on awareness and coordination among different agencies but the risk is constant, as is uncertainty about the nature of a potential outbreak.	=	=	=
30	Infectious disease Though infection rates for some diseases are stabilizing in some regions, e.g. HIV/AIDS in sub-Saharan Africa, overall the risk remains constant and severe in terms of loss of life.	=	=	=
31	Chronic disease The incidence of chronic disease is rising across both the developed and developing world. Medical advances and awareness can reduce the risk severity but chronic disease is still the main cause of death worldwide.	↑	↑	=

#	Societal Risks	Likelihood	Severity US$	Severity No. of Deaths
32	Liability regimes Experts saw the risk of US-style liability regimes spreading to other countries as increasing.	↑	=	n/a
33	Migration This risk was included in the assessment for the first time for 2009.	*	*	*
34	Critical Information Systems (CII) breakdown A balance between vulnerability due to increased interconnectivity and system dependency and improved security mean that experts judged this risk as stable.	=	=	=
35	Emergence of nanotechnology risks As the study and use of nanotechnology and materials progresses, uncertainty remains about the potential risks involved.	↑	=	=
36	Data fraud/loss This risk was included in the assessment for the first time for 2009.	*	*	n/a

Appendix 2: Global Risks Report: Process and Definition

The Risks Interconnections Map (RIM) and perception survey

A primary objective of the Global Risk Network is to increase awareness and understanding of the interlinkages among risks and the complexity this implies for decisions about risk management and mitigation. The data used to build the Risk Interconnections Map (RIM) (see Figure 2) is drawn from two sources. The connections and strengths are developed using data from the Global Risks Perception Survey. This Web-based survey was completed by over 120 risk experts and members of the Forum's Global Agenda Councils. The nodes on the RIM represent the same assessment data for "severity" as the barometer. The thickness of the lines connecting the risks represent the strength of the relationship between them. Where the first part of a line emanating from one risk is thicker it indicates that risk as the dominant one.

A note on the regional risk maps produced by Zurich Financial Services

The analysis is based on a methodology and data set developed by Zurich Financial Services. The methodology is broadly comparable to statistical cluster analysis that partitions a data set into subsets (or clusters) with the property that the data in each subset (cluster) share common characteristics – in this case the characteristics are risks. Countries with similar risks are close neighbours on the risk map; they form clusters. In contrast, countries that are dissimilar with respect to their risks are displayed comparatively far apart from each other; they are not part of a cluster.

The data set covers 160 countries; the 24 global risks are grouped in five risk classes: economic, environmental, health, geopolitical and technological risks. Hard data is drawn from established public sources and incorporated into the model using parameters for high to low risk developed by Zurich Financial Services. The data used to determine the interconnections among the risks is drawn from the qualitative assessment data on those interconnections established for *Global Risks 2008*.

The criteria used to define global risks

The criteria for global risks have been set as follows:

Global Scope: To be considered global, a risk should have the potential to affect (including both primary and secondary impact) at least three world regions on at least two different continents. While these risks may have regional or even local origin, their impact can potentially be felt globally.

Cross-Industry Relevance: The risk has to affect three or more industries (including both primary and secondary impact).

Uncertainty: There is 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 around US$ 10 billion.

Public Impact: The risk has the potential to cause major human suffering and to trigger considerable public pressure and global policy responses.

Multistakeholder Approach: The complexity of the risk both in terms of its effects and its drivers as well as its interlinkages with other risks require a multistakeholder approach for its mitigation.

The Global Risk Network

To refine its understanding of risk, the Global Risk Network conducted a series of workshops, interviews and meetings throughout 2008 and expanded its work both globally and on a regional basis. This included the publication of three regional reports, *Africa@Risk*, *Europe@Risk* and *India@Risk*, as well as a topical report on emerging markets and high-growth companies, *Global Growth@Risk*.

Overall, the Global Risk Network identified this year a total of 36 specific risks to the international community over the next 10 years, using an updated taxonomy (compared with 31 risks featured in the 2008 taxonomy). Risks that were previously aggregated for various purposes have been disaggregated throughout this report for consistency and improved comparability year on year. A number of risks on the previous year's list have been removed or rephrased because they failed to meet the criteria of the revised methodology, while the 2009 list also features eight new additions (flagged in the table above and on the visualization of the global risks landscape, inside flaps).

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Expert Workshops

Over the past year, the Global Risk Network has engaged with a wider group of experts in workshops and meetings held in New York, London, Dalian, Delhi and Zurich. These workshops, along with the risk assessment process and meetings in Nigeria, Kenya, South Africa, China, Turkey and India, have provided broad expertise and invaluable insight for this report. They are an integral part of the Global Risk Network's mandate to foster and support multistakeholder dialogues to improve understanding of global risks and to increase the possibilities for risk mitigation.

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